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Early influences on child satiety responsiveness: the role of weaning style

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Abstract

Background: Experiences during infancy may have a long term impact upon weight gain and eating style. Breastfeeding and a later introduction of solids are both protective against overweight. However how infants are introduced to solid foods may be important. Traditionally infants are introduced to solid foods via spoon feeding of purees. However baby-led weaning advocates allowing infants to self feed foods in their whole form. Advocates suggest it may promote healthy eating styles but evidence is sparse. The aim of the current study was to compare child eating behaviour at 18-24 months for infants weaned following a traditional weaning approach compared to a baby-led weaning style.

Methods : 298 mothers with an infant aged 18–24 months completed a longitudinal, self report questionnaire. In Phase One mothers of an infant aged 6–12 months reported breastfeeding duration, timing of solid foods, weaning style (baby-led or standard) and maternal control measured using the Child Feeding Questionnaire. At 18–24 months post partum mothers completed a follow up questionnaire examining child eating style (satiety responsiveness, food responsiveness, fussiness, enjoyment of food) and reported child weight.

Results: Infants weaned using a baby-led approach were significantly more satiety responsive and less likely to be overweight compared to those weaned using a standard approach. This was independent of breastfeeding duration, timing of introduction to complementary foods and maternal control.

Conclusions: A baby-led weaning approach may encourage greater satiety responsiveness and healthy weight gain trajectories in infants. Further research using a randomised controlled trial is needed.

Introduction

Childhood obesity remains a concern in the UK and USA [1] (CDC report 2012) and many negative health and social implications[2]. Whilst there are multiple determinants of obesity[3] there is increasing recognition of the role gene environment interactions in the development of obesity[4]. Recently Wardle and colleagues have put forward the appetite-environmental interaction model of obesity suggesting that weight gain is the product of the interaction between genetically determined appetite traits and environment[5]. In a large cohort study children's satiety responsiveness was negatively related to BMI standard deviation scores[6]. Evidence in support of satiety responsiveness as a heritable component of appetite comes from a subset of this cohort who were homozygous for the high risk A allele variant of the FTO gene. Those with two copies of the A allele had higher BMI and were also lower in satiety responsiveness measured using the Child Eating Behaviour Questionnaire[7].

Given the strong evidence in support of an appetite phenotype[5-7] which influences children's risk of obesity it is especially important to understand the role the early feeding environment and to establish the characteristics of an environment that ameliorates the risk of obesity. For example one key environmental factor is a controlling parental child-feeding style which has been shown to lead to poorer appetite regulation[8,9]. Controlling feeding practices such as restricting diet and pressuring children to eat are associated with a decreased ability to regulate intake according to appetite. Restricting intake of food can lead to increased intake when allowed free access[10, 11] whereas pressure to eat can lead to increased fussiness[12, 13]. As a consequence, high levels of maternal control can effect children's BMI and weight gain trajectories. Typically, restrictive practices have been linked to increased weight gain[14] whilst pressure to eat can lead to increased fussiness and subsequent underweight[15] . However it should be noted that not all studies have found conclusive evidence, or rely on predominantly white, middle class, US based samples[16, 17].

Another aspect of the early food environment is the choice of infant feeding method and the way in which the transition to solids progresses. It is already known that longer breastfeeding duration[18] and later introduction of complementary

foods[19] are protective against later risk of overweight. Breastfeeding may promote satiety responsiveness in childhood[20] as breastfed infants have greater opportunity to self-regulate their own intake of milk[21]. This may be due to lower maternal control during milk feeding[22] as the quantity of milk taken and duration of feeding is led by the infant. Indeed, breastfed infants have a lower risk of childhood obesity whilst infants who are bottle fed either formula or expressed milk are at greater risk of over consumption and increased weight gain[23].

