Comparison of food and nutrient intake in infants aged 6–12 months, following baby-led or traditional weaning: A cross-sectional study

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Comparison of food and nutrient intake in infants aged 6-12 months, following baby-led or traditional weaning: A cross-sectional study

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Abstract

Background: A baby-led approach to weaning (BLW) encompasses self-feeding and self-selecting graspable foods, offering an alternative to traditional weaning (TW). This cross-sectional study explored adherence to characteristics of BLW and differences in food group exposure and nutrient intake between babies following either TW or BLW.

Methodology: Nutritional data were collected via multi-pass 24-hour recall, following parental completion of an online survey.

Results: Infants were grouped according to age (6-8 months; TW (n=36) and BLW (n=24)) and (9-12 months; TW (n=24) and BLW (n=12)). BLW babies were more likely to be breast fed (P=0.002), consumed a higher percentage of foods also consumed by their mother (P=0.008) and were fed less purees (P<0.001) aged 6-8 months. TW babies were spoon fed more (P=<0.001) at all ages. At 6-8 months, total intake (from complementary food plus milk) of iron (P=0.021), zinc (P=0.048), iodine (P=0.031), vitamin B12 (P=0.002) and vitamin D (P=0.042) and both vitamin B12 (P=0.027) and vitamin D (P=0.035) from complementary food alone was higher in babies following TW. Compared to TW, BLW babies aged 6-8 months had a higher percentage energy intake from fat (P=0.043) and saturated fat (P=0.026) from their milk. No differences in nutrient intake were observed amongst infants aged 9-12 months. Few differences were observed between groups in their number of exposures to specific food groups.

Conclusions: TW infants had higher intakes of key micronutrients aged 6-8 months but there were few differences in nutritional intake aged 9-12 months, or food group exposure between babies following TW or BLW. BLW appears to be socially desirable and guidance for parents is required, along with larger, longer-term studies, which explore the potential impact of BLW in later childhood.

Key words: Infant feeding, solid foods, complementary feeding, dietary intake, weaning, baby-led weaning

Background

Complementary feeding is the introduction of solid foods to infants, alongside their usual milk (breast or formula) starting when milk alone is no longer sufficient to meet the nutritional requirements of infants [(1)]. The World Health Organisation (WHO) recommend that complementary feeding should be timely, adequate and safe with foods being properly fed, consistent with a child's appetite and satiety [(2)]. Commonly termed 'weaning', complementary feeding should be initiated at around 6 months of age, to avoid growth faltering and iron deficiency [(3, 4, 5)]. In the UK, a traditional approach to weaning (TW) usually involves spoon feeding purees then graduating to more textured foods and some finger foods before joining in with the family diet by 12 months of age [(6)]. Alternatively, a baby-led approach to weaning (BLW), encompasses offering healthy foods, sharing family mealtimes, self-feeding, and self-selecting foods, in addition to offering graspable foods from the outset, which babies may pick up with their hands [(7, 8)]. Proponents of BLW suggest the method allows the baby to choose what and how much to eat, therefore, responding to appetite, developing motor skills and due to only whole foods being given, to learning about the varied texture and flavour of individual foods [(9)]. Despite the rise in popularity of BLW, this style of weaning is not supported by current guidance for parents in the UK [(6)] and health professionals have raised concerns about whether BLW leads to inadequate intakes of iron, zinc and energy and an increase in the risk of choking [(5, 10)]. Choking risk was largely discounted in studies by Fangupo et al. (2016) [(11)] and Brown (2018) [(12)]. A review of the evidence base underlying current recommendations for feeding children up to 5 years of age was published by the UK Scientific Advisory Committee on Nutrition (SACN) in early 2018 [(4)]. The report highlighted several benefits of BLW and concluded that BLW did not appear to decrease energy or micronutrient intakes, but did result in earlier self-feeding, less food fussiness and greater enjoyment of food [(4)]. However, there are a scarcity of studies exploring differences in nutrient intake, eating behaviours, long-term patterns of eating or longer-term health parameters between weaning approaches [(9, 13, 14, 15)].

The definition of BLW for use in research is also not clear [(9)]. BLW appears to be an approach, rather than simple method and consists of several underlying principles [(7, 14)]. Previous studies have focussed on identifying BLW by asking parents to self-classify their approach to weaning (TW or BLW) or by asking parents to estimate the percentage of foods spoon fed (rather than self fed) or in pureed food (rather than whole or finger foods), with BLW classed as those who use ≤10% spoon feeding and ≤10% pureed foods [(16, 17, 18, 19, 20)]. All definitions are subjective, and it may be challenging for parents to estimate in terms of percentages.

