

## Original Article

# Differences in eating behaviour, well-being and personality between mothers following baby-led vs. traditional weaning styles

**Amy Brown***Department of Public Health and Policy Studies, College of Human and Health Sciences, Swansea University, Swansea, UK***Abstract**

Baby-led weaning, where infants self-feed family foods in place of traditional spoon-feeding of purees, is continuing to grow in popularity. Evidence is emerging which suggests that the method may promote healthier eating behaviour and weight gain in children, but the research is in its infancy. One issue is the self-selecting nature of participants to the approach. Although those who follow a baby-led approach are known to have a higher education and more professional occupation, little is known about wider maternal characteristics, which might affect either adoption of or outcomes of the method. The aim of this study was to explore differences in maternal characteristics between those adopting a baby-led or traditional approach. Six hundred four mothers with an infant aged 6–12 months completed a questionnaire including a copy of the Dutch Eating Behaviour Questionnaire (DEBQ), Brief Symptom Inventory (BSI) (anxiety, obsessive–compulsive and depression scales) and Ten Item Personality Questionnaire (TIPO) alongside details of weaning approach (baby-led vs. traditional). Mothers who adopted a baby-led weaning style scored significantly lower on restrained eating (DEBQ), anxiety and introversion (TIPO) and anxiety and obsessive–compulsive symptoms (BSI). Mothers who currently adopt a baby-led approach are therefore significantly different in personality, eating behaviour and well-being characteristics compared with those adopting a traditional approach. These characteristics may affect likelihood of choosing a baby-led approach or indirectly affect outcomes for infants weaned using the approach. Further research exploring baby-led weaning in a wider population sample is needed.

**Keywords:** weaning, infant feeding decisions, infant and child nutrition, complementary feeding, maternal confidence, maternal mental health.

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**Introduction**

Baby-led weaning, where infants are encouraged to self-feed family (rather than pureed) foods, is continuing to grow in popularity. A Google Scholar search now returns over 1.7 million hits (accessed 7 September 2014) with a number of books, web sites and online social media groups discussing the approach.

Although baby-led weaning appears to be growing in popularity, the efficacy, safety and outcomes of baby-led weaning are not well researched, although emerging research findings do suggest the approach may foster healthier eating and feeding behaviours. Baby-led weaning has been associated with better appetite regulation and less fussy eating in toddlers (Brown & Lee 2014) and lower risk of overweight (Townsend & Pitchford 2012; Brown & Lee 2014).

However, infants may be at risk of consuming higher levels of saturated fat, sugar and salt due to being exposed to higher levels in family meals compared with typical infant foods (Rowan & Harris 2012). Moreover, baby-led weaning is embedded within the wider debate examining optimal timing of introduction to solid foods at 4–6 vs. 6 months (Agostoni *et al.* 2008). By its very nature baby-led weaning involves later introduction at around 6 months [as per current Department of Health guideline (NHS 2011)], and consumption is likely to be slow at the beginning (Rapley & Murkett 2008).

However, one of the main issues with baby-led weaning research and moving forward in examining its impact is its current select population and thus potential participant bias. The Department of Health do not currently recognize baby-led weaning as an approach to introducing solid foods [although finger foods from the start of weaning are recommended (NHS 2011)]. Those who follow and identify with the approach have thus made the decision to seek out their own information and support for the method. In research, baby-led weaning samples typically have a higher education and are more likely to have a professional occupation than those following traditional weaning or in the general population (Brown & Lee 2011a, 2014), although not all studies have found this pattern (Townsend & Pitchford 2012; Cameron *et al.* 2013). Mothers who follow a baby-led approach also consistently breastfeed for longer and introduce solid foods at a later date compared with those following a traditional approach (Brown & Lee 2011a; Townsend & Pitchford 2012; Cameron *et al.* 2013).

These different backgrounds and feeding choices may have an impact upon the food choices and

experiences infants who are baby-led weaned receive comparatively with those who spoon-feed. This may explain later differences in weight and eating behaviour, although maternal demographics (Townsend & Pitchford 2012; Brown & Lee 2014) and breastfeeding duration (Brown & Lee 2014) have been controlled for in research examining outcomes.