It is also important to understand the potential influence of weaning practices on the risk of obesity. Later introduction to complementary foods and maternal child feeding style during this period are associated with infant weight[15, 24, 25]. Interest is also growing in *how* infants are introduced to complementary foods. Traditionally infants are weaned with puréed foods which tend to be spoon-fed by a parent/carer along with a gradual introduction of finger foods[26]. However a recent popular trend in weaning, baby-led weaning (BLW) [Google search of 'baby-led weaning' produces over 1.1 million hits: Accessed 24/06/12] emphasises self-feeding, rather than spoon-feeding, by infants from 6 months old[27]. Foods in their whole form are presented to the baby whom self-selects, grasps, brings to the mouth and consumes of its own volition[28, 29]. A reported characteristic of baby-led weaning is that maternal control over feeding is minimal such that the infant decides which food item is selected, how much of it is consumed and the speed of consumption throughout an eating episode[30,31].

Both breastfeeding and baby-led weaning place the infant in control of intake[22, 30,31]. Given the positive association between breastfeeding and satiety responsiveness we hypothesise that baby-led weaning could potentially maximise satiety responsiveness and be a positive environmental influence on the risk of obesity. To date evidence for this notion is mainly anecdotal and based on small scale studies[32,33]. One study has suggested that children who followed a baby-led approach during weaning are less likely to prefer sweet foods and less likely to be overweight although sample size was small and based on self-report[34]. Alternatively, we have previously suggested that low levels of maternal control encouraged by BLW and/or associated tendency for breastfeeding in mothers using BLW account for any improved outcomes rather than self-feeding and

absence of purées *per se*[30,31]. Furthermore, Sachs has questioned whether baby-led weaning is quantifiably different to how many parents introduce solid foods to their infant without considering themselves 'baby-led' [35].

The aim of this current study is twofold. First we set out to examine whether infants weaned with a baby-led approach exhibited differences in eating behaviour during the second year compared to those weaned following a standard approach. Secondly we further explored the role of maternal control, breastfeeding duration and timing of introduction to solid foods in these relationships. Here we report the results of the second phase of a two-part study. In Phase 1 we showed that a baby-led feeding style was associated with significantly lower levels of control compared to mothers who followed a standard weaning approach in babies between 6 to 12 months[31]. In Phase 2, reported here, we collected follow-up data 12 months later in order to investigate how appetite traits such as satiety responsiveness at 18 – 24 months of age are related to both weaning approach and maternal child-feeding style during the weaning period.

Methods

Participants

Approval for this study was granted by the Department of Psychology Research Ethics Committee. 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.

In Phase One six hundred and four mothers with an infant aged six to twelve months (mean age 8.34 months) whom had started consuming complimentary foods completed a questionnaire examining weaning style. Consent was sought from mothers to be contacted for potential follow up. Four hundred and twenty three mothers (70.26%) consented to being contacted. Mothers were invited to take part in Phase Two when their children were aged between 18 and 24 months of age. Three hundred and twenty five mothers responded to the request (76.8% of consented sample, 53.98% of original sample). After exclusion criteria (child health problems or severe issues with weight such as failure to thrive, failure to give consent or

incomplete survey entry) two hundred and ninety eight mothers remained in the full analysis (70.45% of consented sample, 49.5% of original sample).

In phase one mothers were recruited via local mother and baby groups based in South West Wales (UK) and through online parenting forums based in the UK. For the groups, contact was made with group leaders who distributed questionnaires to group members. Questionnaires were returned to the leader in a sealed envelope or via post to the researcher. In addition posters were placed in centres around the city asking participants to contact the researcher for further details via email, phone or post. Questionnaires had information letters attached with details of how to contact the researcher if further information was required. Study adverts were also placed on specific research request boards on online message boards on parenting forums based in the UK (e.g. www.mumsnet.com; www.bounty.com) with an online link to complete the questionnaire via survey monkey. All participants were however based in the UK. Details were given for how to contact the researcher if needed. Participants completing the questionnaire via paper or online copy were given a written debrief at the end of the questionnaire and given researcher details to contact if they wanted further information. All participants were given instruction to contact their relevant health professional if completing the questionnaire had raised any questions or issues with regard to caring for their baby[31].

For phase two, data was collected predominantly via an online questionnaire designed and hosted using SurveyMonkey.com. Mothers who consented to follow up at stage one were sent a link to complete the second part of the study online or offered a paper copy. 94.96% of participants completed the survey online.