To date there have only been two studies in the UK, which directly compare exposure or dietary intake of babies following TW or BLW [(20, 21)]. As diet in this age group is key to development, further studies are required to help provide evidence for policy makers, health professionals and parents. This study adds to this body of evidence by exploring dietary intake in infants aged 6-12 months and the extent to which families follow key BLW characteristics such as self-feeding and consuming whole or finger foods.

Methods

Participant recruitment and data collection

Ethical approval for the study was granted by the University of Nottingham Biosciences Research Ethics Committee (SBREC180129A and SBREC180129A) and by Sheffield Hallam University Ethics Review (ER28122050). Participants were the main caregiver of infants aged 6-12 months, recruited by placing adverts on parenting forums, weaning and parenting Facebook groups at three time-points: 4th Oct-30th Nov 2019, 22nd June and 7th July 2020 and 1st Nov – 1st December 2020. Participants were self-selecting. Some additional parents were included from a second study, recruited in June 2019 (prior to initiation of solid foods) with nutritional data collected 4th Oct-30th Nov 2019 when their babies were aged 6-12 months. Questionnaires were housed on the JISC survey platform [(22)] and completed online. All participants were presented with an information sheet at the start of the electronic study, where the nature of the questionnaire and how the data would be used was explained. If participants consented to take part in the study, but clicking that they had read the information sheet and wanted to take part, they were presented with questions included demographic questions relating to theirage, occupation, education, home ownership, marital status, height, weight, pre-pregnancy weight (if applicable), parity, singleton/multiple birth and baby (age, birthweight). A milk feeding history was recorded for the baby, along with a validated retrospective infant feeding behaviour questionnaire [(23)] and questions relating to the way in which babies were fed their normal milk and solid food. Additionally, measures of weaning style included asking the caregiver the percentage of time infants were spoon fed and percentage of times infants were fed puree, consistent with other studies [(16, 17, 18, 19, 20, 24)] and a yes/no answer to the following statement: "*Baby-led weaning is the process of placing foods in front of your baby and letting them feed themselves – picking the food up and putting it in their mouths unassisted, rather than being spoon-fed by an adult" – Do you follow a baby-led weaning approach?*" similar to Rowan, Lee & Brown (2019) [(21)].

Participants were asked to provide a phone number which was used by a researcher to complete a multi-pass 24-hour recall with both the caregiver and the baby, following a standardised methodology [(25)]. The number of foods eaten by the baby were counted and the % of those foods that were the same as those consumed by the caregiver was calculated. Caregivers were also asked whether an adult family member was eating (meal or snack) at the same time as the baby was eating (regardless of whether the same food was consumed), whether each food given to the baby was spoon-fed or self-fed and whether each food was provided as a puree or as a whole/finger food, pre-loaded spoon or dipper (a firm food used to eat a soft one, e.g. toast fingers to eat hummus).

Caregivers were aged over 18 and resident in the UK. Babies were aged 6-12 months of age. Some circumstances can cause delayed weaning or feeding difficulties in children, therefore, babies born prematurely (≤37 weeks gestation) or suffering a disability, health problem or congenital abnormality affecting feeding were also excluded from the study. Infants with allergies were not excluded.

Nutritional analysis

All 24-hour recalls (foods and individual recipes) were entered into Nutritics [26] by the lead researcher. Foods with full nutritional analysis (with respect to nutrients of interest) were selected where available, otherwise new foods were inputted per 100g using data from grocery (e.g. ASDA, Tesco, Sainsbury's;) [20] or manufacturer's websites (e.g. Ella's Kitchen, Heinz). Where micronutrient data was not available from either Nutritics, manufacturer or grocery website, new recipes were created using % ingredients (usually baby foods which list the % of each ingredient). Portion size data (teaspoons, tablespoons, jar/container sizes or fractions of adult portion sizes) was provided by participants. When portion size estimation was missing or unclear, portion sizes recommended in Nutritics (for example, weights of teaspoons or tablespoons of food) or estimated using manufacturers data, Food Portion Size handbook [27] or the First Steps Nutrition Trust Guide [28] were used.