Research has not however considered how other maternal characteristics outside of demographic background may differ between mothers who choose (and continue with) a baby-led approach compared with those who choose traditional weaning. In older children, maternal factors such as child-feeding style, eating behaviour, parenting style and weight are tied to child weight and eating behaviour (for a review, see Ventura & Birch 2008). Maternal mental health has been linked to breastfeeding duration (Adedinsewo *et al.* 2014), child-feeding style (Farrow & Blissett 2005) and child overweight (Stenhammar *et al.* 2010; Topham *et al.* 2010). Breastfeeding has also further been linked to maternal personality (Brown 2013), eating behaviour (Brown 2014) and parenting style (Brown & Arnott 2014).

It is logical to expect that decisions around introducing solid foods and the style of weaning may therefore also be linked to maternal characteristics, which in turn could affect outcomes of weaning style. Mothers who follow a baby-led weaning style have been shown to be more confident about introducing solid foods (Brown & Lee 2011b) suggesting a different background. The aim of the current study was therefore to explore difference in maternal characteristics between mothers who chose to follow a baby-led or traditional weaning style.

### Key messages

- Mothers who follow a baby-led weaning style differ in characteristics to those who spoon-feed.
- Mothers who follow a baby-led weaning style score lower on traits that are associated with childhood overweight.
- Differences in later eating behavior associated with weaning style may be affected by maternal, rather than purely infant, characteristics.

## Methodology

### Participants

Approval for this study was granted by a 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.

Mothers completed a self-report questionnaire when their infant was aged 6–12 months. Exclusion criteria included a low birthweight (<2500 g), premature birth (<37 weeks), inability to consent and infant/maternal health issues.

Mothers were recruited via local mother and baby groups and child care centres based in South West Wales (United Kingdom) and through online parenting forums based in the United Kingdom. For the groups, contact was made with group leaders/centre managers 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 United Kingdom (e.g. <http://www.mumsnet.com>; <http://www.bounty.com>) with an online link to complete the questionnaire via SurveyMonkey. Because of the low level of baby-led weaning in the general population, specific messages were placed on baby-led weaning groups and forums to allow a comparative group in size to traditional weaners to be sampled. All participants were however based in the United Kingdom. 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. Consent was given via tick boxes for both methods. 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.

### Data collection

Mothers completed a self-report questionnaire examining:

- maternal demographic background (age, education, profession, income, home ownership, marital status)
- infant background (birthweight, current weight, gender, gestation, breastfeeding duration).
- weaning style: Although there is no official definition of baby-led weaning, this method typically involves allowing the baby to self-feed rather than be spoon-fed and offering family foods in their whole form, e.g. non-pureed. This is in contrast to traditional weaning where infants are typically spoon-fed purees. To differentiate between baby-led and traditional weaning participants separately estimated the proportion that they spoon-fed and used purees using a scale from 100% of the time to 0% of the time (0%, 10%, 25%, 50%, 75%, 90%, 100%). This allowed behaviour to be measured rather than asking mothers if they felt they were following a baby-led style that was open to interpretation.
- Maternal pre-pregnant and current weight and height
- The Dutch Eating Behaviour Questionnaire (DEBQ) (Van Strien *et al.* 1986) (scales of restraint, external and emotional eating). This scale has been translated into numerous languages and shows strong reliability and predictive validity (Van Strien & Van de Laar 2008; Bozan *et al.* 2011; Cebolla *et al.* 2014).
- The 10-item personality measure (TIPM) (Gosling *et al.* 2003) that measure the 'Big Five' personality traits of openness to experience, extraversion, agreeableness, conscientiousness and emotional stability. Although this questionnaire is a short format measure, it shows strong convergence with more detailed versions, has high test–retest reliability and is considered a more valid measure than other short measures of personality (Furnham 2008).

- Brief Symptom Inventory (BSI) (Derogatis & Melisaratos 1983) anxiety, obsessive–compulsive and depression scales. This measure is considered a valid indicator of general symptomatology (Boulet & Boss 1991) and has good internal reliability (Derogatis & Melisaratos 1983).

### Data analysis

The TIPM, DEBQ and BSI were scored as per instructions. Cronbach's alpha was calculated to examine internal reliability of these scales within the sample group. Reliability was good ranging from 0.73 to 0.91 (TIPM), 0.75 to 0.92 (DEBQ) and 0.68 to 0.90 (BSI).

