

Acceptability to Parents of a Baby-Led Approach to Complementary Feeding

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Abstract

In Baby-Led Weaning (BLW), infants are offered foods that they are able to pick up and feed themselves from the start of the complementary feeding period. This means that infants who are fully BLW are not spoon fed by their parents, and instead feed themselves entirely. The Baby-Led Introduction to Solids (BLISS) study was a randomised controlled trial of the effect of a modified version of Baby-Led Weaning on infant growth, iron status, and risk of choking, and provides an opportunity to investigate parents' experiences of a baby-led approach to infant feeding. Cross-sectional studies have suggested that BLW may be associated with a wide range of possible benefits including better energy self-regulation and a lower risk of obesity, but randomised controlled trials of BLW are needed in order to determine whether these outcomes are truly the result of BLW, or due to other characteristics of families who choose to follow this method of infant feeding. Complementary feeding methods are usually chosen by parents, so it is important to ascertain whether parents find a baby-led method of introducing solids acceptable if they are assigned to follow it. This is both so that it can be determined whether it would be feasible to randomise them to follow such an approach in future randomised controlled trials, and because if beneficial effects of BLW are shown, policy makers need to know whether parents would find it acceptable to follow BLW instead of traditional spoon feeding.

The aim of this thesis was to determine the acceptability to parents of a baby-led approach to complementary feeding, specifically convenience, happiness, frustration, expense and mess, at 7 to 9, and 12 months of age, and age when parents considered that their infant was consuming enough food.

In total, 206 participants were randomised to Control (n=101) or BLISS (n=105) groups in the third trimester of pregnancy. When the infants were 7, 8, 9, and 12 months of age, questionnaires were administered that aimed to capture aspects of a baby-led approach to complementary feeding that might be considered acceptable or unacceptable by parents: specifically convenience, happiness, frustration, expense, mess, and how the method suits the parent, and the age of the infant when their parent considered that they were consuming enough food. The cost of foods consumed was

estimated using supermarket prices linked to a 3-day weighed diet record completed by the participants on three non-consecutive days at 7 months of age.

When asked to report on their attitude to the method of complementary feeding they had been randomised to follow, both groups reported high levels of convenience and happiness, and found the method suited them very well. However, they also reported finding complementary feeding very frustrating. The only significant difference between the groups was in the perceived expense of the feeding method, where the BLISS group were more likely to perceive the method as expensive. In response to open ended questions on what it was that the parent liked about the method they followed, subthemes such as ‘improved autonomy’ and ‘fitting in with the family’ arose in the BLISS group. The Control group reported that ‘bonding’ and ‘monitoring the amount of food consumed’ were things that they liked.

Infants in the BLISS group were significantly more likely to drop their food, but the difference between the groups was small (3.80%; 95%CI 1.86% to 7.75%). Both groups found the mess associated with complementary feeding to be acceptable, and were relatively comfortable with it at home, although less so away from home. The only significant difference between the groups was in overall messiness, with the BLISS group reporting less messiness. However, there was no significant difference between groups in the number acting to make mess more manageable. Common strategies against mess in both groups were using a bib and a mat, the use of wipes, and restraining the child – usually in a highchair.

It cost the BLISS group \$1.70 per day to feed their infant. The amount consumed was only \$0.90 of this, leaving \$0.60 in left overs. The Control group spent \$1.90 per day to feed their infant, with the infants consuming \$1.10 of this, leaving \$0.50 in left overs – these values were not statistically significantly different.

The BLISS group felt that it took 5.5 weeks after beginning complementary feeding until their infant was eating enough, whereas the Control group felt it took 5.4 weeks.

In conclusion, parents did not find a baby-led approach to introducing solids any less acceptable than Control parents found standard infant feeding – even though they had

been randomised to follow the approach rather than choosing it themselves. However parents did report high levels of frustration with complementary feeding no matter what method they were using. Each group had their own way of finding positives in the method they were following, with both groups reporting increased autonomy, improved fine motor skills, and benefits to their child's health. Although the BLISS group was more likely to consider their method expensive, there was no difference in the actual cost as measured by the 3 day diet records. These results show that a baby-led approach to complementary feeding can be as acceptable for parents as a standard approach, and does not differ in cost. It also shows that while frustrations arise in each method, parents are resourceful in managing these and accept them as part of the process. This study shows that it is feasible to run studies where parents are randomised to follow a baby-led approach to complementary feeding, and that, should advantages to BLW be discovered, parents are likely to find it acceptable to follow BLW.

Preface

This one-year full-time equivalent by thesis only MSc project was completed as part of the Baby-Led Introduction to SolidS (BLISS) study. The study was conducted in the Department of Human Nutrition and the Department of Medicine at the University of Otago, Dunedin, New Zealand. Associate Professor Anne-Louise Heath and Professor Rachael Taylor were the Principal Investigators and responsible for the design of the study. Liz Fleming was responsible for loading the food prices determined by the candidate into Kai-culator so that the total diet cost could be calculated. Jill Haszard was responsible for the statistical analyses.

The MSc candidate was responsible for:

- Developing a system to collect food prices from a local supermarket using their online shopping tool and visiting the physical supermarket.
- Collecting fruit and vegetable prices at a local supermarket at four different time points in one year to account for seasonal variation.
- Determining average weights for fruit and vegetables where these were sold as 'each' rather than by weight.
- Collecting shelf food prices for all foods consumed by the participants.
- Checking entries of foods into Kai-culator from some of the 3-day weighed diet records previously entered by another candidate.
- Developing a coding system for summarising and interpreting answers to open ended questions on likes and dislikes about the feeding method, as well as open ended questions about what the participants did about mess.
- Coding the open ended questions.
- Weighing empty containers for different sizes of baby food cans, jars and pouches to enable estimation of leftovers recorded in the weighed diet records when commercial baby food fed from containers was only partly consumed.
- Calculating the amount of formula powder used when participants listed formula in its liquid prepared form only.

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1 Introduction

With the population wide increase in obesity now affecting children as well as adults, it is important to look at how we can improve their health outcomes through nutrition (Barton, 2012). The first opportunity we have to influence the eating habits of children is during the phase when complementary foods are first introduced. In New Zealand, the recommendations are to start this process around 6 months of age with smooth, soft, and plain food (Ministry of Health, 2013). However, with Baby-Led Weaning (BLW), infants are offered foods that they are able to pick up and feed themselves from the start of the complementary feeding period (G. Rapley, 2011). This means that infants who are fully BLW are not spoon fed by their parents, and instead feed themselves entirely. Due to the current lack of research in the area, BLW is not recommended by the Ministry of Health in New Zealand (Ministry of Health, 2016). Cross-sectional studies have suggested that BLW may be associated with a wide range of possible benefits including better energy self-regulation and a lower risk of obesity (Brown & Lee, 2014; Townsend & Pitchford, 2012a). However, it is possible that these outcomes could be due to characteristics of families who chose to use this method of complementary feeding. Therefore, randomised controlled trials on BLW are needed. And as complementary feeding methods are usually chosen by the parents, it is important to establish the acceptability to parents of this method of infant feeding. One way to do this, is to assign parents to this method of complementary feeding and measure their acceptance of it. This will show whether it is feasible to randomise parents to follow such an approach in future randomised controlled trials, and whether it would be feasible for policy makers to make recommendations for a baby-led approach to weaning should benefits of the approach be shown.

The Baby-Led Introduction to SolidS (BLISS) study was a randomised controlled trial of the effect of a modified version of Baby-Led Weaning on infant growth, iron status, and risk of choking, and provides an opportunity to investigate parents' experiences of a baby-led approach to infant feeding when they have been asked to follow it, rather than chosen to do so themselves.

The aim of this thesis is to determine the acceptability to parents of a baby-led approach to complementary feeding. The four key objectives are:

To determine in a baby-led approach compared to a traditional spoon-feeding approach to complementary feeding:

1. Parental perceptions of convenience, expense, and mess at 7 to 9 and 12 months of age.
2. Parental happiness and frustration, and the extent to which the approach “suits them” as a parent at 7 to 9 and 12 months of age.
3. Parental perception of how many weeks of complementary feeding are needed before the infant is eating “enough” food.
4. Food cost at 7 months of age.

2 Literature Review

2.1 Search Methods

The databases Medline (1946 - 25 September 2014) and Scopus (1823 - 25 September 2014) were searched for the terms listed in **Table 1**. Studies were only included if they were in English and from industrialised countries. Reference lists from the resulting studies were also searched to find relevant references.

Table 2.1 Search terms used to identify studies for this literature review

Search terms used to identify complementary feeding studies	
1	Baby led
2	Baby-led
3	Self feeding
4	Self-feeding
5	Infant
6	Infant feeding
7	Feeding method
8	Weaning
9	Complementary feeding
10	((1) OR (2) OR (3) OR (4)) AND ((5) OR (6) OR (7) OR (8) OR (9))
11	Family meal
12	Family food
13	Satiety control
14	Picky eating
15	Choking
16	Iron
17	(5) AND ((11) OR (12) OR (13) OR (14) OR (15) OR (16))
Search terms used to identify method of cost measurement studies	
18	Measure
19	Method
20	Cost
21	Diet
22	((18) OR (19)) AND (20) AND (21)
Search terms used to identify method of measuring acceptability	
23	method
24	Qualitative content analysis
25	(23) AND (24)

2.2 Baby-led complementary feeding

2.2.1 Introduction

A baby-led approach to complementary feeding gives the infant more control over what they eat, how much and when (Gill Rapley, 2011). Complementary feeding refers to the practice of feeding the infant foods in addition to the milk they have received for the initial period of their life. In a baby-led approach, the infant is offered a variety of foods at each meal and is allowed to consume which of these he wants and how much. Food is usually offered at family mealtimes and is often family food, but in a form that is easily grasped and consumed by the child. Purées are usually not given for two reasons. First, these need to be fed by spoon, which removes the autonomy in feeding for the younger child not physically capable of managing a spoon. Second, purées are not considered to be developmentally necessary for a child of 6 months, as by this age the child is able to chew soft foods, and there may be benefits to consuming food in its solid form.

A baby-led approach to complementary feeding, which is commonly referred to as 'Baby-led weaning' is not new, however the term is relatively new, having been coined by Gill Rapley, who aimed to bring greater awareness to it (Rapley & Murkett, 2008). In 2002 the World Health Organisation changed their recommendation for the age of introduction of solids to babies from 4 months to 6 months (WHO, 2001). At 4 months of age the child is not developmentally ready for anything other than liquids, hence the use of puréed foods. However, if the introduction to solids is delayed until 6 months, when the child is able to sit up unaided, then they are developmentally capable of grasping objects and bringing them to their mouth, and of chewing and swallowing lumpy foods (Wright, Cameron, Tsiaka, & Parkinson, 2011). At 6 months of age the gag reflex is still relatively far forward in the mouth, thus protecting against choking (Naylor 2001).

2.2.2 Possible benefits of a baby-led approach to complementary feeding

Overall, the proposed benefits of baby-led complementary feeding are that it produces healthier children, with healthier eating habits and body weight. These healthier eating habits include improved energy regulation, and less food fussiness and picky eating. This means the children are more likely to stop eating when they are full, and to eat a wider range of foods.

Part of the baby-led complementary feeding recommendations are that the infant is breastfed exclusively for 6 months. Improved energy self-regulation could be a benefit of this. Energy regulation, also known as satiety control, refers to the ability to recognise when one is full and respond by not eating any more. Satiety control has been linked to breastfeeding, where at least six weeks of breastfeeding, rather than formula feeding from birth, showed a positive effect on satiety control at 18 -24 months, independent of the complementary feeding style (Brown & Lee, 2012). These same authors later showed that feeding style was linked to satiety control, independent of breastfeeding duration (Brown & Lee, 2014). In this latter longitudinal study, 298 mothers with infants 6 - 12 months of age reported on breastfeeding, timing and style of introduction to complementary feeding, and maternal control. A baby-led complementary feeding style was classified as the use of puree and spoon feeding $\leq 10\%$ of the time. At follow up the eating style of the 18 - 24 month children was assessed with the Child Feeding Questionnaire, which measures parental feeding practices (Birch et al., 2001). It was found that a baby-led complementary feeding approach was linked to significantly greater satiety control and a lower rate of overweight in the children. This shows that both exclusive breastfeeding until 6 months of age, and a baby-led feeding approach may improve satiety control in children.

Children will naturally regulate their own energy balance (Birch, Johnson, Andresen, Peters, & Schulte, 1991), however when the child is spoon fed it may be possible for the parent to override the child's innate sense of when they are full. This may lead to a situation where the child interprets a meal being finished when the plate is empty, when others stop eating, or when the parent says so, rather than when they feel full. This was found by Elliott (2014), in a study where 68.4% of 402 children aged 6 to 11 who were studied used these external cues to identify the end of a meal. A parent's child feeding style has also been shown to influence satiety control, with an indulgent feeding style (defined as low demandingness and high responsiveness i.e. the parent

does not set boundaries for the child in terms of their eating, and has a high level of engagement with the child's needs) being shown to have a negative effect (Frankel et al., 2014). Although a baby-led complementary feeding approach was not specifically included in this study, it shows that feeding style can have an influence on satiety control. Therefore, a baby-led complementary feeding approach may allow children to retain their natural sense of when they are full, and thus be better able to regulate their energy intake.