To assess milk feeding, the brand and volume of formula milk consumed was recorded and converted into number of grams. It was assumed formula milk was made up according to the pack instructions. The amount of breast milk consumed by breastfed infants was estimated in grams, in a similar way to the BLISS trial [29] using breast milk volumes reported by Dewey et al. (1991) [30] and Committee on Nutritional Status During Pregnancy and Lactation (1991) [31]. These values were dependent on the age of the infant; 5.0-7.5 months (769g breastmilk per day, assuming complementary feeding has commenced), 7.6-10.9 months (637g) and 11-12 months (445g). Where infants were mixed fed, the no. of grams of breastmilk was calculated by subtracting the no. of grams of formula reported, from the estimated average daily intake of breastmilk above [30]. The use of vitamin, mineral or other supplements were recorded and included in the analyses. The nutrient content of human milk was available in Nutritics, originally from …??

Food group analysis

To explore the frequency of exposure, foods were grouped similar to Townsend & Pitchford (2011) [32], Alpers et al.(2019) [20], Rowan et al. (2019) [21] (Table 5). Wherever individual ingredients were listed as part of a meal, in a recipe or recipe title, individual ingredients were recorded in each relevant food group. Homemade dishes with no recipe or an ambiguous title, e.g. 'homemade bolognaise' then this was listed as a homemade composite dish.

Calculations and statistical analysis

Percentage energy from macronutrients were calculated using metabolisable energy conversion factors; carbohydrate (16 kJ/g), protein (17 kJ/g), fat (37 kJ/g), saturated fat (37 kJ/g) and free sugars (16 kJ/g) [33]. A simplified NS-SEC code [34] was assigned to both the participant and their partner based on their occupation. These were combined and the highest occupation class used to classify each household.

Data were exported to SPSS Statistics for Windows, version 24.0[35] and checked for potential outliers. Tests for normality were carried out using Shapiro-Wilk test and Kolmogorov-Smirnov tests. Chi-squared and Fishers Exact tests were carried out on frequency data. Independent samples t-test and were carried out where data were continuous and parametric. Mann-Whitney-U tests were carried out where data were continuous or ordinal and non-parametric. A significance level of P<0.05 has been use throughout.

Results

Maternal and infant characteristics

A total of 319 respondents completed the online survey about infant feeding and complementary feeding, all of whom were the baby's mother. Of the 189 respondents who left a phone number, 102 completed a 24-hour recall and are the focus of this analysis. Six infants were later excluded (three were aged over 12 months, two were born prematurely and one recall was incomplete), leaving 96 mother-infant pairs who met the study criteria. Of these, 60 were classed as TW and 36 as following BLW. Infants following BLW were spoon-fed ≤10% of the time and were fed purees ≤10% of the time as self-reported by parents [16, 17, 18, 19, 20, 24]. Mothers were aged 25-45 years with a mean (SD) of 33.3 (4.0) years. There were no significant differences in the age or other demographic characteristics of mothers between weaning groups (Table 1).

Most of the infants in the study had been breastfed at some time since birth (96.9%) and 55.2% were currently consuming only breast milk via their milk feeds, whilst 28.1% and 16.7% were formula or mixed (a mixture of breast and formula) fed respectively at the time of the study (Table 2). There were significant differences between the TW and BLW groups in the proportion of infants who were currently breastfed (41.7% and 77.8% respectively, P=0.002), breastfeeding duration (73.3% in TW compared to 86.1% in BLW group at 6 months of age, P=0.026) and volume of milk consumed (although this was based on estimates for breastfed infants). A significantly higher proportion of mothers following TW, compare to those following BLW, reported dairy allergy in their baby. (16.9%

versus 2.9% respectively, P=0.040). Five categories of infant feeding behaviour were included (general appetite, food responsiveness, enjoyment of food, satiety responsiveness, slowness in eating) but there were no significant differences between weaning groups for any behaviour prior to initiation of weaning. No other differences were observed, including choking incidences although this was higher in the TW group (20.0% compared to 8.3% in the BLW group, NS).

Characteristics of weaning style

Characteristics of a BLW style were also explored (Table 3). The group following a BLW style were significantly more likely to self-report following BLW (P<0.001 in all groups), consumed a higher percentage of foods that were also consumed by their mother at 6-8 months only (P=0.008) (following the family diet) and were significantly less likely to be spoon fed (P<0.001 in all groups), or fed purees (P<0.001 at 6-8months) as recorded on the 24-hour recalls.