Maternal pre-pregnant and current body mass index (BMI) was computed using height and weight scores. Infant birth and current weight were converted to z-scores.

Participants were grouped into either baby-led or traditional weaning groups. To be considered baby-led, mothers had to give purees and spoon-feed 10% or less of the time. This allowed mothers who were following a baby-led approach but occasionally gave a puree or used a spoon (e.g. if in a café or at someone else's house) to be included in this group. For a full discussion of this categorization, see Brown & Lee (2011a,b).

Pearson's correlations explored associations between timing of introduction to solid foods and each scale of the DEBQ, TIPM and BSI and for maternal pre-pregnant and current BMI for the whole sample, baby-led and traditional groups. Analyses of covariance were then used to examine differences between weaning group for each scale of the DEBQ, TIPM and BSI and for maternal pre-pregnant and current BMI, controlling for timing of introduction to complementary foods and maternal education and profession.

### Results

Six hundred four mothers had full data and were classified as baby-led or traditional weaning following the criteria described earlier. Three hundred fifty-one (58.1%) were classified as baby-led and 253 (41.9%) traditional weaning.

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. A total of 68.8% of mothers were primiparous. Mothers following a BLW (Baby-led weaning) approach had significantly higher levels of education [ $F(588) = 3.639$ ,  $P < 0.00$ ] and were more likely to have a professional/managerial occupation [ $\chi^2(1, 499) = 10.54$ ,  $P < 0.001$ ]. No difference was seen between the two groups for maternal age, marital status or income (see Table 1 for demographic details of sample).

Mean age of introduction of complementary foods to the infant was 20.76 weeks [standard deviation (SD): 2.34]. A total of 65.9% of participants introduced complementary foods before the recommended age of 6 months with 22.3% starting before 17 weeks. Overall modal age of introduction was 20 weeks.

In the traditional weaning group mean age of introduction was 18.51 (SD: 3.38). Modal age of introduction was 19 weeks with a range from 6 to 26 weeks. In the baby-led group mean age of introduction was 23.97 (SD: 2.46) with a modal age of 24 weeks, range 21–28 weeks.

No significant difference was found in maternal demographic background, well-being, personality or eating behaviour between participants who were recruited online or face to face.

### Timing of introduction to complementary foods

A later introduction of complementary foods was associated with significantly lower maternal anxiety and obsessive–compulsive symptoms. Moreover, mothers who are higher in extraversion and conscientiousness and lower in anxiety introduced complementary foods at a later date. Finally, lower maternal restraint and emotional eating were significantly associated with a later introduction to complementary foods (Table 2). These findings held for the sample as a whole and individually for the baby-led and traditional weaning groups.

Significant inverse correlations were seen between maternal and infant weight and timing of complementary foods. Mothers who had a higher pre-pregnant and current BMI, and whose infant was heavier at

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

Indicator	Group	Baby-led 351		Traditional 253	
		<i>n</i>	%	<i>n</i>	%
Age	≤19	12	3.4	5	2.1
	20–24	53	15.1	28	11.2
	25–29	138	39.4	118	46.7
	30–34	107	30.4	73	28.9
	35≥	42	11.7	28	11.1
Education	School	45	12.9	53	20.9
	College	90	25.6	70	27.7
	Higher	216	61.5	130	51.4
Marital status	Married	245	69.8	175	69.2
	Cohabiting	91	25.9	70	29.6
	Single	15	4.3	8	3.2
Home	Owned	226	64.3	169	66.8
	Rented	97	27.6	68	26.8
	Council	13	3.7	8	3.2
	Other	14	3.9	8	3.2
Employed before birth of first child	Yes	322	91.7	229	90.5
	No	29	8.3	24	9.5
Maternal occupation	Professional and managerial	152	43.3	90	35.1
	Skilled	59	16.8	44	17.3
	Unskilled	116	33.1	98	38.7
	Stay at home mother	24	6.8	21	8.2
–	–	<i>n</i> = 351	100%	<i>n</i> = 253	100%

**Table 2.** Association between maternal well-being, personality, eating behaviour, BMI, infant weight and timing of introduction to solid foods