Food restriction of palatable foods, such as foods high in sugar and/or fat, has been shown to increase body mass index (BMI) by reducing satiety responsiveness to restricted foods (Fisher & Birch, 1999). It has been shown that there are low levels of restriction and pressure to eat displayed by mothers following a baby-led approach to complementary feeding (Brown & Lee, 2011c). This is another aspect of this complementary feeding approach that may lead to healthier eating habits in children. In the BLISS study, from which this thesis draws its data, infants randomised to follow a baby-led complementary feeding approach were found to be less satiety responsive at 24 months of age, but the infants were following a modified version of BLW so this may not reflect the response to un-modified BLW (Taylor et al., 2017).

Picky eating is a trait that parents hope to minimise by choosing to use a baby-led complementary feeding approach (Cameron, Heath, & Taylor, 2012a). Picky eating, sometimes also termed food fussiness, can be defined as having low levels of food responsiveness, low enjoyment of food, and high levels of satiety responsiveness, food fussiness, and slowness in eating (Tharner et al., 2014). Timing of the introduction to solids may have an effect on picky eating, as found in a survey of 242 parents of 2-3 year old children (Shim, Kim, & Mathai, 2011). When solids had been introduced before six months, the children were 2.5 times more likely to display characteristics of picky eating such as food neophobia and consuming a limited variety of foods. These characteristics fit the aforementioned profile with low food responsiveness and high food fussiness. As a baby-led complementary feeding approach advocates waiting until 6 months of age before introducing complementary foods, this may be a way in which the method reduces the likelihood of the child becoming a picky eater.

Another way in which a child's acceptance of foods can be influenced is through persistence. Parents may be quick to assume that their child does not like a food, only offering it 3 -5 times (Carruth, Ziegler, Gordon, & Barr, 2004), when perhaps all the child needs is additional chances to experience the flavours and textures. A baby-led complementary feeding approach encourages the rejection of foods by the child and the repeated offerings of these foods even though they have been rejected before by the child. In older children of 3-5 years of age, fruit and vegetable intake has been positively associated with the frequency of fruit and vegetable offerings per day (Wyse, Campbell, Nathan, & Wolfenden, 2011). In six month old infants this method of simple persistence has been shown to have a positive effect on new food acceptance (Remy, Issanchou, Chabanet, & Nicklaus, 2013). It was found that after 10 exposures to a basic artichoke purée once a day on non-consecutive days, the infants' acceptance of the purée, as measured by intake and liking, was significantly higher than the initial pre-exposure test. Although purées were used in this study, it is possible that the results would translate to a child's experiences with whole foods. Therefore the repeated offering of foods previously rejected by a child, may be a way in which a baby-led complementary feeding approach reduces the trait of picky eating in children.

Children fed using a parent-led complementary feeding approach may initially be given purées rather than foods in their whole state. If purée feeding extends too long, specifically past 10 months, the child may become difficult to feed and have more definite likes and dislikes, characteristics that can be seen as picky eating (Northstone, Emmett, & Nethersole, 2001). In this way, children fed with a baby-led complementary feeding approach may be less likely to develop picky eating habits, as they are exposed to lumps from the beginning of complementary feeding at or around 6 months of age.

However, the greatest amount of evidence for a feeding style that limits the development of picky eating in children is around providing a wide variety of foods to the child. A wider variety of foods has been shown to increase the liking of a new food (Remy et al., 2013). And in older children 15 months to 4 years, greater variety at an earlier age predicted less pickiness at their current age (Lange et al., 2013; Tharner et al., 2014). These two intervention studies in infants using an exposure period of 9 days with several vegetables alternated each day, found that acceptance of a new food was significantly greater than for infants given the same vegetable each day. The baby-led

complementary feeding method recommends that children are offered a wide variety of healthy foods, and in this way it may reduce the likelihood of children becoming picky eaters. Although purées were used in all of these studies, it is possible the results could translate to a child's experiences with whole foods, such as used in a baby-led complementary feeding approach. Indeed, the BLISS study has found that the infants following a modified version of BLW were significantly less likely to be picky eaters at 12 months of age (Taylor et al., 2017).

One of the recommendations with a baby-led complementary feeding approach is that the child is included in family meals and is offered family foods in a form appropriate for the child. Frequent family meals are associated with healthier body weight and eating habits in children ranging in age from 2.8 – 17.3 years (Hammons & Fiese, 2011). Further research shows that this effect may be due to children eating the same foods as their parents. Intake of fruit and vegetables in preschool children has been shown to be similar to their parents' intake (Sweetman, McGowan, Croker, & Cooke, 2011; Wyse et al., 2011), supporting the findings that children are more likely to meet the recommendations for this food group if their parents role model fruit and vegetable intake (Draxten, Fulkerson, Friend, Flattum, & Schow, 2014). Therefore it is possible that positive effects on diet and health that may be seen in children fed with the baby-led complementary feeding method could be attributed to the effect of family meals or to the children eating the same meals as their parents.

To date there has only been one intervention study investigating a baby-led complementary feeding approach that has measured the effects of the method on satiety control and picky eating and this was in a modified version of BLW (Taylor et al., 2017). For parents and healthcare professionals to make informed decisions about this complementary feeding style further research is needed to clarify these effects.

2.2.3 Possible risks of a baby-led approach to complementary feeding

There are also some possible risks to a baby-led complementary feeding approach that have been voiced by both parents and healthcare professionals (Cameron et al., 2012a). These include a fear of choking, possible growth faltering and insufficient iron intake.

One of the most serious and feared risks of the baby-led complementary feeding approach is choking. In children under the age of three years, choking is one of the main causes of morbidity and mortality, with food being one of the main risk factors (Committee on Injury & Prevention, 2010). In particular, foods such as raw apple, raw carrot, and whole grapes are considered high risk foods for choking (Committee on Injury & Prevention, 2010). Therefore, a baby-led complementary feeding approach that uses these foods may place a child at higher risk of choking. No differences in choking incidence were found between the baby-led complementary feeding approach and parent-led complementary feeding approach in an online survey of 199 New Zealand mothers (Cameron, Taylor, & Heath, 2013). Mothers using the baby-led complementary feeding approach also reported that the child had resolved any choking episodes themselves (Cameron, Heath, & Taylor, 2012b). These mothers were also aware of the differences between gagging and choking, the former being a natural reflex that helps prevent choking (Committee on Injury & Prevention, 2010). In the BLISS intervention study, there were no serious choking incidents reported (Taylor et al., 2017). However, this could be due the additional education given to the participants on how to avoid choking in infants with food, and therefore may not represent the general population's approach to BLW.

With the baby-led complementary feeding approach children have more autonomy in the amount of food they consume. It is possible that if the actual amounts of food consumed are not adequate, the child may experience some growth faltering. Indeed, children fed with a baby-led complementary feeding approach have been reported to consume less of their food than those fed with a parent-led complementary feeding style, which may indicate a tendency to lower energy intake and thus greater likelihood of growth faltering (Brown & Lee, 2011b). However, as the parents in this survey were asked to report the proportion of a meal consumed, it is possible that the meals offered with a baby-led complementary feeding approach were larger and therefore the proportion consumed would seem smaller. A quantitative measure of food consumed would better illuminate the difference between the two groups. Children fed with a baby-led complementary feeding approach have also been shown to have a greater

incidence of BMI scores in the underweight range following the Centers for Disease Control and Prevention criteria (Townsend & Pitchford, 2012b). However, at 9.5%, this was still only a small proportion of the group and the presence of underweight cannot be directly linked to growth faltering. In addition, height and weight were self reported in the BLW group, which may have impacted the results. In the BLISS intervention study, there was no growth faltering reported in either group (Taylor et al., 2017). However, this could be due the additional education given to the BLISS participants on how to ensure adequate energy intake, which included high energy recipes, and therefore may not represent the general population's approach to BLW.

One of the most common first purée foods given to children is cereal, often baby rice, which is usually fortified with iron. This is done to support the growing child's need for this nutrient. When the baby-led complementary feeding approach is used these cereal based first foods may not be used (Cameron et al., 2013), as purées are difficult to manage for the self-feeding child. If the whole foods offered to a child with the baby-led complementary feeding style do not contribute adequately to their iron intake, it is possible that this could affect the growth and development of the child (Lozoff, 2007). In the BLISS intervention study, there were no differences in iron deficiency anaemia (Taylor et al., 2017). However, this could be due the additional education given to BLISS participants on how to include iron rich foods in their infant's diets, and therefore may not represent the general population's approach to BLW.

To date there has only been one intervention study investigating a baby-led complementary feeding approach that has measured the effects of the method on choking risk, growth faltering or iron status in children fed with this method and this was in a modified version of BLW. For parents and healthcare professionals to make informed decisions about this complementary feeding approach, further research with a larger and more generalised population is needed to clarify these effects.

2.2.4 Cost of a baby-led approach to complementary feeding

While no studies have directly measured the cost of a baby-led complementary feeding approach, there has been some evidence that parents perceive it to be cheaper (Brown & Lee, 2013; Cameron et al., 2012b). Cost of food plays an important role in consumers' purchasing choices, particularly for those on a low income (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998; Maubach, Hoek, & McCreanor, 2009; Steenhuis, Waterlander, & de Mul, 2011). It has also been shown that a price discount of fruit and vegetables significantly increased consumption of this food group in adults (Waterlander, de Boer, Schuit, Seidell, & Steenhuis, 2013). Therefore, it is clear that the cost of food plays an important role in purchasing behaviour and ultimately consumption. If a baby-led complementary feeding approach were indeed cheaper than a parent-led complementary feeding approach, this would be an added benefit. However if it involves extra expense this may prove to be a barrier to parents using the method. To date, no intervention studies have investigated the cost difference between a baby-led complementary feeding approach and a parent-led complementary feeding approach.

2.3 Acceptability of a baby-led complementary feeding approach for parents

A number of studies have investigated parent perceptions of a baby-led complementary feeding approach, as shown in **Table 2**. An important factor to establish in regards to a baby-led complementary feeding approach is the acceptability to parents. If the method can be found to have health benefits for the child, the degree of acceptability to parents would need to be taken into account when promoting it to the general population via the healthcare system.

2.3.1 Positive perceptions of the baby-led complementary feeding approach for parents

The various positive perceptions that have been shown by these studies are around the method being easier, healthier, and less expensive. A common perception is that because the child is included in the family meal and is fed family foods the method is easier and takes less time, is less stressful and more pleasurable (Arden & Abbott, 2014;

Brown & Lee, 2013; Cameron et al., 2012b). One of the factors leading to decreased stress may be that rejection of food by the child is seen as acceptable, and therefore the parent is not worried about whether the child eats all the food they have offered (Arden & Abbott, 2014). Parents who choose to use this method may also be using less maternal control and be less worried about the child gaining enough weight (Brown & Lee, 2011c). The child is also trusted to eat what they need and when they need (Arden & Abbott, 2014), which would also create less stress at meal times. Another factor that was believed to impact the child's health in a positive way was that the child would be less fussy and therefore eat a greater variety of foods (Brown & Lee, 2013; Cameron et al., 2012b), and this in turn may make it more acceptable to parents. The method was also viewed in a positive way as it was considered to cost less (Brown & Lee, 2013; Cameron et al., 2012b). Two studies have asked mothers whether they would recommend the method to other parents. While all would recommend the method, some felt that combining the method with spoon feeding was advisable to ensure adequate nutrient intakes (Cameron et al., 2012b; Cameron et al., 2013).

Table 2.2 Observational studies investigating experiences of parents using a baby-led approach to complementary feeding

Author(s)	Participants	Study design	Results
Arden and Abbott (2014)	15 Mothers living in the UK with an infant 9 – 15 Months of age	Semi-structured interview conducted over 5 emails	Child was trusted to consume the food when they were ready. Infant had control of amount and what they eat, which would lead to good appetite control. Child's rejection of food acceptable with BLW. Some were worried about adequate intake. Others found the family meal less stressful. Some helped or used a spoon to reduce mess and increase consumption.
Brown and Lee (2013)	36 Mothers with infant 12-18m living in the UK.	Semi-structured interviews asking about attitudes, beliefs and behaviours with BLW.	Belief that the child would be less fussy and eat ↑ variety. Belief that low maternal control for feeding would result in better self-regulation. Trusted infants to eat enough and wide variety. Concern ↓ over time regarding adequate intake. Mealtimes were easier, ↑pleasure, ↓cost and time. Mess and food waste a concern, both got better over time. Concerned at first about choking but over time learn to tell difference between gagging and choking.
Cameron et al. (2012b)	31 Healthcare professionals working with infants/families. 20 mothers who had used BLW (self-defined), all living in New Zealand.	1-1.5hr interviews.	BLW was considered more convenient and less expensive. Mealtimes easier as no extra preparation for child, didn't have to feed child. Felt that child could develop healthier eating habits by recognising satiety and trying a greater variety of foods. Some concerns about what foods to give when, and adequate iron intake. Were prepared for and not worried about gagging, although it took some time to differentiate gagging from choking. Mess was biggest disadvantage, but got better with time. All would recommend to other mothers.