Measures

In phase one mothers reported their weaning style in terms of degree of spoon and purée use. Mothers were classed as baby-led weaners (BLW) if they reported using both spoon feeding and purées 10% of the time or less. Alternatively if mothers reported using both spoon feeding and purées more than 10% of the time they were classified as standard weaning (SW). Based on this, 351 (58.1%) participants were classified in phase one as following a BLW feeding style and 253 (41.9%) followed a

SW approach. Mothers also completed a copy of the Child Feeding Questionnaire[36], reported breastfeeding duration and timing of introduction to complementary foods.

In phase two, mothers completed a second copy of the Child Feeding Questionnaire[36] answering items targeting restriction, pressure to eat, monitoring, concern for child weight and perceived responsibility. Five scales of the Child Eating Behaviour Questionnaire [Food responsiveness', 'Enjoyment of food', 'Satiety responsiveness', 'Slowness in eating' and 'Food fussiness'] were also completed[37]. The 'Food responsiveness' scale measures desire of the child to eat in response to food stimuli regardless of how hungry they are. 'Enjoyment of food' reflects a positive eating style and enjoyment of eating. The 'Satiety responsiveness' examines ability to regulate intake of food in relation to satiety. Linked to this, 'Slowness in Eating' reflects the speed at which a child eats. Finally 'Food fussiness is defined by picky and limited food choices. Participants also self reported the current weight of their child.

Data analysis

Data analyses were carried out using SPSS v16, SPSS UK Ltd. Data were checked for normal distribution and found adequate. The CFQ[36] and CEBQ[37] are typically used for preschool aged and older children. Therefore principal components analysis using varimax rotation was performed on both the CFQ and CEBQ to ensure that the original factor structures held within this new sample and age range[38]. Factors with eigenvalues over 1 were retained. A threshold of 0.5 was used based on recommendations by Nunnally[39]. Factors produced mirrored those on the original questionnaires. As a further test of reliability, Cronbach's alpha was computed for items loading above the threshold onto each scale and found to be over 0.7 for each scale. Therefore both the CFQ and CEBQ were scored as per original instructions.

Infant birth and current weight were converted to z scores. Current infant weight was also classified as normal weight (5^{th} – 85^{th} percentile), underweight (<5^{th} percentile) or overweight/obese (>85^{th} percentile) for infant age and gender according to the World Health Organisation Child Growth Standard Charts[40].

A MANCOVA was used to examine differences in child eating behaviour for infants weaned using a baby-led or standard weaning approach whilst controlling for maternal education, breastfeeding duration and timing of introduction to complementary foods. The MANCOVA was then repeated controlling additionally for maternal control at phase one and two.

Results

Weaning style

163 (54.7%) of the Phase Two sample had been classified in the first part of the study as following a BLW style and 135 (45.3%) a SW style. This compared to 58.1% of the original sample following a BLW style and 41.9% following a SW style suggesting similar uptake of the Phase Two questionnaire in the two weaning groups.

As found in phase one, the BLW group had a significantly higher level of education [$F(270) = 3.2189$, $p < 0.01$] in comparison to those using a SW approach although no significant difference was found for maternal age. Maternal education was therefore controlled for throughout. There was no significant difference in the age or education of mothers who completed the Phase Two follow up compared to the whole sample in Phase One.

Mean current age of child was 21.46 months (SD: 3.05) with a range from 18 to 24 months. No significant difference in child age was seen between the BLW and SW group. All children were considered fully weaned in that they were reported to be eating a wide range of family foods at regular meal times. Infants who were weaned using a SW approach were introduced to solid foods significantly earlier than those weaned following a BLW approach [$t(287) = 2.069$, $p < 0.01$].

Participants also indicated the age of their infant when they were first introduced to foods in their whole form [finger foods] (as opposed to purees e.g. toast, carrot stick). Children were introduced to finger foods (rather than first food *per se*) significantly later [$t(287) = 3.018$, $p < 0.003$] . Therefore age of introduction to solid foods and finger foods were also controlled for throughout.