Measure	Factor	Whole sample Age introduction complementary foods	Baby-led Age introduction complementary foods	Traditional Age introduction complementary foods
Well-being	Anxiety	$r = -0.088, P = 0.010^*$	$r = -0.234, P = 0.004^{**}$	$r = -0.178, P = 0.000^{**}$
	OCD	$r = -0.074, P = 0.024^*$	$r = -0.207, P = -0.017^*$	$r = 0.073, P = 0.036^*$
Personality	Depression	$r = 0.056, P = 0.083$	$r = -0.044, P = 0.315$	$r = -0.037, P = 0.183$
	Extraversion	$r = 0.096, P = 0.005^*$	$r = 0.300, P = 0.003^*$	$r = 0.170, P = 0.000^{**}$
	Conscientiousness	$r = 0.236, P = 0.000^{**}$	$r = 0.232, P = 0.004^*$	$r = 0.177, P = 0.000^{**}$
	Anxiety	$r = -0.231, P = 0.000^{**}$	$r = -0.201, P = 0.012^*$	$r = -0.174, P = 0.000^{**}$
	Agreeableness	$r = -0.028, P = 0.225$	$r = 0.131, P = 0.072$	$r = 0.030, P = 0.229$
Eating behaviour	Openness to experience	$r = 0.042, P = 0.135$	$r = 0.068, P = 0.225$	$r = -0.044, P = 0.150$
	Restraint	$r = -0.215, P = 0.000^{**}$	$r = -0.171, P = 0.010^*$	$r = -0.241, P = 0.000^{**}$
	Emotional	$r = -0.554, P = 0.000^{**}$	$r = -0.720, P = 0.000^{**}$	$r = -0.320, P = 0.000^{**}$
Maternal weight	External	$r = 0.026, P = 0.256$	$r = 0.022, P = 0.411$	$r = 0.027, P = 0.267$
	Pre-pregnant BMI	$r = -0.534, P = 0.000^{**}$	$r = -0.519, P = 0.000^{**}$	$r = -0.575, P = 0.000^{**}$
Infant weight	Current BMI	$r = -0.521, P = 0.000^{**}$	$r = -0.425, P = 0.000^{**}$	$r = -0.548, P = 0.000^{**}$
	Birthweight	$r = -0.260, P = 0.000^{**}$	$r = -0.033, P = 0.161$	$r = -0.271, P = 0.000^{**}$
	Current weight	$r = -0.105, P = 0.003^*$	$r = -0.197, P = 0.038^*$	$r = -0.084, P = 0.022^*$

BMI, body mass index; OCD, obsessive-compulsive disorder. \* $P < 0.05$ ; \*\* $P < 0.001$ .

**Table 3.** Differences in maternal well-being, personality, eating behaviour, BMI and infant weight between mothers following a baby-led or traditional weaning approach

		Mean (SD)		F
		Baby-led	Traditional	
Well-being	Anxiety	1.89 (0.05)	2.24 (0.05)	$F(1, 600) = 15.72, P = 0.000$
	OCD	1.70 (0.05)	2.13 (0.05)	$F(1, 600) = 15.48, P = 0.000$
	Depression	1.18 (0.03)	1.24 (0.03)	$F(1, 600) = 1.71, P = 0.192$
Personality	Extraversion	4.91 (0.11)	5.07 (0.09)	$F(1, 600) = 1.37, P = 0.24$
	Conscientiousness	3.50 (0.12)	2.97 (0.13)	$F(1, 600) = 12.67, P = 0.000$
	Anxiety	2.7 (0.09)	3.10 (0.10)	$F(1, 600) = 29.56, P = 0.00$
	Agreeableness	2.97 (0.09)	3.12 (0.12)	$F(1, 600) = 2.52, P = 0.12$
Eating behaviour	Openness to experience	4.72 (0.09)	4.73 (0.08)	$F(1, 600) = 0.018, P = 0.89$
	Restraint	2.26 (0.04)	2.44 (0.05)	$F(1, 600) = 6.989, P = 0.007$
	Emotional	2.57 (0.5)	2.52 (0.05)	$F(1, 600) = 0.633, P = 0.427$
Maternal weight	External	3.45 (0.12)	3.56 (0.13)	$F(1, 600) = 2.680, P = 0.443$
	Pre-pregnant BMI	24.34 (0.59)	23.98 (0.52)	$F(1, 523) = 0.045, P = 0.832$
	Current BMI	25.22 (0.53)	24.64 (0.54)	$F(1, 548) = 0.28, P = 0.596$
Infant weight	Birthweight (kilos)	3.77 (0.06)	3.69 (0.05)	$F(1, 598) = 1.45, P = 0.25$
	Current weight (kilos)	10.56 (0.21)	10.23 (0.19)	$F(1, 597) = 2.0, P = 0.157$