Cameron et al. (2013)	199 Parents living in New Zealand with an infant 6 – 12 months of age	Online survey. Adherent: tried BLW, infants mostly or always self-fed at 6-7 months. Self-identified: had tried BLW but spoon-fed at least half time. Parent led: spoon-fed at least half the time.	All recommended BLW, more than half recommended combining with spoon feeding. Reasons for not trying BLW were fear or choking, child not getting enough, thought child not capable, SW worked fine.
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BLW: Baby-led weaning
 SW: Standard weaning

2.3.2 Negative perceptions of the baby-led complementary feeding approach for parents

There are also various negative perceptions of BLW that have been reported by parents. These are worries about the child choking, whether the child will consume an adequate amount of food, and the mess involved with the feeding approach.

In a New Zealand study interviewing mothers who used a self-defined baby-led complementary feeding approach, some were not worried about choking (Cameron et al., 2012b). In a similar study in the United Kingdom exploring mothers experiences choking was a concern, but they found this worry decreased over time once they were able to differentiate gagging from true cases of choking (Brown & Lee, 2013). For other parents, fear of choking was one of the factors preventing them from trying the method (Cameron et al., 2013).

Some parents found it difficult to know what foods to give and when (Cameron et al., 2012b), while others were concerned about the child having an adequate intake of food, although for some this concern decreased over time as the child became better at eating (Arden & Abbott, 2014; Brown & Lee, 2013). Indeed, concern over adequate food intake by the child was also cited as a reason for not trying the baby-led complementary feeding approach (Cameron et al., 2013). Growth faltering was not a concern expressed specifically by parents, however their concern over adequate intake could be interpreted as such (Cameron et al., 2012b). Parents were also concerned about the child's iron status, particularly as iron rich infant cereals were not used with the baby-led complementary feeding approach (Cameron et al., 2012b).

While the mess involved with a baby-led complementary feeding approach was considered a negative aspect, parents reported that this improved with time (Brown & Lee, 2013; Cameron et al., 2012b). In some cases the parent would help the child or use spoon feeding to limit mess (Arden & Abbott, 2014). In relation to mess, food wastage was also expressed as a concern, particularly when expensive food items were given (Brown & Lee, 2013).

Overall, the limited data suggest that parents find the baby-led complementary feeding approach easier, less stressful, and less expensive. They also believe that the wider variety of foods consumed and greater energy self-regulation will lead to healthier eating habits and body weight in the child. While choking was a commonly stated concern, this concern decreased over time, along with concerns over adequate intake and mess. A limitation of these studies may be that parents who have had success with a baby-led complementary feeding approach and therefore persisted with it may be more likely to take the time to participate in a study, and therefore their results are more favourable to this feeding approach.

While these observational studies illuminate positive and negative aspects of the acceptability of a baby-led complementary feeding approach to parents, to date no intervention studies have examined these aspects of acceptability for parents who would otherwise not normally be motivated to use this complementary feeding approach.

2.4 Methods for measuring acceptability of complementary feeding style to parents

2.4.1 Methods for measuring overall acceptability of complementary feeding style to parents

Acceptability can be measured using qualitative or quantitative methods, or a mix of both. Qualitative content analysis methods can be useful for drawing out themes from the data, and in the case of directed content analysis, preconceived theories can be validated or extended (Hsieh & Shannon, 2005). Three studies have investigated parents' perceptions and attitudes to a baby-led complementary feeding style with these methods (Arden & Abbott, 2014; Brown & Lee, 2013; Cameron et al., 2012b). All three used semi-structured interviews, which were conducted in person or by email. Content analysis was performed in each case to identify themes and sub categories in the participants' responses. Results were then presented according to the identified themes. While this method is more labour intensive, it allows themes to be established which researchers may not have considered.

For a quantitative method of measuring perceptions and attitudes, the Likert scale is often used to rate participants' agreement with set statements (Likert items), with response options ranging from strongly agree to strongly disagree (Alphen, Halfens, Hasman, & Imbos, 1994). These data can then be used to effectively compare the perceptions and attitudes of different groups in a quantitative manner. To date, only one study has investigated the perceptions and attitudes of parents to a baby-led complementary feeding approach in a quantitative manner (Brown & Lee, 2011b). Using an online questionnaire the study measured anxiety, enjoyment, and confidence in relation to infant feeding. This was done using a five point Likert scale which produced results that could be analysed and presented in a quantitative manner.

While qualitative methods may be useful in establishing the common themes around a subject, these themes need to be measured in a quantitative manner for significant differences between groups to be established.

2.4.2 Methods for Measuring Diet Cost

Methods for estimating dietary intake have been well tested over time and include the weighed or estimated diet record (WDR or EDR), the diet history questionnaire (DHQ), the 24 hour recall, and the food frequency questionnaire (FFQ). These methods can then be linked to any of the food cost estimation methods described below. These methods include using food purchase receipts, either from supermarket shopping or from all food purchases. The household expenditure can then be divided evenly between occupants, or linked to individual dietary data. There are a paucity of data evaluating methods for assessing the cost of dietary intake. As such, no 'gold standard' or best practice has yet been defined for these methods.

Food costs can be estimated using various methods. Using food purchase receipts collected by participants, which are then linked to dietary assessment data, is one method (Aaron, Keim, Drewnowski, & Townsend, 2013). These receipts can then be used to estimate either household or individual food costs. Household food costs are estimated by adding all food purchases from supermarket receipts to estimate a total food cost over the set receipt collection period. A more comprehensive method is to

collect all receipts pertaining to food consumed by the household. This reduces underestimation produced by the assumption that the household only eats food that is purchased from the supermarket. However, a limitation of this method is if participants eat foods already purchased before the start of the study. Where individual food costs are estimated receipts must pertain to purchases only for the individual, or the individual's dietary intake must be recorded to ascertain which foods from household receipts have been consumed. In either the case of the household, or the individual, the accuracy of this method can be increased by using dietary intake data to show which of the foods were actually consumed during the specified time period of investigation. This however, makes the method very labour intensive for both participants and researchers, thus reducing the practical applications in larger scale research projects. A less labour intensive, but also less accurate, method for individual food expenditure estimation is to take the household food expenditure and divide it by the number of people in the household to give a per capita food expenditure cost. However this method assumes that each individual consumes an equal amount of the food purchased and when comparing people with greatly varying eating habits this could produce very inaccurate results.

Supermarket prices collected by the researcher can also be used to estimate dietary costs (Timmins et al., 2013). Prices that reflect those likely to be encountered by the participants are collected using supermarkets in the region where the participants live. Average prices taken from a selection of supermarkets or from one supermarket with prices that are in the mid-range of those locally available can be used. Prices are collected as close as possible to when the dietary data are collected to reflect the actual prices encountered by participants at the time. When dietary data are collected over more than one season of the year, multiple price samplings can be collected to account for seasonal variation in prices. Where it is unclear from the dietary intake data exactly which type of a food is consumed, for example which brand of pasta, the average price of all the available brands of pasta can be used. It is also important that the edible portion of a food is taken into account, particularly when foods are reported metrically. For example, when 50g of banana is reported to be consumed, the weight of the skin of that much banana must be calculated, to then be able to correctly estimate the cost, as a banana is sold by weight with its skin on. While this method is initially labour

intensive, it can provide cost data applicable to large groups of participants. There is also the possibility of adding the prices as an extra nutrient line in a nutrient analysis program, making it less labour intensive overall than using household or individual food purchase receipts, and therefore more practical. This is also better for comparing large groups of participants to establish the difference in cost. It is however, less accurate than the food purchase receipt method as the assumption is that all foods consumed are purchased at supermarkets and then prepared and eaten at home, thus introducing underestimation of costs.

National food price surveys are the least labour intensive method for estimating dietary costs (Murikami et al., 2008). Similar to the above method, however, it introduces underestimation as foods are assumed to be purchased and then prepared and eaten at home. And again, when foods are reported metrically, the edible portion must be accounted for to calculate the true cost of the food. While prices can be adjusted to account for inflation if the survey data are not recent, seasonal variation in prices may not be accounted for if the price sampling was only done at one time point.

Only recently have some specific method studies been done that attempt to compare, and in some cases to validate, the different methods of measuring diet cost against each other. In a group of 121 lower income women, no significant difference in average diet cost was obtained when comparing a 24 hour recall linked to food expenditure recorded by receipts and self-made price notes, and a FFQ linked to supermarket and fast food chain prices (Aaron et al., 2013). For both methods the edible portion was accounted for. Interestingly, there was no significant difference in the mean daily dietary cost between the two methods, but the relationship between the two was only weak with a Pearson correlation coefficient of 0.21 ($p < 0.05$). From this comparison we see comparable results in lower income women may be achieved. However, due to the use of two different dietary intake methods, it is unclear what effect the price collection method has on the results and no new insights into the validity of either method are provided.

In a similar approach, another set of methods were compared against each other, again with no common point of comparison. Household per capita food cost was compared with supermarket prices linked to a 4-day weighed diet record (4DDR) (Timmins et al., 2013). Receipts were collected by 214 households over a 28 day period. The per capita food costs took wastage into account by applying a -15% correction factor. The 4DDR completed by the same participants was then linked to the DANTE food cost database created with supermarket prices. The results showed a weak, albeit significant, correlation between the two methods (Pearson's $r=0.33$ $p<0.001$), however this difference was no longer significant when the diets of the children in the household were analysed alone (Pearson's $r=0.22$ $p = 0.06$). The children's mean diet cost was found to be significantly higher for the receipt method than for the DANTE database method (£2.00 vs £2.55 $p = 0.001$), whereas for the whole group no significant difference was found (£2.96 vs £3.06 $p = 0.81$). As the authors suggest, this may be because the till receipt method assumes that children consume the same amount as adults thus creating an overestimation for that subgroup. While linking food expenditure receipts to dietary intake can be more labour intensive, as a more accurate method it could have been used to strengthen the validity of the comparison in this study.

A more robust comparison of methods was conducted by keeping one factor constant in each comparison in a study by Monsivais, Perrigue, Adams, and Drewnowski (2013). A 4-day diet record (4DDR) was linked to both food expenditure receipts and to supermarket prices. The second comparison they did was between the methods of the 4DDR and a FFQ against the supermarket prices method. In this way they compared two methods of food price collection (food expenditure receipts and supermarket prices) against one method of dietary intake estimation (4DDR). And then two methods of dietary intake estimation (4DDR and FFQ) against one method of food price collection (supermarket prices). This was to compare food price collection methods (in the former comparison) and dietary intake estimation methods (in the latter comparison). The study was conducted over four weeks with 164 participants, starting with the FFQ. Supermarket receipts were collected for the whole duration, but receipts for food purchased away from home were only collected for the last two weeks. When the 4DDR was linked to food expenditure receipts, dietary intake was only able to

explain 6% of the diet cost ($r^2=0.06$) which can be explained by the huge variation in food expenditure reported by the participants compared to the relatively narrow variation in energy intake. This suggests that although participants were eating similar foods, the costs for these foods varied widely. When the 4DDR and FFQ were linked to supermarket prices, they explained 24% ($r^2=0.24$) and 66% of the diet cost respectively. However, it is important to note that receipts for food consumed away from home were only collected for the last two weeks, in order to decrease the burden on the participants, so these foods could not be included in the receipts calculations, leading to underestimation. In contrast, the supermarket price approach was able to assign supermarket prices to food purchased away from home in those first two weeks. If the data from each two week collection period had been kept separate this would have provided a useful insight into the degree of underestimation produced by not collecting receipts for food consumed away from home. Also, a short time period of three months for collecting supermarket prices means that seasonal variation was not taken into account. In addition, as the various participants were being recruited and completed the 4DDRs at different times in the year, prices may have been over or underestimated depending on the season. These results show that food expenditure estimated from receipts may reflect the individual diet costs very well, as each individual's expenditure is recorded. However, for group analysis the large variability in food prices from individual food purchase receipts may make relationships between diet cost and dietary intake difficult to establish. In contrast, although linking supermarket prices to dietary data may underestimate diet cost as it is only able to factor in the ingredient cost of food purchased and consumed away from home (e.g. restaurant meals), it produces a less variable range of results. This is because participants may spend widely varying amounts on the same types of food depending on brand or whether it was ready made or made at home. Using one source of dietary cost such as the supermarket, means that all foods are assigned the same price. Therefore, results produced by using supermarket prices may be more helpful in determining the cost of a particular dietary pattern, without being influenced by different participants' brand choices. This latter method is also more practical in that it reduces the labour burden on both participants and researchers.