Mean duration of breastfeeding in the sample was 26.11 weeks (SD: 23.27 weeks). No significant difference in breastfeeding duration was evident between the two weaning groups [$t(296) = -.710$, $p = .478$] although mothers in the baby-led group were significantly more likely to have initiated breastfeeding at birth [$t(296) = -3.211$, $p = 0.001$]. Breastfeeding initiation was therefore controlled for in comparisons between groups.

Maternal child-feeding style

Significant differences in current maternal child-feeding style were seen between those who weaned using a baby-led or standard weaning approach. Mothers who followed a BLW approach reported significantly current lower levels of concern for child weight [$F(1, 278) = 6.714$, $p < 0.01$], pressure to eat [$F(1, 278) = 5.273$, $p < 0.05$], restriction [$F(1, 278) = 15.383$, $p < 0.001$] and monitoring [$F(1, 278) = 5.808$, $p < 0.05$] compared to mothers who weaned using a standard approach. No significant difference was seen between the two groups for perceived responsibility.

Child Eating Behaviour

A multivariate ANCOVA found significant differences between those weaned following a baby-led or standard weaning style for the Child Eating Behaviour measures of food responsiveness, satiety responsiveness and food fussiness (Table 2). No significant difference was found for enjoyment of food. Those infants who had followed a BLW were reported to be significantly less food responsive and less fussy and significantly more satiety responsive than those following a SW style.

Breastfeeding duration was significantly associated with satiety responsiveness (Pearson's $r = .134$, $p = 0.01$) and inversely associated with fussiness (Pearson's $r = -.145$, $p = 0.007$). Infants who were breastfed for a longer duration were reported as significantly more satiety responsive and significantly less fussy.

Timing of introduction to complementary foods was significantly inversely associated with fussiness (Pearson's $r = -.179$, $p = .001$) but no other behaviour. Infants who were weaned at an earlier age were reported to be significantly more fussy at 18-24 months.

Age at which infants were introduced to finger foods was significantly associated with food responsiveness (Pearson's r =.182, p = .001). Infants who were introduced to whole foods at an earlier stage were significantly less food responsive.

Child Eating Behaviour and Maternal child-feeding style

The association between maternal child feeding style at phase one and phase two and current eating behaviour was examined. Analyses were performed separately for those in the baby-led and standard weaning groups (Table 3). Phase one control was placed as a covariate when examining the relationship between control and eating behaviour at phase two.

Significant associations were found between maternal control at phase one and current eating behaviour but only for those in the standard weaning group. High levels of restriction were significantly associated with lower levels of satiety responsiveness whereas concern for infant weight was significantly associated with higher levels of food fussiness. High levels of pressure to eat were also associated with significantly lower levels of enjoyment of food.

For phase two control, pressure to eat was significantly positively associated with food responsiveness for both weaning groups whilst restriction was significantly associated with higher levels of food responsiveness (for the standard weaning group) and lower levels of satiety responsiveness for both weaning groups. Finally amongst the standard weaning group, both higher levels of monitoring and concern for infant weight were associated with increased food fussiness.

Child weight

No significant difference in birth weight or weight at six months was found between the two groups.

Current child weight was examined and compared for the two weaning groups. 10.1% of the sample (n=30) did not provide a current weight for their infant. Of the remaining, predominantly infants in the sample were within normal weight

expectations for their age (74.5%, n = 222). 11.7% of the sample were overweight (n=35) and 3.7% underweight (n = 11).

Infants in the standard weaning group were however significantly currently heavier than those in the baby-led group [F (1, 225) = 7.931, p = 0.005]. This relationship was independent of birth weight, breastfeeding duration, age of introduction to solid foods and maternal control at both phase one and phase two. Mean weight in kg of infants in the standard weaning group was 12.86 (SD: 3.73) compared to 11.79 (SD: 3.53) in the baby-led group.

Pearson's chi square also revealed a significant association of current weight category and weaning style [χ^2 (2, 268) = 8.100, p < 0.017]. For the baby-led group 86.5% were of normal weight, 8.1% overweight and 5.4% underweight. In comparison 78.3% of those in the standard group were normal weight, 19.2% overweight and 2.5% underweight. A greater percentage of those infants who were overweight followed a standard weaning approach.