BMI, body mass index; OCD, obsessive-compulsive disorder; SD, standard deviation.

birth introduced complementary foods significantly earlier than mothers with a lower BMI or lower birthweight infant.

### Weaning style

Mothers following a baby-led approach reported significantly lower anxiety and obsessive-compulsive disorder scores compared with those following a traditional approach. Baby-led mothers also scored significantly high on traits of conscientiousness and lower on anxiety compared with traditional weaners. Finally, mothers following a baby-led weaning style were significantly lower in restraint compared with those following a traditional weaning style. No difference in maternal pre-pregnant or current BMI nor infant birth or current weight was seen between the two groups (Table 3).

### Discussion

This paper explored the relationship between maternal personality, well-being, eating behaviour and decisions surrounding introducing infants to complementary foods. Overall it showed that mothers with

lower state and trait anxiety symptoms, higher extraversion and conscientiousness, and lower restrained eating were both more likely to introduce complementary foods at a later date, and independently, follow a baby-led weaning approach.

A later introduction to solid foods was associated with maternal characteristics. Mothers higher in trait and state anxiety, introversion and restrained and emotional eating introduced solid foods at an earlier age. Maternal anxiety surrounding food intake has previously been associated with an earlier introduction of solid foods through concerns about infant intake, weight gain and behaviour and the belief that solid foods will reduce this (Arden 2010). Less is understood as to the link between maternal eating behaviour and timing of introduction to solid foods. However, it is known that maternal-restrained eating is associated with a controlling maternal child-feeding style (Fisher & Birch 2002; Tiggemann & Lowes 2002) and in turn a controlling child-feeding style is associated with a shorter breastfeeding duration and earlier introduction of solid foods (Brown *et al.* 2011).

However, the main focus of this paper was to explore differences in maternal background in relation to weaning approach. Understanding the different

backgrounds of mothers who choose to follow a baby-led or traditional method of weaning is important for two main reasons. Firstly, baby-led weaning has been associated with less fussy eating and lower risk of overweight in later childhood (Townsend & Pitchford 2012; Brown & Lee 2014). Although the data controls for maternal demographic background, it is possible that maternal characteristics associated with choosing a baby-led approach may partly explain these differences. Secondly, these maternal characteristics may make a baby-led or traditional approach more appealing. If baby-led weaning is established as promoting healthier eating and weight gain, then understanding the barriers to adopting the method is important.

Mothers following a baby-led style scored significantly lower on restrained eating compared with the traditional group. It is known that mothers high in restraint are more likely to follow a child-feeding style high in restriction (Fisher & Birch 2002) and monitoring of intake (Tiggemann & Lowes 2002). This may be due to higher personal weight concerns and a belief that adopting a high level of control over their child's intake will foster healthier eating behaviour and weight gain in the child (Benton 2004). A traditional weaning approach, which allows greater control, may thus be more appealing to mothers higher in restraint.

However, this greater restraint may also affect child weight; higher maternal restraint is associated with child overeating (Rodgers *et al.* 2013) and child overweight (Ogden *et al.* 2006; Clark *et al.* 2007), although not every study is conclusive (Haycraft & Blissett 2008). Maternal-restrained eating may also be a consequence of maternal overweight (de Lauzon-Guillain *et al.* 2006) which is in turn associated with increased risk of child overweight through both genetic and environmental pathways (Kral & Faith 2009). Maternal restraint does not appear to be associated with child fussy eating, although the evidence is scant (Jacobi *et al.* 2003) and links are seen between maternal and daughter restraint in older children (Ricciardelli & McCabe 2001). However, a baby-led weaning style has been shown to be associated with reduced risk of overweight when maternal child-feeding style and maternal weight are controlled for (Brown & Lee 2014).