Another robust comparison was conducted by Murikami et al. (2008) using one source of dietary cost data against two different dietary intake methods. A group of 92 Japanese women and their husbands completed a DHQ (DHQ 1-4) asking about the previous month and a weighed 4DDR (DR 1-4) once every season from 2002 to 2003. The results show a reasonably strong agreement between the methods with a Pearson correlation coefficient of 0.64 for women and 0.69 for men. They also compared DHQ 1 with DR 1-4 to see whether one DHQ recalling the previous month could predict a whole year's food expenditure, with a resulting Pearson correlation coefficient of 0.60 for women and 0.52 for men. Each time the DHQ was done first, which would have reduced bias created from heightened awareness of dietary intake after completing the 4DDR. However this does mean that the 4DDR was done in a time period not captured by the DHQ, making the results somewhat less comparable. They used the National Retail Price Survey 2004, and mean prices from a national supermarket and two fast food chains for foods not included in the survey. Thus we see that the less labour intensive DHQ method may produce similar results to the more accurate 4DDR in men and women, and may even be able to predict a year of food expenditure to some degree. As the purpose of this study was to compare the two different dietary intake estimation methods, the decreased accuracy due to the underestimation involved in the use of survey and supermarket price data was of minor importance.

There are various ways to estimate the cost of dietary intake with varying degrees of accuracy and practicality. Little research has been done to evaluate these methods and it is unclear what the best practice in this field may be as no gold standard has been defined. While food expenditure receipts may represent the most accurate method for estimating food expenditure, it has been shown to be unsuitable for use with larger groups. The use of food expenditure receipts to estimate a household per capita food cost has also been shown to be unsuitable, particularly when comparing groups with large variations in dietary intake. Using price data from supermarkets and national price surveys has produced the best results. While the 4DDR is a more accurate measure of dietary intake, the FFQ and DHQ have both been shown to produce similar results when investigating food expenditure, and in fact the DHQ may even be able to predict longer periods of food expenditure. National price survey data are less accurate because they bring limitations when the data are not recent, as inflation of prices must

be adjusted for, and new products to the market may not be included. Therefore, supermarket price data represents the most practical method for assigning current price data to dietary intake. While the less labour intensive methods of FFQ and DHQ may produce similar results to the 4DDR, this latter method was deemed most suitable for the BLISS study as closer scrutiny of dietary intake was the primary focus of that study and that could only be achieved using a weighed diet record.

2.5 Conclusion

A baby-led complementary feeding approach appears to give more control to the child of what and how much to eat. There are some possible benefits to a baby-led complementary feeding approach that include improved satiety control and less picky eating in the child. In particular, satiety control has been shown to be improved in children fed with a baby-led complementary feeding approach. Characteristics such as waiting until 6 months to introduce complementary feeding and increased variety of food, similar to the baby-led complementary feeding approach, have been associated with less picky eating in children. In addition, extended use of puree foods may have a negative effect on children's acceptance of foods. There are some possible risks associated with a baby-led complementary feeding approach, which include choking, growth faltering, and reduced iron status. These possible benefits and risks of a baby-led complementary feeding approach have only been investigated with one intervention study to date, and further research is needed determine their occurrence in comparison with a parent-led complementary feeding approach.

The acceptability of a baby-led complementary feeding approach to parents has been investigated in an observational manner to some degree. Overall, parents seem to find the method easier and expect it to be healthier for their child due to better self-regulation of energy intake and decreased picky eating. Concerns regarding choking, adequate intake, and mess were common, however these concerns decreased over time. While these aspects of acceptability have been investigated in an observational manner, no randomised controlled intervention study has attempted to study them in a quantitative manner. One particular aspect of the acceptability of the baby-led complementary feeding approach is cost. While parents using the baby-led complementary feeding approach perceive it to be less expensive, no randomised controlled intervention studies

have investigated the difference in cost between a baby-led or parent-led complementary feeding approach. This means that it is not known whether these approaches differ in cost and, if so, whether this is the result of the feeding approach itself, or merely reflects the characteristics of families who choose to follow BLW – a question only a randomised controlled trial can answer.

3 Methods

3.1 Introduction

The Baby Led Introduction to Solids (BLISS) study was a randomised controlled study, running over a two year period from its commencement in 2013. It investigated the effect of the baby led method of introducing solids to infants. However, due to concerns being raised about the potential for growth faltering, iron deficiency, and choking within this feeding method (Cameron, Heath, & Taylor, 2012), the study used a modified version of baby-led weaning. It involved a one year intervention, from birth until 12 months of age, and had a one year follow up until the child was 24 months of age. The aim of the study was to establish whether a baby led approach prevents overweight by encouraging self-regulation of energy intake in the child, and whether this could be done in a manner that would not negatively affect iron status or growth. This thesis focuses on the acceptability to parents of the baby-led approach to complementary feeding. The study was approved by the Lower South Regional Ethics Committee of New Zealand (Project key: LRS 11/09/037). Prior to randomisation the primary caregiver of each child gave written informed consent.

3.2 Participants

At 28 weeks gestation, all pregnant women booked at the Queen Mary Maternity Centre in the Dunedin Public Hospital, the only maternity unit available in the city, were sent a letter of invitation to participate in the study. Contact was made by phone if the mother had not opted out after two weeks using the phone number provided. At this point the study was further explained and the mother could choose to officially enrol in the study or to opt-out. The recruiting period was from December 19 2012 to March 17 2014. Exclusion criteria included not being booked at the local maternity unit before 34 weeks gestation, being younger than 16 years, not intending to live locally for the next two years, and not being able to communicate in either English or Te Reo Māori. After birth, participants were excluded if the baby was born prematurely (less than 37 weeks gestation), or had a congenital abnormality that could affect feeding or growth.

3.3 Study design

Out of the 879 women approached, 206 were considered eligible and randomised to the control (n=101) or BLISS (n=105) groups. Randomisation was achieved using random length blocks after stratification for parity (first child, subsequent child) and education (non-tertiary or tertiary). Research staff were blinded to group allocation until all primary analyses were completed.

All families received Well Child health care checks, available free of charge to all New Zealand children up until five years of age (<http://www.health.govt.nz/your-health/pregnancy-and-kids/services-and-support-you-and-your-child/well-child-tamariki-ora-visits>). The BLISS group received an additional eight contacts, either individually or within a group setting that were either face to face or by telephone. These were for support and education on the BLISS approach to complementary feeding. Participants were encouraged to delay the introduction of solids until 6 months, and to respond to hunger and satiety cues in a responsive feeding manner. Recipes and advice were also given to encourage a diet high in iron and energy, and safety advice given on how to avoid choking risks. Participants were also able to request extra support.

3.4 Questionnaires

The baseline questionnaire was completed by the mother at 30 weeks gestation. Demographic variables collected were maternal age, self-reported pre-pregnancy weight and height, education, employment, parity, ethnicity, and household deprivation. Sex and birthweight of the infant were collected from hospital records.

The acceptability questions in the 7, 8, 9, and 12 month questionnaires were developed by a team of nutritionists, paediatricians, and a dietitian (see Appendix B for the 9 month questionnaire). These questions aimed to capture aspects of baby led weaning that could be considered acceptable or unacceptable by parents. These aspects were taken from the current literature on baby led weaning, in particular work by Cameron et al. who investigated the attitudes of mothers to baby led weaning (Cameron, Heath,

& Taylor, 2012). Themes for the open ended questions were identified by reading through all answers to find concepts that described the responses of multiple participants, and each response was then coded to these “themes”. While coding the answers into these main themes, further minor themes were identified.

3.5 Dietary cost differences

The cost of foods consumed at 7 months of age was estimated using supermarket prices linked to the diet records of 206 participants, instructions for which can be found in Appendix A. A single supermarket chain was used (Countdown), chosen for convenience as it was the only supermarket in Dunedin with an online shopping website. An online website made the pricing process simpler, given that close to 1000 foods had to be priced. As items available and prices differed by region, prices were collected for the Dunedin region, where our participants lived. Prices for all foods consumed were collected at the beginning of November 2014 once all the diet records were collected. The 3DDRs had been completed over a period of 14 months by the various participants as they reached 7 months of age, from August 2013 to October 2014. Therefore seasonal variation in fruit and vegetable prices were accounted for by also sampling prices at the beginning of May and August 2014, and February 2015. This was also done to capture seasonal items that were only available for shorter times that may have been missed in a twice annual price sampling. Prices were sampled by viewing the foods on the supermarkets online shopping website and entering the name as a food ID (e.g. Apple, braeburn), any additional identifying information such as brand or variety offered on the website listing, unit of measurement (e.g. bag 150g, or loose per kg), and the price into an Excel spreadsheet. Collecting prices of all the 305 available fruit and vegetables was necessary for the first two price samplings as the 3DDRs were not yet completed. All herb and condiment prices were excluded as these were assumed to be consumed in such small quantities that their contribution to overall diet price would be negligible. Where items were listed as a non-metric unit, for example a whole pumpkin, the average weight was ascertained by random sampling of 5 items in the supermarket. The cost per 100g was calculated for all fruit and vegetables using the average price from the four price samplings.

Where foods were reported only in their prepared form e.g. banana peeled, USDA conversion factors were used to calculate the unpeeled weight of the banana so that cost of the banana as purchased could be estimated. For example, when 50g of peeled banana was consumed a conversion factor of 1.56 was used to convert the peeled weight back to the weight of the unpeeled banana ($50 \times 1.56 = 78\text{g}$ unpeeled banana). In most cases cooked foods consumed were reported as the raw ingredients before cooking, making price estimation simpler. Foods reported only in the cooked form, e.g. 50g cooked rice, were converted back to the dry uncooked weight using the USDA conversion factors ($50\text{g} \times 0.36 = 18\text{g}$ uncooked dry rice). Where foods were reported in the cooked form but without a recipe reported, the recipe ingredients were estimated in terms of content and amount. The cost for each food eaten was then calculated, e.g. if the cost of bananas was \$0.30/100g, and 50g of peeled banana was consumed (78g unpeeled), then the cost of the banana consumed is $\$0.30 \times 0.78 = \0.23 . Calculations were completed on an Excel spreadsheet that included the various forms of each food matched to its specific conversion factor e.g. apple, cored and defects removed, raw, conversion factor X; apple, peeled, cored and defects removed, conversion factor X raw; and apple, peeled, cored and defects removed, cooked, conversion factor X. The conversion factor was then used to calculate the price per 100g, as purchased, for each form of the apple. Similar calculations were used for all foods consumed by the participants.

Where an unspecified variety or brand of food was given in the 3DDR, the average price was used. For example, the average price of all the apple varieties was used when just 'apple' was recorded. The cost of each day of each participant's diet was then calculated.

3.6 Statistical analyses

All statistical analyses were completed using Stata 15.1 (StataCorp, Texas).

Mean scores (SD) were calculated for Likert scale variables at each age (7, 8, 9, and 12 months). To determine the overall difference in scale scores between the BLISS and Control groups in this time a mixed effects regression analysis was used, with a random effect for participant ID. At each age differences between groups for dropping and

throwing food were first described using dichotomous variables (they did this at ‘some’ or ‘most’ of the meals compared to ‘rarely’ or ‘never’), along with the number acting to make mess at home and away from home more manageable (‘yes’ or ‘no’). Then population-averaged odds ratios and 95% CI were calculated using generalised estimating equations for a binomial distribution.

4 Results

4.1 Participant Demographics

The demographic characteristics of the participants are shown in **Table 4.1**. Both groups had a mean maternal age of 31.3 years. Approximately half of the participants had completed tertiary education (53% of Controls and 43% of BLISS). The majority were New Zealand European, although 10-15% were Māori or Pacific. Participants were most commonly in the mid-range of 4 -7 for household deprivation (49% for Control and 53% for BLISS). In total, 44% of participants were in the highest three deciles of household deprivation (23% in Control and 21% in BLISS), compared to the expected 30% for the general population.