Infant birth weight, weight at six months and current weight were unrelated to current child satiety or food responsiveness. However current child weight was significantly inversely associated with perceived fussy eating (Pearson's r = -.171, p = 0.003).

Child Eating Behaviour, Maternal child-feeding style and Weaning style

As child eating behaviour was associated with weaning style, maternal child-feeding style, child weight and weaning behaviours, the analyses between weaning approach and later child eating behaviour were performed for a second time, placing maternal education, maternal child-feeding style, breastfeeding duration, timing of introduction to complementary and finger foods, birth weight and current weight as covariates in the analysis.

A multivariate ANCOVA showed significant differences for food responsiveness [F(1, 249) = 4.778, p < 0.01] and satiety responsiveness [F(1, 249) = 4.500, p < 0.01] remained between those following BLW or SW approach. Infants weaned using a baby-led approach were rated as significantly less food responsive and significantly

more satiety responsive than those weaned following a standard approach independently of maternal education, maternal control, breastfeeding duration, child weight and timing of introduction to complementary foods.

No significant difference between the two groups remained for food fussiness once covariates were accounted for.

Discussion

These results demonstrate for the first time the impact of weaning approach and maternal behaviour during the weaning period (6 – 12 months) on later child eating behaviour at 18 – 24 months old. Mothers who used baby-led weaning (infant self-feeds foods in their solid form) had children who were perceived at follow-up as having better appetite control and had a lower BMI than children weaned using a standard weaning style (spoon feeding puréed foods). These findings indicate that the approach adopted at the time of weaning coupled with maternal feeding style affect child eating behaviour 12 months later.

In this sample, use of the baby-led weaning approach predicted lower levels of food responsiveness and higher satiety responsiveness compared to a standard weaning approach. High levels of food responsiveness [desire to eat in response to food stimuli regardless of hunger][41] and low levels of satiety responsiveness [ability to regulate intake of food in relation to satiety][42] have been associated with greater risk of childhood overweight. We suggest therefore that adoption of a baby-led weaning approach provides an environment during the development of eating patterns that promotes eating according to appetite. Indeed, infants in the standard weaning group were significantly heavier than those in the baby-led group with a greater proportion of standard weaning infants with a weight over the 85th percentile (although it has to be recognised that the overall number of infants above this centile was low).

There are a number of possible explanations for why infants following a baby-led weaning approach are more satiety responsive and less food responsive. Firstly, it could be argued that baby-led weaning is merely associated with other behaviours

that have been linked to specific appetitive traits. For example, mothers who follow a baby-led weaning style are more likely to breastfeed, introduce complementary foods at a later date and use lower levels of control over their infants intake of food[29,31] all of which are all associated with a decreased risk of obesity[18-20]. Mothers who adopt baby-led weaning have consistently been shown to have a high level of education which is typically associated with healthier child diet and weight[43] and this was also reflected in this sample. However, we found that use of BLW was associated with satiety responsiveness at 18-24 months *independently* of maternal control, breastfeeding duration, timing of introduction to complementary foods and maternal demographic background.

Moreover, when exploring the association between maternal control and eating style (where previous literature has shown a link between high levels of maternal control and a breakdown in self regulation[8,9]), baby-led weaning appeared to protect the infant from high levels of maternal control. Whereas for those infants weaned using a standard weaning approach, maternal control both during infancy and the current time period was associated with poorer self regulation, these relationships did not exist, or were weaker, amongst the baby-led group suggesting an intervening factor.

Potentially therefore there is something unique about BLW that sets it apart from standard weaning methods. Although speculative it is plausible that by allowing infants choose which food offering to grasp and bring to the mouth without much parental involvement the pace and duration of eating episodes are optimal for the development of satiety responsiveness. Infants are given greater opportunity to determine the end point of a meal compared to spoon feeding where the parent may consciously or subconsciously wish the set portion size to be consumed. Even when maternal desire for control is higher, the ability of the infant to control the pace and size of the meal may overcome this. Moreover, greater participation in family meal times [29, 44] may extend meal duration and decrease overall eating speed which has been associated with increases physiological signs of satiety[45]. Babies have no notion of portion sizes or habitual plate clearing and when given the opportunity will likely determine when the meal finishes without regard to how much food remains uneaten. Ability to eat to satiety rather than finishing the portion available may be an important element in protection against overweight[46]. Evidence shows that preschool

children are less likely to finish a larger than needed portion size[47] but that this ability reduces by later childhood and adulthood[48]. A baby-led approach may thus prolong or protect this ability, increasing the likelihood of continued satiety responsiveness into older childhood and adulthood.