Intake from food and milk

Estimated nutrient intake from food, milk and total intake was compared between those babies following TW and BLW (Table 4). There were no significant differences in energy intake between the groups, although TW babies consumed more energy from food (NS) and BLW babies consumed more energy from milk (NS) at 6-8 months. Average energy intakes exceeded the estimated average requirement (EAR), but are very similar to those observed by Alpers et al. (2019). At 6-8 months, TW and BLW babies received 52% and 58% of their energy intake from milk, respectively. At 9-12 months this was 42% in both groups. BLW babies aged 6-8 months and all BLW babies combined consumed more fat, percentage energy from fat, saturated fat and percentage energy from saturated fat from their milk. A higher percentage of total energy intake from fat (P=0.042) and saturated fat (P=0.006) was observed amongst BLW babies when babies of all ages were grouped together.

Total iron intake (food and milk combined) and total zinc intake was higher in TW babies aged 6-8 months (P=0.021 and P=0.048 respectively) and all babies following TW (P=0.008 and P=0.040 respectively). Iodine intake was significantly higher only in younger babies following TW compared to the BLW group (P=0.031). All babies following TW and younger babies following TW had higher total intakes of vitamin B12 than those following BLW (P=0.002 at both 6-8 and 9-12 months). Vitamin B12 intake was also higher from complementary foods only amongst all TW babies combined (P=0.027) and TW babies in the younger age group (P=0.006). Vitamin D intake estimated from milk alone was higher amongst all TW babies (P=0.034) and from both total intake (P=0.042) and from food alone (P=0.035) in 6-8-month-olds.

Babies in both groups exceeded the EAR for energy and the reference nutrient intake (RNI) for protein, sodium, vitamin A, vitamin B12 and vitamin C at both 6-8 and 9-12 months. Babies in all groups consumed below the RNI for iron with 44.4% of younger TW babies and 62.5% younger BLW babies falling below the lower reference nutrient intake (LRNI) (see supplementary data). All BLW babies together and those aged 6-8 months fell below the RNI for zinc with 25% of younger BLW babies and 5.6% of younger TW babies falling below the LRNI (see supplementary data). Younger babies following BLW consumed below the RNI for calcium but no babies in the study fell below the LRNI.

Few differences were observed between groups in their number of reported exposures to specific food groups (Table 5) and exposure to oily fish, processed meats, sugary foods, alternatives to dairy and commercially produced meals and snacks were low across all groups. Most babies were exposed to more than one iron-containing food on the day of measurement. Younger babies (6-8 months) following TW had significantly higher exposures to oily fish (P=0.037), fortified infant cereal (P=0.035), dairy or dairy-based desserts (P=0.036) and commercially produced infant meals; (P=0.005). Older babies (aged 9-12 months) following BLW were exposed to more protein-containing foods (P=0.042) and dairy/dairy-based desserts (P=0.022).

Discussion

This study, which aimed to compare infant feeding characteristics and nutritional intake between babies following either a TW or BLW approach, found significant differences in the way in which babies fed. When looking at total daily intake, younger babies (6-8 months) following TW consumed more iron, zinc, iodine and vitamin D than BLW babies, whilst younger BLW infants consumed more fat and saturated fat via their milk than their TW counterparts. Considering complementary foods alone, only the intakes of vitamin B12 and vitamin D were significantly higher in younger TW infants. Younger TW infants had more exposures to iron-fortified infant cereal and commercially produced baby foods. Differences in both nutritional intake and food group exposure disappeared by 9-12 months.