Table 4.1 Participant characteristics at baseline

Variable		Category	Control n (%)	BLISS n (%)	
n			101	105	
Maternal variables	Age (years) ¹	<i>Mean (SD)</i>	31.3 (6.2)	31.3 (5.0)	
	Pre-pregnancy BMI ²	<i>Mean (SD)</i>	25.6 (5.6)	25.9 (6.3)	
	Education	School only		29 (28.7)	34 (32.4)
		Post-secondary		19 (18.8)	24 (22.9)
		University		53 (52.5)	47 (44.8)
	Employment	Not employed		33 (32.7)	20 (19.0)
		Part-time		27 (26.7)	36 (34.3)
		Full-time		41 (40.6)	49 (46.7)
	Parity	First child		42 (41.6)	43 (41.0)
		Two children		32 (31.7)	43 (41.0)
3 or more children			27 (26.7)	19 (18.0)	

	Ethnicity	New Zealand European or Other	85 (84.2)	83 (79.0)
		Māori or Pacific	10 (9.9)	15 (14.1)
		Asian	6 (5.9)	7 (6.7)
	Household deprivation	0-3 (Low)	29 (28.7)	31 (29.5)
		4-7	49 (48.5)	53 (50.5)
		8-10 (High)	23 (22.8)	21 (20.0)
Infant variables	Sex ³	Male	53 (52.5)	43 (41.0)
		Female	47 (47.5)	62 (59.0)

Data expressed as n (%) except where indicated. Data missing for 1¹, 7², and 1³ participants.

BLISS (Baby-Led Introduction to SolidS), BMI (body mass index).

4.2 Parental perceptions of acceptability of complementary feeding method

Table 4.2 shows the responses given by the participants to questions designed to establish their acceptance of the complementary feeding method they were assigned to. Both groups reported high levels of convenience and happiness, and found the method suited them very well. However, they did find the method very frustrating. The only significant difference between the groups was in the expense of the feeding method, where the BLISS group were more likely to perceive the method as expensive.

Table 4.2 Parental perceptions of convenience, happiness, frustration, expense, and extent to which the complementary feeding approach “suits” them at 7 to 9 and 12 months of age

	7 months, mean (SD)		8 months, mean (SD)		9 months, mean (SD)		12 months, mean (SD)		Overall ^a , mean (SD)		Mean difference between groups ^b (95% CI)
	Control (n=88)	BLISS (n=94)	Control (n=83)	BLISS (n=91)	Control (n=87)	BLISS (n=95)	Control (n=81)	BLISS (n=92)	Control (n=91)	BLISS (n=97)	
Convenience ^c	3.8 (1.0)	3.8 (1.0)	4.0 (1.0)	3.9 (1.0)	4.0 (0.9)	4.0 (1.1)	3.6 (1.2)	3.8 (1.3)	3.8 (0.7)	3.9 (0.7)	0.0 (-0.2, 0.2)
Happiness (respondent) ^d	4.6 (0.7)	4.3 (0.9)	4.5 (0.8)	4.3 (1.0)	4.5 (0.8)	4.4 (0.8)	4.3 (1.0)	4.4 (0.9)	4.4 (0.6)	4.4 (0.8)	-0.1 (-0.2, 0.1)
Happiness (partner) ^d	-	-	4.6 (0.9)	4.4 (0.9)	4.5 (0.9)	4.3 (1.0)	-	-	4.5 (0.8)	4.4 (0.8)	-0.2 (-0.4, 0.1)
Frustration ^e	4.3 (1.0)	4.1 (1.1)	4.2 (1.0)	4.2 (1.0)	4.1 (1.1)	4.2 (1.0)	4.0 (1.0)	4.2(0.9)	4.2 (0.8)	4.1 (0.8)	0.0 (-0.2, 0.2)
Expense ^f	3.9 (1.1)	4.2 (0.9)	3.9 (0.9)	4.3 (1.0)	3.9 (1.0)	4.1 (1.0)	3.6 (1.0)	4.0 (0.9)	3.8 (0.8)	4.2 (0.8)	0.4 (0.1, 0.6)
Suits the parent ^g	4.4 (0.8)	4.4 (0.8)	4.5 (0.8)	4.3 (0.9)	4.5 (0.8)	4.4 (0.8)	4.5 (0.7)	4.5 (0.9)	4.5 (0.6)	4.4 (0.7)	-0.1 (-0.2, 0.1)

^a Mean scores for each participant from 7, 8, 9, and 12 months were calculated.

^b Regression analysis compared BLISS with Control adjusted for maternal parity and education, and infant sex.

^c Possible responses range from 1 – 5. 1 = very inconvenient to 5 = very convenient.

^d Possible responses range from 1 – 5. 1 = very unhappy to 5 = very happy.

^e Possible responses range from 1 – 5. 1 = not at all frustrating to 5 = very frustrating.

^f Possible responses range from 1 – 5. 1 = very inexpensive to 5 = very expensive.

^g Possible responses range from 1 – 5. 1 = doesn’t suit me at all to 5 = suits me very well.

4.3 Open ended responses to questions on acceptability of complementary feeding method

In response to the question “What is it about this approach to giving your baby solids that you like”, three main themes were identified: benefit to the child (**Table 4.3**), convenience for the parent (**Table 4.4**), and pleases the parent (**Table 4.5**). Example quotes from both groups for each sub-theme can be found in C.

The key *benefits to the child* (Theme 1; **Table 4.3**) included autonomy:

“She knows when she is finished - no force feeding and more independence.” (BLISS participant, age 8 months)

Interestingly the Controls also mentioned this frequently (101 quotes from BLISS compared to 55 from Controls), although their perspective on autonomy was slightly different:

“Mum gives baby a turn - enjoys this. Baby gets an idea of putting spoon in his mouth.” (Control participant, age 7 months)

Another key benefit to the child was increased variety:

“...introduces him to a wide range of foods early on...” (BLISS participant, age 8 months)

Controls also mentioned this (30 quotes from BLISS compared to 15 from Controls), again showing a different perspective

“Good to be able to choose different flavours and combinations.” (Control participant, age 7 months)

A third key benefit to the child frequently mentioned by both groups was improved fine motor skills (29 quotes from BLISS compared to 13 from Control):

“Really good for fine motor skills - able to pick up small dropped pieces of food and finish eating it.” (BLISS participant, age 7 months).

Controls also saw improvement in this area, but in a different way:

“She is now grasping at the spoon and starting to feed herself, developing hand-eye coordination.” (Control participant, age 7 months).

Of interest is that the Control group were more likely to comment on the health benefits of their feeding method (16 quotes from Controls compared with 8 from BLISS):

“More nutritious buying products because we know the vitamins and minerals are in the NZ baby food products” (Control participant, age 8 months).

Whereas the BLISS participants had a different perspective on this:

“Food not as processed.” (BLISS participant, age 9 months)

Table 4.3 Open ended responses on what the adult participant likes about the approach – theme ‘Benefit to the child’

Sub-theme	Group	Number of quotes			
		7m	8m	9m	Total ^a
Autonomy	Control	19	15	21	55
	BLISS	36	29	36	101
Increased variety	Control	5	3	7	15
	BLISS	10	8	12	30
Improve fine motor skills	Control	6	3	4	13
	BLISS	10	10	9	29
Health	Control	5	9	2	16
	BLISS	4	3	1	8
Child willing to eat	Control	4	5	1	10
	BLISS	1	1	1	3
More sleep	Control	0	1	0	1
	BLISS	1	0	1	2
Other benefit to child	Control	0	2	1	3
	BLISS	5	1	3	8

^a This is a total number of responses, participants could make similar comments at multiple time points.

In theme two, *convenience for the parent*, there were four key sub-themes (**Table 4.4**). The main sub-theme was that the method fits in with the family, which was predominantly around being able to serve family food:

“She's eating the same food and don't have to buy baby foods. Eats what the children are eating.” (BLISS participant, age 8 months).

The Controls gave fewer comments on this subject (131 quotes from BLISS compared with 48 from Control), but from a similar perspective:

“It is easy that she is now eating some of the same food as the rest of the family.” (Control participant, age 8 months).

General comments on convenience were made equally by both groups (66 quotes each) and were very similar: “It's really easy.” (BLISS participant, age 7 months). And “Find it easy.” (Control participant, age 7 months)

No extra meal preparation was another key *convenience* for the parent commented on by the BLISS group:

“Not having to prepare extra foods or buy much separate food.” (BLISS participant, age 8 months).

Controls commented similarly, although not nearly as frequently (7 quotes from Control compared to 58 from BLISS):

“Mum does not feel she has to make other meals.” (Control participant, age 8 months).

Another key convenience for parents was not having to feed the child themselves:

“That she's doing it, no-one has to sit there and feed her: very convenient.” (BLISS participant, age 9 months).

The Control commented on this far less frequently (27 quotes from BLISS compared to 6 from Control):

“Packets of food easy when out as he feeds himself.” (Control participant, age 8 months).

Table 4.4 Open ended responses on what the adult participant likes about the approach – theme ‘Convenience’

Sub-theme	Group	Number of quotes			
		7m	8m	9m	Total ^a
Fits in with family	Control	15	15	18	48
	BLISS	43	47	41	131
Convenience	Control	20	25	21	66
	BLISS	23	19	24	66
No extra meal prep	Control	2	4	1	7
	BLISS	19	22	17	58
Don’t feed	Control	2	1	3	6
	BLISS	3	7	17	27
Quick	Control	2	5	7	13
	BLISS	5	2	3	10
Less Mess	Control	2	5	4	11
	BLISS	0	1	1	2
Not expensive	Control	2	2	1	5
	BLISS	1	1	0	2
Don’t know any other way	Control	4	0	1	6
	BLISS	0	0	1	1

^a This is a total number of responses, participants could make similar comments at multiple time points.

The third theme, *Pleases the parent*, also had four key sub-themes (**Table 4.5**). The main sub-theme that pleased parents was the child enjoying food:

“Seeing her positive reactions and enjoyment of food, and seeing her enjoy healthy foods such as vegetables.” (BLISS participant, age 7 months).

Control participants were also enthusiastic about this (30 quotes from BLISS compared to 20 from Controls):

“Baby loves it, eats happily - baby enjoys method.” (Control participant, age 7 months).

An interesting difference between the groups was with the sub-theme of monitoring the amount of food:

“Know he is actually getting some food instead of playing with it.” (Control participant, age 7 months).

Whereas the BLISS group had very few comments on this (29 quotes from Control compared to 3 from BLISS), and one of these was using a mixed feeding approach:

“Like mix of finger foods and puree so I know he is eating enough as he cries when hungry.” (BLISS participant, age 9 months).

Another sub-theme that was more prevalent in the Control group was the parent bonding with the child:

“Closeness, spending time feeding them.” (Control participant, age 8 months).

Whereas the few comments from the BLISS groups (27 quotes from Control compared to 6 from BLISS) showed that the bonding came from family time together:

“...good family time...” (BLISS participant, age 8 months).

The fourth key sub-theme to arise was knowing what the child is getting:

“Like being able to control the texture and consistency.” (Control participant, age 9 months).

Interestingly there were 17 quotes from the Control group on this, and only one from the BLISS group:

“I know that he's getting it into his belly.” (BLISS participant, age 9 months).

Table 4.5 Open ended responses on what the adult participant likes about the approach – theme ‘Pleases the parent’

Sub-theme	Group	Number of quotes			
		7m	8m	9m	Total ^a
Child enjoys food	Control	6	8	6	20
	BLISS	10	14	6	30
Monitor amount	Control	8	11	10	29
	BLISS	0	0	3	3
Parent bonds with child	Control	12	10	5	27
	BLISS	4	1	1	6
Know what child is getting	Control	8	5	4	17
	BLISS	0	0	1	1
New foods	Control	9	3	2	14
	BLISS	6	1	1	8
Increased safety	Control	4	1	1	6
	BLISS	1	0	0	1
Influence amount	Control	2	2	0	4
	BLISS	0	0	0	0
Other pleases parent	Control	1	2	3	6
	BLISS	7	5	6	18

^a This is a total number of responses, participants could make similar comments at multiple time points.

The key *disadvantages to the child* (Theme 1; **Table 4.6**) included the child not eating enough:

“Possibly doesn't eat enough.” (BLISS participant, age 8 months).

This was mentioned less frequently by the Control group (3 quotes from Control compared to 11 from BLISS):

“Don't like it when she doesn't eat much.” (Control participant, age 7 months).

The other key sub-theme was the child getting frustrated when hungry, which was reported only in the BLISS group:

“At the moment he's not able to get as much as he would like, which makes him cranky.” (BLISS participant, age 8 months).

Table 4.6 Open ended responses on what the adult participant doesn't like about the approach – theme 'Disadvantage to the child'

Sub-theme	Group	Number of quotes			
		7m	8m	9m	Total ^a
Child not eating enough	Control	2	0	1	3
	BLISS	4	6	1	11
Child frustrated when hungry	Control	0	0	0	0
	BLISS	6	1	2	9
Poor self-feeding	Control	0	2	0	2
	BLISS	5	2	1	8
Constipation	Control	0	0	1	1
	BLISS	2	1	1	4
Feel like child is forced to eat	Control	1	2	1	4
	BLISS	0	0	0	0
Child not willing to eat	Control	0	0	1	1
	BLISS	2	0	1	3

^a This is a total number of responses, participants could make similar comments at multiple time points.

The second theme, *not convenient for the parent*, had three key sub-themes (**Table 4.7**). Mess was the most commented on (82 quotes from BLISS compared to 46 from Control):

“...the mess and the washing...” (BLISS participant, age 8 months).