It is also possible that one of the benefits of BLW is that it maximises learning about the postingestive consequences of food. Numerous studies have demonstrated that sensory properties of a food can over a number of exposures become associated with postingestive effects, for example visual cues, flavours and textures become associated with how satiating that food is[46]. In turn learned food experience influences food selection and portion size choices appropriately[49]. With baby-led weaning foods are presented in their whole form such as an apple or piece of chicken rather than in a less recognisable puréed form. Moreover, infants are often given a selection of discrete food pieces to choose from (e.g. a piece of toast, slices of banana). This contrasts with purées which often consist of different foods and flavours are mixed together (e.g. a sweet potato, parsnip and carrot purée)[30]. For commercially prepared purées the main ingredient may not fit with the main flavour of the purée (e.g. a potato based purée having a predominant broccoli flavour) setting up a relationship between flavour and postingestive consequences that will later change again as the transition is made from purées to discrete food items. We postulate that perhaps baby-led weaning enables early and more stable learning about the satiating capacity of foods thus promoting satiety responsiveness. This of course needs to be tested empirically and it will be important to establish if enhanced satiety responsiveness continues further into childhood.

Infants who followed a baby-led weaning style were also rated as significantly less fussy than infants following a standard weaning style supporting speculation that baby-led weaning fosters positive appetitive traits[33]. However, once maternal control was accounted for, this relationship disappeared and weaning style did not remain predictive of fussiness in the regression analysis. This is not to say a baby-led approach is not associated with a wider acceptance of foods, but that it may be explained by the low level of maternal control involved in the method. Indeed, lower levels of maternal control over child diet have been associated with lower levels of pickiness and fussiness in older children[50]. This is an interesting finding as it not only

highlights the impact of weaning style but suggests that for those who adopt a standard weaning approach, doing so in a responsive way may be beneficial to later food preferences in children.

Finally, infants who followed a baby-led approach were significantly less likely to have a weight centile > 85th than those who followed a standard approach, supporting previous findings[34]. Allowing placing the infant in control of food intake and greater acceptance of a wider variety of tastes may promote a healthier weight trajectory. However, this association must be taken with caution as weight was self reported by parents and numbers of infants in the overweight range were small. Further research clearly needs to examine impact of baby-led weaning on longer term weight trajectories.

These findings do need to be considered in the light of limitations. The sample was self-selecting both in terms of participation and decision to follow a certain approach to weaning. It may be that parents who are especially concerned with infant weight and eating style or their own health choose to adopt a baby-led approach as they have heard anecdotal stories about its benefits. Indeed mothers in the baby-led group had a higher level of education, although this was controlled for in the analyses. Another possibility is that parents who follow a baby-led approach are more aware of the importance of eating to appetite and the health benefits of and have a strong belief in the ability of BLW to lead to positive eating styles thus influencing the way they complete the questionnaire. The current study relied on self report of child eating behaviour which could have been open to responder bias. Further research may wish to observe child eating behaviour rather than rely on parental report.

It is also important to consider the role of infant characteristics . Much emphasis is placed on intake of food and infant weight gain during the weaning period with mothers concerned about their infants progress[51]. If an infant is perceived as a fussy eater, mothers may not feel confident in adopting a baby-led approach or allowing the infant opportunity to self regulate appetite. Instead they may choose to use traditional methods of purées and spoon feeding to have greater control and measure what their infant is consuming. Alternatively they may start the weaning

process using a baby-led approach but struggle and move to spoon feeding. Child weight and eating style can drive maternal child-feeding style for older children[8,9], thus it is likely to for younger infants. Rather than baby-led weaning leading to an infant who is more responsive and less fussy, perhaps infants who are less fussy and more responsive are more likely to start or continue following a baby-led approach.