BLW is not well defined. Loosely, it encompasses the form and delivery of food to the baby, offering family foods, sitting in on meals, waiting until 6 months to introduce solids and milk feeding on demand [7, 36] but adherence to these principles was not consistent between groups. Whilst the BLW group were more likely to adhere to all the measures of BLW weaning style in this study, parents categorised as following the TW approach were most likely to self-report following 'predominantly TW' or 'predominantly BLW' rather than identifying with a purely TW approach. As 55% of the TW group, overall, also answered 'yes' to the BLW statement [21], indicating following BLW, this could indicate aspiration to or social desirability of BLW. When exposure to the family diet was measured (similarity between infant and maternal foods), all groups demonstrated relatively low similarity (<33%) but was significantly higher in the younger BLW group. These findings contrast with Brown and Lee (2011) [16] who found that BLW was associated with greater self-reported participation in mealtimes and exposure to family foods than TW. A lack of consistency between differing measures of BLW suggest that families may pick and choose which parts of a weaning style suit them best and differences become less significant amongst older babies. Sachs (2011) [36] suggested that many of the defining principles of BLW such as sharing family foods and mealtimes correspond with current Public Health England/NHS weaning advice which encourages parents and infants to sit together for family mealtimes and for the infant to move towards family foods by 12 months [6]. As a result, there may be less distinct differences between BLW and TW than when BLW was first described [7] and that differences mostly persist amongst younger babies. Self-reported spoon feeding ≤10% most closely predicted weaning style as used in this study but even then, BLW babies were still spoon fed 16.2% of the time on their recall.

Three previous studies have explored nutrient intake and weaning style; Alpers et al. (2019) [20] in the UK and Morison et al. (2016) [37] and Williams-Erickson et al. (2018) [15] in New Zealand. The overall quality of evidence is low [38]. Two studies found higher intakes of fat amongst BLW babies (from food only in the UK study) [20, 37]). The present study found intakes of both fat, saturated fat and percentage intakes of fat and saturated fat were higher in younger and combined BLW groups. Younger babies consumed more breast/formula milk and less food than older babies. A diet of predominantly breast/formula milk is more likely to have a higher fat content than a diet of predominantly solid food[2]. There was also a high proportion of breastfed babies in the BLW group and breastmilk has a slightly higher fat content (4.1g in human milk versus 3.6g in formula milk) in UK databases, which may account for some of the observed difference [26 39]. Fat intakes of 30-45% energy are thought to be prudent by the WHO but the UK do not currently have guidelines for children under 2 years of age. Intakes of fat in this study do not appear to be concerning [2, 33]. Estimated energy intakes were high in this study, likely due to over estimation of portion sizes and underestimation of food lost to the floor or clothing, but values were similar to Alpers et al. (2019) [20] who also used 24-hour recall. If portion sizes are over-estimated, however, this further accentuates the likelihood that dietary reference values (DRVs) for micronutrients are not met.

Health professionals commonly raise the concern that BLW will be associated with lower intakes of iron [5, 9, 39, 40] which has been observed amongst younger babies in this study. This concern stems from BLW infants consuming less traditional weaning foods such as fortified baby cereals. These are very high in iron but are not contingent with BLW, as they are not graspable and appropriate as finger foods [38]. Fortified baby foods are not usually part of the family diet so lower consumption would be expected when following BLW. In the current study exposure was very low across both groups but significantly higher in younger babies following TW. Iron status is determined by both in utero reserves and dietary intake but qualitative data from the UK has shown that many families believe 'food before one is just for fun' and so may not understand the importance of iron-containing foods during complementary feeding [42]. Infants in this study consumed Weetabix® and Ready Break® slightly softened or cooked and cut into fingers so it could be that parents are including fortified foods but actively avoiding commercially available baby foods, which may be less acceptable to families who have a higher social class and/or food knowledge and wish to avoid pre-packaged and processed baby food [43]. This may be apparent in the current study where the majority of participants were educated to degree level and were of high SES. Observed differences in iron intake between younger babies following TW and BLW were only apparent when both food and milk were combined. This indicates an accumulation of small differences via the type of milk consumed and amount of, if not number of exposures to, iron-containing foods. Infant formula contains 10 times more iron (0.7mg/100ml) than mature human breastmilk (0.07mg/100g) as the non-haem iron in formula milk is less bioavailable (10%) than the haem iron in breastmilk (50%) [26, 41]. This difference is reflected in UK DRVs, which are set at a value appropriate for formula fed infants and higher than necessary for breastfed infants [43]. Breast fed babies may have adequate or at least equivalent intakes of iron and the failure to meet DRVs may be of more concern amongst formula fed infants, even though intakes appear higher. Studies exploring haematological parameters of iron (including plasma ferritin, iron store depletion, early functional iron deficiency) in infants following either BLW or TW found no differences between groups whether parents had received dietary support to include iron-containing foods or not [44, 29]. Daniels et al. (2018) [29] suggested this was due to babies being offered high iron foods as part of their intervention study but Rowan et al. (2019) [21] found no significant differences in exposure to iron-containing foods in their UK babies following one of three groups: strict BLW, Loose BLW or TW. Differences in estimated iron intake at 6-8 months, in this study, could be due to BLW babies eating smaller amounts of food because they are younger and self-feeding at a slower pace. Iron intakes amongst infants are often problematic and stronger, more targeted guidance/advice on iron-containing foods for all babies may be required [36, 37, 39].