Comments from the Control group were similar:

“How far the food can go. So much to clean up.” (Control participant, age 9 months).

The sub-theme of slowness showed this was a source of inconvenience for participants:

“The time it takes for baby to feed himself.” (BLISS participant, age 9 months).

And this also affected the Controls, although to a lesser extent (11 quotes from Control compared to 20 from BLISS):

“It takes a long time to feed him.” (Control participant, age 8 months).

Interestingly, the sub-theme of more work was commented on equally by both groups (15 quotes each), and seemed to come from a similar perspective:

“If the family food is not appropriate then have to find her something else, easier to open a jar of puree.” (BLISS participant, age 8 months);

“...the fact that she wants us to feed her first that I have to prep meals for her separately.” (Control participant, age 7 months).

Table 4.7 Open ended responses on what the adult participant doesn't like about the approach – theme 'Not convenient'

Sub-theme	Group	Number of quotes			
		7m	8m	9m	Total ^a
Mess	Control	17	13	16	46
	BLISS	23	27	32	82
Slow	Control	2	7	2	11
	BLISS	7	8	5	20
More work	Control	6	5	4	15
	BLISS	3	6	6	15
Increased waste	Control	4	0	1	5
	BLISS	2	3	5	10
Won't feed self	Control	2	2	4	8
	BLISS	0	0	1	1
Struggle for food ideas	Control	1	1	2	4
	BLISS	2	3	2	7
Increased cost	Control	4	1	2	7
	BLISS	1	0	1	2
Child will not allow feeding	Control	1	1	1	3
	BLISS	1	2	1	4
Time needed to supervise	Control	1	1	1	3
	BLISS	1	1	1	3
Other not convenient	Control	1	1	3	5
	BLISS	6	0	4	10

^a This is a total number of responses, participants could make similar comments at multiple time points.

The third theme of *worries the parent*, had two key sub-themes (**Table 4.8**). The one that worried parents most was the fear of choking:

“At beginning, concern she'd choke, now less of a concern as she's been fine.”
(BLISS participant, age 8 months).

While this fear was less commented on by the Control group (8 quotes from Control compared to 45 from BLISS), it was still of similar concern – although in the following quote this was because of a food the baby was feeding themselves:

“Don't really like feeding rusks because they break and afraid he might choke”
(Control participant, age 7 months).

The other key sub-theme was not knowing how much the child consumes, which highlighted uncertainties in the BLISS group:

“Don't know if she is getting enough. If I spoon feed her she might eat more.”
(BLISS participant, age 7 months).

While this was commented on less frequently with the Control group (11 quotes from Control compared to 16 from BLISS), the concern was similar:

“...hard to know how much is being eaten...” (Control participant, age 8 months).

Table 4.8 Open ended responses on what the adult participant doesn't like about the approach – theme 'Worries parent'

Sub-theme	Group	Number of quotes			
		7m	8m	9m	Total ^a
Fear of choking	Control	5	1	2	8
	BLISS	19	15	11	45
Don't know how much child consumes	Control	4	4	3	11
	BLISS	10	3	3	16
Lack of knowledge	Control	3	1	3	7
	BLISS	2	3	1	6
Don't know what nutrients child gets	Control	1	2	1	4
	BLISS	3	1	3	7
Can't read food like cues	Control	2	0	1	3
	BLISS	0	0	1	4
Can't read satiety cues	Control	1	1	1	3
	BLISS	1	1	0	2
Child eating too much	Control	0	0	0	0
	BLISS	0	1	2	3
Concern/fear from wider family and friends	Control	0	1	0	1
	BLISS	1	1	0	2
Lack of confidence	Control	1	1	0	2
	BLISS	0	0	0	0
Guilt for not allowing freedom	Control	0	2	0	2
	BLISS	0	0	0	0
Other worries parent	Control	0	0	1	1
	BLISS	2	0	0	2

^a This is a total number of responses, participants could make similar comments at multiple time points.

In response to the question “What do you think it is about this approach to giving your baby solids that they [the partner] like?”, three main themes were identified: *benefit to the child* (Table 4.9), *convenience for the partner* (Table 4.10), and *pleases the partner* (Table 4.11). Example quotes from both groups for each sub-theme can be found in

Appendix C. The key *benefits to the child* (Theme 1; **Table 4.9**) similar to those for the parent, included autonomy:

“she's learning to be independent, chew well. She lets us know when she's had enough.” (BLISS participant, age 9 months).

This was also mentioned by Controls (16 quotes from Controls compared to 28 from BLISS):

“likes that baby stops eating when full.” (Control participant, age 9 months).

Variety was the other key sub-theme mentioned:

“She's learning to have a variety of food which will hopefully lead to her not being fussy.” (BLISS participant, age 9 months).

This was commented on less frequently by the Controls (4 quotes from Controls compared to 15 from BLISS), and only at age 9 months, which may reflect the change in diet with increasing age:

“More variety and textures involved, rather than sloppy.” (Control participant, age 9 months).

Table 4.9 Open ended responses on what the adult participant thinks their partner likes about the approach – theme ‘Benefit to child’

Sub-theme	Group	Number of quotes		
		8m	9m	Total ^a
Autonomy	Control	8	8	16
	BLISS	15	13	28
Variety	Control	0	4	4
	BLISS	9	6	15
Fine motor skills	Control	1	0	1
	BLISS	4	5	9
Child willing to eat	Control	5	4	9
	BLISS	3	0	3
Health	Control	2	2	4
	BLISS	2	0	2
Other benefit to child	Control	1	0	1
	BLISS	1	3	4

^a This is a total number of responses, participants could make similar comments at multiple time points.

In Theme 2, *convenience for the partner*, there were two key sub-themes (**Table 4.10**). The main comment related to *convenience*, similar to that reported by the parent respondent themselves, was that the method fits in with the family:

“We can all eat at the same time.” (BLISS participant, age 8 months).

The Controls were less likely to comment on this (19 quotes from Controls compared to 51 from BLISS), but those who did comment found a way for their method to fit with the family:

“Eats the same meals but slightly different.” (Control participant, age 8 months).

The second key sub-theme to arise was around general convenience with number of quotes (38 quotes from Controls compared to 40 from BLISS) and types of comments being similar:

“...convenient...” (BLISS participant, age 8 months); and

“Easy and convenient.” (Control participant, age 8 months).

Table 4.10 Open ended responses on what the adult participant thinks their partner likes about the approach – theme ‘Convenience’

Sub-theme	Group	Number of quotes		
		8m	9m	Total ^a
Fits in with family	Control	10	9	19
	BLISS	23	28	51
Convenience for parent	Control	18	20	38
	BLISS	10	30	40
Don’t have to feed child	Control	3	2	5
	BLISS	5	7	12
No extra meal preparation	Control	2	3	5
	BLISS	6	5	11
Not expensive	Control	2	2	4
	BLISS	4	1	5
Quick	Control	1	1	2
	BLISS	2	2	4
Can feed anytime/food always available	Control	3	1	4
	BLISS	1	3	4
Less Mess	Control	3	2	5
	BLISS	0	1	1

^a This is a total number of responses, participants could make similar comments at multiple time points.

In the third theme, *pleases the partner*, there were two key sub-themes (**Table 4.11**). Partner bonds with child was the main sub-theme:

“Getting to sit with her and communicate about what she's eating.” (BLISS participant, age 8 months).

The Control group commented on this more frequently (18 quotes from Controls compared to 9 from BLISS), and showed a more hands on form of bonding:

“He likes spending time and talking to baby while feeding him.” (Control participant, age 8 months).

The other key sub-theme was contributing to feeding, with BLISS partners being reported to enjoy being involved in decision making:

“He can help decide what baby eats too.” (BLISS participant, age 8 months).

While the Controls enjoyed the physical task of feeding the child:

“...that they are able to be more part of feeding now.” (Control participant, age 8 months).

Table 4.11 Open ended responses on what the adult participant thinks their partner likes about the approach – theme ‘Pleases partner’

Sub-theme	Group	Number of quotes		
		8m	9m	Total ^a
Partner bonds with child	Control	10	8	18
	BLISS	6	3	9
Contribute to feeding	Control	7	8	15
	BLISS	5	3	8
Monitor amount	Control	5	5	10
	BLISS	0	2	2
Child tries new foods	Control	2	2	4
	BLISS	4	5	9
Child enjoys food	Control	2	3	5
	BLISS	4	4	8
Know what child is getting	Control	1	3	4
	BLISS	0	0	0
Don't have to do anything	Control	1	3	4
	BLISS	2	1	3
Increased safety	Control	1	2	3
	BLISS	0	0	0
Making food	Control	2	1	3
	BLISS	1	0	1
Support partner	Control	0	0	0
	BLISS	1	1	2
Baby gets fed/is not hungry	Control	2	0	2
	BLISS	1	1	2
Less waste	Control	1	1	2
	BLISS	0	0	0
Other pleases Partner	Control	1	4	5
	BLISS	5	2	7

^a This is a total number of responses, participants could make similar comments at multiple time points.

In response to the question “What do you think it is about this approach to giving your baby solids that they [the partner] don't like?” three main themes were identified: *disadvantage to the child* (Table 4.12), *not convenient for the partner* (Table 4.13),

and *worries the partner* (Table 4.14). There were two sub-themes in theme one (Table 4.12). The child not eating enough was the most commented on:

“Concerned that he is not eating enough.” (BLISS participant, age 9 months).
The Control group seemed less concerned about this:

“...would like to see him eating a bit more also.” (Control participant, age 9 months).

Table 4.12 Open ended responses on what the adult participant thinks their partner doesn't like about the approach – theme 'Disadvantage to child'

Sub-theme	Group	Number of quotes		
		8m	9m	Total ^a
Child not eating enough	Control	1	1	2
	BLISS	3	3	6
Other disadvantage to child	Control	2	0	2
	BLISS	0	0	0

^a This is a total number of responses, participants could make similar comments at multiple time points.

In the second theme, *not convenient*, there was only one key sub-theme (Table 4.13). The inconvenience of mess was commented on in similar numbers by both groups (29 quotes from Controls compared to 38 from BLISS), and from the same perspective:

“The mess all over her hands, sleeves, face.” (BLISS participant, age 8 months); and

“Doesn't like mess on her face (a wee bit grossed out).” (Control participant, age 9 months).

Table 4.13 Open ended responses on what the adult participant thinks their partner doesn't like about the approach – theme 'Not convenient'

Sub-theme	Group	Number of quotes		
		8m	9m	Total ^a
Mess	Control	12	17	29
	BLISS	21	17	38
Slow	Control	5	3	8
	BLISS	2	3	5
More work	Control	3	0	3
	BLISS	2	4	6
Increased cost	Control	2	2	4
	BLISS	0	0	0
Won't feed self	Control	1	3	4
	BLISS	0	0	0
Increased waste	Control	1	1	2
	BLISS	1	0	1
Struggle for food ideas	Control	0	0	0
	BLISS	0	2	2
Other not convenient	Control	3	1	4
	BLISS	3	3	6

^a This is a total number of responses, participants could make similar comments at multiple time points.

Theme three, *worries partner*, also had only one key sub-theme (**Table 4.14**), fear of choking:

“Worried about gagging/choking.” (BLISS participant, age 9 months).

The Controls commented on this less frequently (13 quotes from Control compared to 20 from BLISS), but their worries were similar:

“Worried about choking.” (Control participant, age 8 months).

Table 4.14 Open ended responses on what the adult participant thinks their partner doesn't like about the approach – theme 'Worries partner'

Sub-theme	Group	Number of quotes		
		8m	9m	Total ^a
Fear of choking	Control	7	6	13
	BLISS	18	12	30
Don't know how much child consumes	Control	0	0	0
	BLISS	3	2	5
Lack of knowledge	Control	2	2	4
	BLISS	1	1	2
Lack of confidence	Control	3	0	3
	BLISS	0	0	0
Don't know what nutrients child gets	Control	1	0	1
	BLISS	1	1	2
Worries partner	Control	1	0	1
	BLISS	3	5	8

^a This is a total number of responses, participants could make similar comments at multiple time points.

4.4 Indicators of mess, parental perceptions and actions against mess

Table 4.15 shows the incidence of food dropping and throwing in both groups. The BLISS group was significantly more likely to drop their food, but the difference was small (3.80%; 95% CI 1.86 to 7.75).

Table 4.15 Infant food dropping and throwing at 7 to 9 months and 12 months of age^a

	7 months, mean (SD)		8 months, mean (SD)		9 months, mean (SD)		12 months, mean (SD)		Overall ^b mean proportion		Mean difference between groups ^c (95% CI)
	Control (n=88)	BLISS (n=94)	Control (n=83)	BLISS (n=91)	Control (n=87)	BLISS (n=95)	Control (n=81)	BLISS (n=93)	Control (n=91)	BLISS (n=97)	
Food dropping	62 (70)	88 (94)	68 (82)	84 (92)	76 (87)	91 (97)	80 (99)	89 (96)	85%	94%	3.80 (1.86, 7.75)
Food throwing	26 (30)	31 (33)	29 (35)	39 (43)	32 (37)	41 (44)	56 (70)	59 (63)	43%	46%	1.22 (0.82, 1.80)

^a Scored as dropping or throwing if they did this at ‘some’ or ‘most’ meals.