Mothers following a baby-led approach scored lower on anxiety and obsessive-compulsive symptomatology and also trait anxiety and introversion. For older children, maternal anxiety is associated with a more controlling child-feeding style (Farrow & Blissett 2005; Mitchell *et al.* 2009) and more widely, a more authoritarian parenting style (Metsapelto & Pulkkinen 2005) which in turn is associated with a child-feeding style higher in control (Duke *et al.* 2004; Hubbs-Tait *et al.* 2008; Hurley *et al.* 2008). Anxiety has also been correlated with lower confidence (Ebstrup *et al.* 2011) and greater risk perception (Suls & Martin 2005). Those higher in anxiety may naturally choose a traditional weaning style where intake is more controlled via spoon-feeding and there is greater support, acceptance, literature and advice from health professionals (Brown & Lee 2013). Indeed, mothers choosing a baby-led approach have significantly lower anxiety regarding introducing their baby to solid foods (Brown & Lee 2011b) and report lower use of concern for child intake during the weaning process (Brown & Lee 2011a).

Similar relationships may explain the association between introversion and traditional weaning. Introversion is linked to a variety of behavioural traits such as lower assertion (Rothbart & Hwang 2005), lower self-efficacy (Schaefer *et al.* 2004) and poorer confidence (Keller *et al.* 2011) alongside a more controlling parenting style (Metsapelto & Pulkkinen 2005). Traditional weaning may feel like the more supported, measurable and secure method for those higher in these traits.

Maternal anxiety and depression have been associated with fussy eating in older children (McDermott *et al.* 2008). However, in terms of maternal anxiety and introversion affecting child weight, there is a dearth of research directly exploring this influence, especially in the early years. Specific anxiety in relation to energy/nutrient intake during the first year is associated with a more controlling feeding style (Farrow & Blissett 2005; Brown *et al.* 2011) which in turn may affect child weight. Mothers who report higher levels of stress (Stenhammar *et al.* 2010) and depression (Topham *et al.* 2010) are more likely to have a child who is overweight. More widely, authoritative parenting is associated with lower nutrient

intake (Arredondo *et al.* 2006), higher sugar consumption (van der Horst *et al.* 2007) and child overweight (Rhee *et al.* 2006). Finally maternal introversion and anxiety are associated with a reduced breastfeeding duration (Brown 2013), with breastfeeding protective against later child overweight (Harder *et al.* 2005). Further research is needed to explore how maternal well-being and personality could affect child weight.

The similarity in maternal characteristics associated with both timing of complementary foods and baby-led weaning suggest an underlying approach to both method and timing. By its very nature mothers who choose to baby-led wean will have to delay introducing complementary foods as the infant needs to gain developmental motor skills that do not emerge until around 6 months of age (Naylor & Morrow 2001). However, associations between maternal characteristics and weaning style were independent of age of introduction to solid foods. It is likely that maternal desire to monitor and control intake underlie both decisions, which in turn are driven by anxiety and uncertainty about food intake. Indeed, similar characteristics have been associated with stopping breastfeeding at an earlier stage (Meedya *et al.* 2010; Brown 2013, 2014; Adedinsewo *et al.* 2014). Breastfeeding is baby-led with less control or monitoring of intake possible, leading to cessation due to anxiety over intake and feeding patterns (Brown *et al.* 2011).

Wider factors outside of or related to maternal characteristics may also play a role. Child weight, eating behaviour and temperament can drive maternal child-feeding style for older children (Ventura & Birch 2008); thus, a similar pathway is likely for infants. Indeed, infants who are perceived as more difficult in temperament are more likely to be introduced to solid foods at an earlier stage (Wasser *et al.* 2011). These infants are also less likely to be breastfed (Niegel *et al.* 2008) and mothers more to report feeding difficulties (Farrow & Blissett 2006) and using food to try and soothe their infant (Vollrath *et al.* 2011). These behaviours mean a baby-led approach is less likely to be followed.

Moreover, there are links between maternal personality and well-being and infant behaviour.