Like iron, intakes of zinc were significantly lower in younger BLW babies and intakes of both zinc and calcium were below the RNI among BLW babies aged 6-8.5 months. Calcium is also less bioavailable in formula milk (40%) than breast milk (66%) and so requires a higher DRV [45]. An Estimated Average Requirement (EAR) of 240mg/day would be adequate for breastfed babies whilst an EAR of 400 would be required for those formula fed. Daniels et al. (2018) [46] found no differences in zinc intake between BLW and TW infants in their randomised-controlled intervention trial which encouraged consumption of iron-rich foods. Foods containing iron are often those which are also high in zinc so guidance to increase intakes of iron would also increase zinc consumption.

Vitamin D intake in this study is a crude estimate. The vitamin D content of breastmilk varies between fore and hind milk and is correlated to maternal plasma 25(OH)D concentrations [20, 47]. There is no vitamin D or vitamin B12 in breast milk in UK databases whilst formula milk is fortified [26, 41]. Babies who are breast fed or receiving less than 500ml per day of formula milk should be given 8-10µg of vitamin a day, usually as drops [48]. Only 43.5% of breastfed babies and 12.5% of formula/mixed-fed babies receiving less than 500ml of formula on the day of measurement were given a supplement on the day of measurement, although like other studies, some parents reported usually or sometimes giving supplements, just not on the day the recall was carried out [20, 49].

Finally, older BLW infants were exposed to dairy and protein-containing foods more often. Higher than recommended intakes of protein may be significant as higher intakes of protein may contribute to increased weight gain over time [50].

It is acknowledged that there are several limitations to this study. Firstly, all data is self-reported and estimates of intake from breastmilk were based on average estimated values. Although there were no significant differences between the weaning groups in maternal demographic characteristics, this sample is not representative of the UK population with 82.5% or respondents in higher managerial occupations and 80.4% holding a university degree (compared with 27% nationally) [50]. This is a common feature of infant feeding surveys [20, 21, 32]. Although internet samples may be diverse [51] health-conscious women with higher levels of education, higher incomes are more likely to participate in online surveys of this nature with breastfeeding women over-represented (55.7% offering only breastmilk at 6 months in this sample, compared to 1% nationally) [41, 52]. As BLW is more likely to follow on from breastfeeding [9], the proportion of BLW followers is likely to be considerably over-estimated [53]. Whilst having a more homogenous sample naturally controls for some predictors of a healthy diet, such as socioeconomic status and education, allowing differences due to weaning style to become more apparent, this also emphasises the need for a nationally representative randomly sampled survey to explore the prevalence of BLW in the UK population.

This study used 24-hour recall to estimate nutrient intake. Many people who completed the online survey did not consent to a researcher calling them to complete a 24-hour recall, although there were no significant demographic differences between those who provided this data and those who did not (data not shown). Although data were recorded by trained researchers, 24-hour recalls have been demonstrated to overestimate energy intake in infants by around 13%, compared with 3 day weighed food records (which over-estimate by 5%). This is consistent with the high energy intakes observed here [54]. The most likely cause of this is over-estimation of portion sizes or over-estimation of milk consumption [54]. Responses may have been subject to respondent bias, incorrect estimations of portion sizes provided, the amount actually eaten [55, 56] and the respondent's memory [56].

Conclusion

The literature comparing TW and BLW is limited and this study adds to a growing picture created by similar small studies in the UK and New Zealand. Although the overall quality of evidence across the range of available studies may be low, there appear to be few persisting differences in nutritional intake or food group exposure between TW and BLW babies and the perceived risk of choking is not supported by the data. As more parents choose to adopt BLW-based approaches to complementary feeding, health professionals should be less concerned with risk and focus more on the longer-term health implications. Larger, longer and more nationally representative samples are needed for this.

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Transparency Declaration':

"The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported. The reporting of this work is compliant with STROBE[2] guidelines. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned (please add in the details of any organisation that the trial or protocol has been registered with and the registration identifiers) have been explained.

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