^b Mean percentage from 7, 8, 9, and 12 months

^c Odds ratios (95% CI) comparing BLISS to Control using generalised estimating equations adjusted for maternal parity and education, and infant sex

Table 4.16 shows the responses given by the participants to questions designed to establish their acceptance and comfort with the mess associated with their feeding method. Both groups found the mess to be acceptable, and were relatively comfortable with it at home, although less so away from home. The only significant difference between the groups was in the overall messiness, with the BLISS group reporting less messiness.

Table 4.16 Parental perceptions of mess associated with complementary feeding at 7 to 9 and 12 months of age

	7 months, mean (SD)		8 months, mean (SD)		9 months, mean (SD)		12 months, mean (SD)		Overall ^a , mean (SD)		Mean difference between groups ^b (95% CI)
	Control (n=88)	BLISS (n=94)	Control (n=83)	BLISS (n=91)	Control (n=87)	BLISS (n=95)	Control (n=81)	BLISS (n=93)	Control (n=91)	BLISS (n=97)	
Overall messiness ^c	2.7 (1.1)	2.1 (1.0)	2.8 (1.1)	2.3 (1.0)	2.7 (1.2)	2.4 (0.9)	2.5 (0.9)	2.7 (1.0)	2.7 (0.8)	2.4 (0.7)	-0.3 (-0.1,-0.5)
Acceptability of mess ^d	4.5 (0.9)	4.5 (0.9)	4.3 (0.9)	4.2 (1.0)	4.3 (0.9)	4.2 (0.9)	4.0 (1.0)	4.0 (1.0)	4.3 (0.7)	4.2 (0.8)	-0.1 (-0.3, 0.1)
Comfort with mess at home ^e	4.5 (1.1)	4.6 (0.8)	4.3 (1.1)	4.2 (1.1)	4.3 (1.0)	4.5 (0.8)	3.9 (1.1)	4.1 (1.1)	4.3 (0.7)	4.3 (0.7)	0.1 (-0.1, 0.3)
Comfort with mess away from home ^e	4.0 (1.3)	3.7 (1.1)	3.6 (1.3)	3.6 (1.1)	3.6 (1.3)	3.5 (1.3)	3.3 (1.0)	3.3 (1.0)	3.6 (1.0)	3.5 (0.9)	-0.2 (-0.4, 0.1)

^aMean scores for each participant from 7, 8, 9, and 12 months were calculated.

^bRegression analysis comparing BLISS to Control adjusted for maternal parity and education, and infant sex.

^cPossible responses range from 1 – 5. 1 = not at all messy to 5 = very messy.

^dPossible responses range from 1 – 5. 1 = very unacceptable to 5 = very acceptable.

^ePossible responses range from 1 – 5. 1 = very uncomfortable to 5 = very comfortable.

The number of participants taking action to make mess more manageable are shown in **Table 4.17**, showing no significant differences between the groups. However, it is interesting to note that both groups were less likely to take action against mess when away from home, with 78% of Controls and 74% of BLISS taking action away from home, compared to 85% of Controls and 82% of BLISS taking action at home.

Table 4.17 Number of participants acting to make mess more manageable

	7 months		8 months		9 months		Overall, mean (SD) ^a		Mean difference between groups (95% CI) ^b
	Control (n=87)	BLISS (n=94)	Control (n=83)	BLISS (n=90)	Control (n=87)	BLISS (n=94)	Control (n=91)	BLISS (n=97)	
Number (%) acting to make mess at home more manageable	73 (84)	74 (79)	73 (88)	77 (86)	74 (85)	79 (84)	85	82	0.83 (0.45, 1.54)
Number (%) acting to make mess away from home more manageable	62 (77)	63 (75)	67 (82)	65 (74)	73 (84)	80 (86)	78	74	0.90 (0.53, 1.52)
	<i>Missing n=6</i>	<i>Missing n=10</i>	<i>Missing n=1</i>	<i>Missing n=2</i>		<i>Missing n=1</i>			

^a Mean percentage from 7, 8, and 9 months.

^b Odds ratios (95% CI) comparing BLISS to Control using generalised estimating equations.

In response to the questions “Do you do anything to make the mess more manageable when your baby is eating at home – explain?” and “Do you do anything to make the mess more manageable when your baby is eating away from home – explain?” three main themes were identified: *avoidance* (**Table 4.18** home, **Table 4.19** away from home), *cleaning* (**Table 4.20** home, **Table 4.21** away from home), and *modify behaviour* (**Table 4.22** home, **Table 4.23** away from home). Example quotes from both groups for each sub-theme can be found in Appendix C.

There were four key tactics for *avoiding mess* at home (Theme 1; **Table 4.18**), including using mats and bibs. The BLISS participants more frequently reported using a mat (163 quotes from BLISS compared to 103 responses from Controls). Commenting on bib use was fairly similar between the two groups (98 quotes from Controls compared to 88 from BLISS).

Altering the child’s clothing was another key sub-theme to arise:

“...take some of his clothes off so they don't get messy.” (BLISS participant, age 7 months).

The Controls took similar actions:

“...take off nice clothes.” (Control participant, age 8 months).

The last key sub-theme to arise was making use of easy to clean ground over which to feed the child:

“...eat in dining room - easy to wipe (avoid carpet)...” (BLISS participant, age 7 months).

The Controls had a similar approach:

“Sometimes feed him outside or on hard ground.” (Control participant, age 7 months).

Table 4.18 Open ended responses on what the adult participant does to make mess more manageable when baby eats at home – theme ‘Avoidance

Sub-theme	Group	Number of quotes			
		7m	8m	9m	Total ^a
Mat	Control	32	32	39	103
	BLISS	55	55	54	164
Bib	Control	34	31	33	98
	BLISS	28	32	28	88
Alter clothing	Control	8	5	6	19
	BLISS	9	10	8	27
Easy to clean ground	Control	4	10	5	19
	BLISS	5	5	6	16
Limit amount	Control	5	4	5	14
	BLISS	3	2	0	5
Parent feeds	Control	4	3	5	12
	BLISS	0	1	4	5
Limit messy foods	Control	2	3	4	9
	BLISS	4	2	3	9
Bowl out of reach	Control	0	5	3	8
	BLISS	1	1	1	3
Other avoidance	Control	3	1	1	5
	BLISS	1	1	2	4

^a This is a total number of responses, participants could make similar comments at multiple time points.

When feeding the baby away from home there were also four key sub-themes arising under the main theme of *avoidance* (**Table 4.19**). In contrast to feeding at home, using a bib was the main strategy to avoid mess, although still commented on more frequently by Controls (78 quotes from Control compared to 56 from BLISS).

Interestingly, the next most common sub-theme was to offer less messy foods to the baby:

“Give finger foods to make less mess.” (BLISS participant, age 7 months). While the Control group commented on this less frequently (60 quotes from BLISS compared to 36 from Control), they had a similar approach:

“Give less messy foods.” (Control participant, age 7 months).

The third key sub-theme to arise was the use of the mat, and in comparison to feeding the baby at home, both groups commented on its use with similar frequency (41 quotes from BLISS compared to 31 from Control).

The parent feeding the child was the last key sub-theme to arise:

“...if eating messy foods mum or dad feeds him...” (BLISS participant, age 8 months).

Whereas the Control group used this approach in a way that fitted their feeding method:

“...feed him in a tidier way.” (Control participant, age 9 months).

Table 4.19 Open ended responses on what the adult participant does to make mess more manageable when baby eats away from home – theme Avoidance'

Sub-theme	Group	Number of quotes			
		7m	8m	9m	Total ^a
Bib	Control	24	28	26	78
	BLISS	17	17	22	56
Less messy food	Control	8	12	16	36
	BLISS	18	19	23	60
Mat	Control	7	12	12	31
	BLISS	12	14	15	41
Parent feeds	Control	8	7	8	23
	BLISS	4	5	8	17
Limit amount	Control	3	4	5	12
	BLISS	5	4	5	14
Easy to clean ground	Control	1	3	0	4
	BLISS	3	3	5	11
Alter clothing	Control	2	2	2	6
	BLISS	3	0	1	4
Bowl out of reach	Control	0	4	2	6
	BLISS	0	0	0	0
No solids while out	Control	2	2	0	4
	BLISS	0	0	0	0
Other avoidance	Control	1	2	1	4
	BLISS	0	0	0	0

^a This is a total number of responses, participants could make similar comments at multiple time points.

The second theme of *cleaning* (**Table 4.20**) had three key sub-themes to arise from feeding the baby at home, the main one of these was using wipes:

“Cloths on hand to wipe up big spills/messes.” (BLISS participant, age 7 months).

While the Controls commented on this strategy more often (30 quotes from Controls compared to 14 from BLISS), they gave similar comments:

“...have wipes on hand.” (Control participant, age 8 months).

An interesting strategy in *cleaning* was the use of the dog:

“The dog is the best for picking up mess.” (BLISS participant, age 7 months). Despite reporting less food dropping, the Control group reported the use of a dog to clean up more frequently (19 quotes from Controls compared to 13 from BLISS), however their comments were similar:

“...let the dog in after he has eaten.” (Control participant, age 8 months).

The third key sub-theme to arise was the strategy of *cleaning* as they went:

“Clean and wipe as she's eating.” (BLISS participant, age 9 months).

The Control group has similar comments:

“...wipe down tray between courses.” (Control participant, age 9 months), however they commented on it more frequently (15 quotes from Controls compared to 9 from BLISS), reflecting perhaps their higher involvement in the feeding process.

Table 4.20 Open ended responses on what the adult participant does to make mess more manageable when baby eats at home – theme ‘Cleaning’

Sub-theme	Group	Number of quotes			Total ^a
		7m	8m	9m	
Wipes	Control	9	14	7	30
	BLISS	7	6	1	14
Dog	Control	4	6	9	19
	BLISS	5	2	6	13
Clean as you go	Control	8	3	4	15
	BLISS	3	2	4	9
Catch food	Control	2	0	0	2
	BLISS	1	1	1	3
Cleaning	Control	3	3	0	6
	BLISS	2	4	2	8

^a This is a total number of responses, participants could make similar comments at multiple time points.

When feeding the baby away from home, the second main theme of *cleaning* had two key sub-themes to arise (Table 4.21). Similar to when feeding the baby at home, the use of wipes was the most common sub-theme:

“...have wipes handy...” (BLISS participant, age 7 months).

Once again, this was a strategy more frequently reported on by the Controls (36 quotes from Controls compared to 19 from BLISS), and the types of comments were also similar:

“...baby wipes...” (Control participant, age 8 months).

Picking up food as it was dropped was the other key sub-theme, and reflecting the increased incidence of food dropping in the BLISS group, was commented on more frequently (19 quotes from BLISS compared to 3 from Controls). However the comments were similar:

“...pick it up as it hits the floor.” (BLISS participant, age 9 months),

and

“...pick up food as it drops.” (Control participant, age 9 months).

Table 4.21 Open ended responses on what the adult participant does to make mess more manageable when baby eats away from home – theme ‘Cleaning’

Sub-theme	Group	Number of quotes			
		7m	8m	9m	Total ^a
Wipes	Control	13	14	9	36
	BLISS	7	6	6	19
Pick up food as dropped	Control	1	1	1	3
	BLISS	3	6	10	19
Clean as you go	Control	5	1	1	7
	BLISS	1	0	2	3
Catch food	Control	0	0	3	3
	BLISS	2	1	3	6
Other cleaning	Control	3	4	2	9
	BLISS	1	2	2	5

^a This is a total number of responses, participants could make similar comments at multiple time points.

The third theme of *modifying behaviour* had one key sub-theme (**Table 4.22**). Restraining the child was commented on with similar frequency between groups, although with different strategies:

“...feed her in the highchair...” (BLISS participant, age 8 months),

and

“...hold arms away from spoon...” (Control participant, age 8 months).

Table 4.22 Open ended responses on what the adult participant does to make mess more manageable when baby eats at home – theme ‘Modify behaviour’

Sub-theme	Group	Number of quotes			Total ^a
		7m	8m	9m	
Restrain child	Control	3	3	5	11
	BLISS	8	3	3	14
Distract child	Control	4	2	3	9
	BLISS	0	1	0	1
Assist with feeding	Control	1	0	0	1
	BLISS	1	3	2	6
Other modify behaviour	Control	0	1	1	2
	BLISS	0	3	0	3

^a This is a total number of responses, participants could make similar comments at multiple time points.