Linked to this, maternal personality may also play a role. Previous work has shown that mothers who follow baby-led weaning are lower in anxiety and feel more relaxed specifically in relation to the weaning process than mothers following a SW approach[29]. Mothers who are high in anxiety are more likely to use a restrictive and controlling feeding style[52] and mothers who are controlling in their parenting style are more likely to use a controlling maternal-feeding style[53] and have overweight children[54]. Perhaps therefore mothers who are more anxious in general gravitate to a standard weaning approach as it allows greater control and measurement which in turn impacts upon child weight and eating style

Limitations aside, these findings raise important questions in regard to not only when infants are introduced to complementary foods but how this process takes place. Evidence is starting to build that a baby-led approach may encourage a satiety responsive eating style to develop; understanding how this works in greater detail may be an important step in developing early interventions to combat rising childhood obesity. Data however now needs to move away from relying on parental self report (e.g. utilising observations of child intake such as an eating in the absence of hunger task) whilst subject selection issues also need to be reduced through randomisation.

In summary, babies who transition from a milk diet to solid foods using the baby-led weaning method show greater satiety responsiveness and decreased likelihood of overweight at 18-24 months compared to the standard spoon and purée approach. Influences on childhood weight gain are complex and driven at least partly by genetics. However, potentially the baby-led approach may provide a protective environment to ameliorate the overall risk of obesity. Further research is needed.

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Table 1: Sample distribution by Demographic Factors

Indicator	Group	BLW		SW	
		N	%	N	%
Age	≤ 19	3	1.0	5	1.7
	20 – 24	21	7.0	26	8.7
	25 – 29	60	20.1	41	13.8
	30 – 34	53	17.8	46	15.4
	35 ≥	26	8.7	17	5.7
Education	School	34	11.4	30	10.0
	College	52	17.4	34	11.4
	Higher	41	13.8	47	15.8
	Postgraduate	36	12.1	24	8.1
Marital Status	Married	110	36.9	91	30.5
	Cohabiting	15.4	15.4	36	12.1
	Partner	1	0.3	4	1.3
	Single	6	2.0	8	2.6
Maternal occupation	Professional / managerial	61	22.2	56	20.3
	Skilled	18	6.5	14	5.1
	Unskilled	43	15.6	30	10.9
	Stay at Home Mother	29	10.6	24	8.7

Table two: Differences in child eating behaviour for infants at 18 – 24 months weaned following a baby-led or standard weaning style

Behaviour	Mean (standard error)		Significance
	BLW	SW	
Food responsiveness	2.85 (.50)	3.18 (.45)	F (1, 268) = 16.143, p < 0.001
Satiety responsiveness	2.61 (.43)	2.42 (.38)	F (1, 268) = 5.492, p < 0.05
Food Fussiness	3.26 (.37)	3.03 (.32)	F (1, 268) = 5.535, p < 0.05
Enjoyment of food	1.91 (.86)	1.84 (.73)	F (1, 268) = .546, p > 0.05

Table three: Association between maternal control and later child eating behaviour at 18 – 24 months

		Food Responsiveness		Satiety Responsiveness		Food Fussiness		Enjoyment of food	
		BLW	SW	BLW	SW	BLW	SW	BLW	SW
Maternal control during phase one	Concern for infant weight	.041	-.118	-.037	-.017	-.101	.210**	-.011	-.044
	Restriction	-.077	-.034	-.120	-.212**	-.167	.091	.069	.009
	Pressure to eat	.071	-.130	-.025	.022	-.018	.065	.029	-.327**
	Monitoring	-.130	-.017	-.045	.018	-.100	.046	.019	-.094
Maternal control during phase two	Concern for infant weight	-.012	.188	.041	.008	-.022	.071	.086	-.64
	Restriction	.059	.157*	.171*	-.279**	-.012	.135*	.014	-.113
	Pressure to eat	.212**	.227**	.112	.017	.071	.035	-.084	-.044
	Monitoring	.052	-.051	-.106	-.113	-.005	-184*	-.061	.103

* = $p < 0.05$, ** = $p < 0.01$