Mothers who experience anxiety or depression are more likely to have a difficult infant, which can have biological pathways through prenatal cortisol (Davis *et al.* 2007) or be a reaction to infant difficult (or perceived difficult) behaviour (Beck 1996; McGrath *et al.* 2008). Thus, it is possible that an infant with a difficult temperament increases risk of feeding difficulties which in turn impacts upon maternal well-being and thus chosen weaning approach. Further research needs to examine the role of infant temperament and maternal well-being around infant eating behaviour in the first year.

The data therefore suggest that mothers choosing to follow a baby-led method may currently be a different population compared with those following a traditional approach. The implication of this depends on the findings of subsequent research. If baby-led weaning is confirmed to promote healthier eating and weight gain as initial findings (Townsend & Pitchford 2012; Brown & Lee 2014) suggest, are these characteristics potential barriers to adopting it as a more main stream approach? If so, interventions may wish to consider how maternal well-being or beliefs about child eating behaviour based on their own body image may affect the weaning process.

More immediately, further research needs to consider the role of maternal eating behaviour, personality and well-being (and potentially infant temperament) in understanding any differences in child outcomes. Are any effects direct? Or mediated by the population who currently choose to baby-led wean. What would the outcome be if a wider population was encouraged to adopt baby-led principles, or indeed, a randomized trial assigning individuals to weaning approach was conducted? How would a mother high in anxiety and restrained eating approach a baby-led feeding style?

Related to this, future research must consider a more standardized way of defining what baby-led weaning is, and potentially what elements of it are important. One of the limitations of the small but growing number of studies in the area is that different authors have used different methods to define the baby-led approach, leading to potential inconsistency in understanding its outcome and use. Cooke (2014) draws attention to this noting that different ways of



defining baby-led weaning may lead to different inclusion criteria. For example, the series of studies by Brown & Lee (2011a,b, 2013, 2014) categorize the baby-led method as using spoon-feeding and puree use 10% or less of the time. Other studies ask mothers to self-identify, even though a proportion identifying as baby-led continue to use higher levels of spoon-feeding and purees (e.g. Cameron *et al.* 2012; Townsend & Pitchford 2012; Cameron *et al.* 2013). This clearly makes analysis of outcomes across studies problematic but also raises the question as to what baby-led weaning is and what elements might be important. Sachs (2011), for example, challenged the approach as a new method suggesting it held similarities to standard weaning with simply a higher level of finger foods and a more responsive feeding style. Further work on definitions and unpicking important elements of the method is thus needed.

The research does have its limitations. The sample was self-selecting and this is reflected in the higher education and age of the mothers comparatively to the general population. The sample was also predominantly White British in ethnic origin. Because of the low levels of baby-led weaning in the general population, specific baby-led weaning forums and online groups were targeted in recruitment. This may have led to a potential bias in the background of the mothers who chose to participate; those particularly interested and involved in baby-led weaning may belong to these groups whereas mothers who are more indifferent are unlikely to be members. Internet recruitment however is growing considerably in popularity with increasing access rates to the Internet (almost 90% in this age range; ONS 2013), reducing disparities in who may access the research. Generalizability must however be undertaken with caution.

Criticism could also be made of examining maternal personality, eating behaviour and well-being in the post-natal period due to it being a period of considerable change (Nelson 2003). Mood disorders are also enhanced in this period (Cohen & Nonacs 2005) and eating behaviour and weight change considerably during pregnancy and post-natally. However, women were not immediately post-natal and the aim of the research was to explore recent mood/personality in

relation to how it drove weaning choices at the time rather than considering these to be stable behaviours over time. Personality also does appear to be stable through pregnancy and the post-natal period (Grant *et al.* 2008) and has been used in a number of studies in the perinatal period (McMahon *et al.* 2001; Hart & McMahon 2006).

Overall this study offers a useful insight into the different backgrounds of mothers choosing to currently follow baby-led or traditional weaning methods outside of maternal demographic background. Maternal characteristics, particularly surrounding anxiety and restrained eating, appear to be associated with choosing a traditional weaning style and an earlier introduction of solid foods. At present we do not have sufficient data for a baby-led weaning approach to be encouraged but the findings are important for considering pathways to child weight and eating outcomes for further research and for understanding potential barriers to the approach if it proves to promote healthier outcomes.

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## Conflicts of interest

The author declares that she has no conflicts of interest.

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