When feeding the baby away from home, the theme *modify behaviour* had only one key sub-theme arise (**Table 4.23**). Restraining the child was again commented on with similar frequency between groups, however more frequently than when feeding the baby at home:

“...try and use a highchair if available. Otherwise sit her in pushchair.” (BLISS participant, age 7 months).

However the Controls use of this strategy revolved around limiting interference with spoon feeding:

“...hold him (ie no highchair) and hold his hand back.” (Control participant, age 7 months).

Table 4.23 Open ended responses on what the adult participant does to make mess more manageable when baby eats away from home – theme ‘Modify behaviour’

Sub-theme	Group	Number of quotes			
		7m	8m	9m	Total ^a
Restrain child	Control	1	5	10	16
	BLISS	6	6	9	21
Distract child	Control	0	1	2	3
	BLISS	0	0	0	0
Other modify behaviour	Control	0	1	0	1
	BLISS	2	3	2	7

^a This is a total number of responses, participants could make similar comments at multiple time points.

4.5 Time needed before the parent considered their infant was eating “enough” food

The BLISS group initiated complementary feeding when their infants were on average 24.6 weeks of age, compared to the Control group who initiated it at 22.3 weeks of age. The BLISS group felt that it took 5.5 weeks after beginning complementary feeding until their infant was eating enough, whereas the Control group felt it took 5.4 weeks. This difference was not statistically significant, and shows that the feeding method did not affect this perception in the parents.

4.6 Daily cost of the infant diet at 7 months of age

The two groups had different perceptions of how expensive the approach they had followed was (Table 4.2), with the BLISS group perceiving it to be more expensive. In **Table 4.24** we can see that it cost the BLISS group \$1.70 per day to feed their infant, the amount consumed was only \$0.90 of this, leaving \$0.60 in left overs. The Control group spent \$1.90 per day to feed their infant, with the infants consuming \$1.10 of this, leaving \$0.50 in left overs – these values were not statistically significantly different.

Table 4.24 Daily cost of the infant diet at 7 months of age^a

	Control (n=77)	BLISS (n=85)	Ratio of geometric means between groups (95% CI)	<i>P</i> -value ^b
Complementary food offered (NZD)	1.9 (1.6, 2.3)	1.7 (1.5, 2.0)	0.91 (0.73, 1.12)	0.360
Complementary food consumed (NZD)	1.1 (0.9, 1.4)	0.9 (0.7, 1.1)	0.76 (0.56, 1.03)	0.078
Complementary food leftover (NZD)	0.5 (0.3, 0.6)	0.6 (0.5, 0.8)	1.35 (0.94, 1.93)	0.100

^a Data expressed as geometric mean (95% CI) daily cost in New Zealand dollars

^b *P*-value for between group comparisons between BLISS and Control adjusted for maternal education and parity, and infant sex.

5 Discussion

5.1 Key findings

These findings illustrate that parents were happy with complementary feeding in general, regardless of whether they were following traditional spoon-feeding or a baby-led approach. Parents thought the method they were assigned to was convenient and that it suited them very well. However, it also appears that complementary feeding can be a frustrating process, with parents in both groups reporting quite high levels of frustration in general. In response to open ended questions on what it was that the parent liked about the method they followed, subthemes such as ‘improved autonomy’ and ‘fitting in with the family’ arose in the BLISS group. The Control group reported that ‘bonding’ and ‘monitoring the amount of food consumed’ were things that they liked.

Infants in the BLISS group were significantly more likely to drop their food, but the difference was small (only 3.8%). Both groups found the mess associated with complementary feeding to be acceptable, and were relatively comfortable with it at home, although less so away from home. One of the significant differences between the groups was in overall messiness, with the BLISS group surprisingly reporting less mess. However, there was no significant difference between groups in the number acting to make mess more manageable. Common strategies against mess in both groups were using a bib and a mat, the use of wipes, and restraining the child – usually in a highchair.

Another significant difference between the groups was in the perceived expense of the feeding method, where the BLISS group were more likely to perceive the method as expensive. However, when cost was measured using the diet records, there were no significant group differences in the cost of food consumed. The BLISS group spent \$1.70 per day to feed their infant, of which the amount consumed represented \$0.90, with \$0.60 ‘wasted’ in leftover food. Corresponding figures for the Control group were \$1.90 per day in total, comprising \$1.10 in food consumed and \$0.50 in leftovers.

5.2 Parental perceptions of convenience and mess

Both the BLISS and the Control group found their feeding method to be relatively convenient, with no statistically significant difference in convenience scores between the groups. This is particularly important given that many of the BLISS participants were most likely feeding their child in a manner they would not have chosen themselves. Based on information obtained at baseline, only 19% of BLISS participants had intended to feed their infant in a manner similar to baby-led weaning (Taylor et al., 2017). No data exist either in New Zealand or internationally to determine how common baby-led weaning is in the general population. A cross-sectional online survey of feeding methods conducted in four main centres in New Zealand in 2010, reported that 70% of the 199 participants were found to use parent-led feeding classified as the parent spoon feeding their child at least half of the time at 6 – 7 months of age (Cameron et al., 2013). Interestingly, 64.4% of this group had never heard of baby-led weaning. However, participants in this survey were not recruited from a random sample of the population and thus are not likely to indicate true prevalence. Similar studies overseas have purposely recruited those following BLW and more traditional feeding practices and thus can also not be used to indicate how common BLW is (Brown & Lee, 2011a). Our observations of a similar degree of convenience in BLISS and control parents shows that the BLISS method can be similarly acceptable.

Both groups found the mess to be acceptable, and were relatively comfortable with it at home, although less so away from home. However, the BLISS group gave a statistically significantly lower score for the overall messiness than did the Control group, indicating they were less concerned with it. Interestingly, the BLISS group also reported a statistically significantly higher rate of food dropping. While this latter finding seems at odds with parents finding the method less messy, the BLISS group more frequently reported the strategy of picking up food as it was dropped. This, along with more frequent mat use shows BLISS parents were using strategies to make the increased mess more manageable and perhaps therefore more acceptable. It should be noted however that the BLISS participants were provided with a mat by the study, which may have increased the acceptability of the mess. These findings are supported by descriptive studies looking at the use of baby-led weaning in the United Kingdom (Brown & Lee, 2011b) and in New Zealand (Cameron et al., 2012a). For example, participants in Brown and Lee's study

completed an online survey about feeding methods for their 6-12 month old child, and were classified as following baby-led weaning if they fed purées $\leq 10\%$ of the time or used a spoon for feeding $\leq 10\%$ of the time. Interestingly, those who followed a standard weaning method were more likely to be concerned about mess.

Two further studies have investigated the experiences of mothers using baby-led weaning, both with similar results (Brown & Lee, 2013; Cameron et al., 2012a). Mothers found the mess associated with the feeding style to be a negative aspect, especially when out in public or at other people's homes. However, they found that with time and improved motor skills the mess did decrease. Parents also used strategies such as long sleeved bibs, mats under the highchair, and using less messy foods while away from home to limit the impact of the mess. In the study by Cameron et.al., (2012) some mothers who had used a standard weaning style with previous children found that both methods were equally messy. However, a limitation of this study was that mothers categorised themselves as using baby-led weaning, whereas Brown & Lee (2013) used a guideline of spoon use and purée use $\leq 10\%$ of the time. This means that for mothers comparing the two methods, we cannot be sure that their definition of the method is the same as used by other studies investigating baby-led weaning. In addition, as all of these studies are cross-sectional, causality cannot be determined. It is feasible that the results observed in these descriptive studies are because those more concerned about mess choose to not use baby-led weaning.

It is also important to note that as the trial could not be blinded, the BLISS participants may have approached the method with preconceived ideas of it being messier than 'normal' feeding methods. This again, could lead to higher levels of acceptance, as the method may not have been as messy as expected. Removing labels such as 'baby-led' in further interventions may reduce this expectation. However, with knowledge of baby-led weaning becoming more widespread, it would be hard to find a group of mothers who would not recognise a baby-led feeding style as such, and therefore avoid these potential preconceptions regarding mess.

5.3 Parental happiness and frustration, and how the method suited them

Overall both groups were happy with the method and found that it suited them well. However, they also found it to be quite frustrating. In response to open ended questions, each of the groups had their own ways of feeling positive about the same sub-themes. For example, while quotes from the BLISS group on autonomy focused on the child feeding himself, the Control group also felt the child was gaining autonomy by having a turn with the spoon. In a similar way, each group found the child was improving their fine motor skills, either by picking up small pieces of food (BLISS) or by grasping at the spoon and having a turn (Control). Another example is with the perceived health of the feeding method, where the BLISS group felt that giving fresh unprocessed foods was a benefit to their child's health, whereas for some of the Control group being able to see the nutrients on the label gave them confidence in the healthiness of the food. In this way, we can see that each of the groups had their own ways to be happy with the method, and find that it suited them.

In regards to frustration, both groups were frustrated by similar things, such as the mess and the work required to clean it up. They also each had their own ways of finding that their method was 'more work'. For example, some of the BLISS group would still prepare different foods for their infant some of the time, while the Control group found extra work in having to prepare different foods and feed it to the child before being able to eat themselves. It is interesting to note that while both groups gave similar scores for their perceived frustration, the BLISS group gave many more comments on things such as the mess and their fear of the child choking.

Overall, despite their acknowledgement of the frustration in feeding their child, as well as being vocal about the many things that they did not like about the method, parents in both groups were still able to say that they were happy with their method and found it suited them. Perhaps this is because parents simply expect these frustrations to arise, and while they acknowledge them, they also accept them which would allow them to still be happy with the method. We can also see from open ended answers that both groups were resourceful in finding ways to deal with the frustration of mess. This suggests that finding

strategies to cope with the frustrations may lead to higher acceptability of the feeding method.

The Control group provided a lot of comments compared to the BLISS group on how being able to monitor the amount of food their infant consumed pleased them. Monitoring refers to the practice of parents keeping track of what and how much their child eats. The Control parents were particularly concerned with ensuring their child had eaten enough. However, parental monitoring of the child's food intake has been found to have no association with satiety responsiveness (or the ability to eat to appetite) in 3 – 5 year olds (Carnell, Benson, Driggin, & Kolbe, 2014). Further to this, parental monitoring has also been shown to have no effect on the likelihood of five year olds to be overweight or obese (Melis Yavuz & Selcuk, 2018). And only a slight protective effect was found in four year old girls whose parents reported they showed impulsivity with food, however this effect was only when the amount of monitoring was low (Bennett & Blissett, 2017).

It is also interesting to note that the Control group made more comments on liking being able to control the texture and consistency of the food they were feeding their infants. They also made fewer comments than the BLISS group about the fear of choking, so controlling the texture of food may have made them less worried about their child choking.

The Control group were also more vocal about enjoying the bonding opportunities feeding their child gave them. This was clearly a benefit they found to their feeding method that was missed by the BLISS group who were less involved in the process of feeding their child. While the BLISS group certainly seemed to enjoy watching their child learn to eat, they offered fewer comments on being able to bond with their child while feeding. To date, literature on the bonding between child and parent during feeding with a baby-led approach are not available.

5.4 Parental perception of how many weeks before infant was eating enough

One of the key messages associated with baby-led weaning is that concerns about whether the child is eating enough is not something parents should worry about for the first six months of weaning (Gill Rapley, 2011). However, mothers using parent-led complementary feeding stated they wouldn't like to try baby-led weaning, as they were concerned their child would not eat enough (Cameron et al., 2012a). Therefore, this study investigated this issue and found there was no statistically significant difference between the two groups in how long it took before parents felt their child was eating enough. Assuming the ways that parents gauge whether their child is eating enough is similar between the two groups, this shows that the feeding method did not affect the consumption of food by the child. However, because complementary foods were introduced earlier by controls, control infants were younger when their parents considered them to be eating enough. It is, therefore, reassuring that no children in the BLISS group displayed intervention-related growth faltering (Taylor et al., 2017).

5.5 Food cost for infants at 7 months of age

There is a general perception that baby-led weaning may be more expensive, particularly because of waste. This was shown in a study interviewing mothers in the United Kingdom who used baby-led weaning, where they perceived the increased waste to be financially wasteful (Brown & Lee, 2013). However, the mothers found that the waste reduced with better eating skills over time, and so it did not remain a concern. The food cost of a child's diet can be estimated by assigning a portion of the weekly household food bill to the child, taking into account their lesser energy needs. The most accurate way to establish the actual cost of a child's diet would be to record their food intake and match it with the cost of those foods from the household's food bill. However this would be very labour intensive for the parents, as they would need to record all foods consumed and wasted, as well as retain receipts for all food purchased, including meals while out. This would also be labour intensive for the researchers, having to match individual diets with individual receipts. Therefore, the most practical way is to record the child's food intake, and then match these to local prices, thus reducing the amount of work required by the parents. This method is also far less labour intensive for the researchers, as the same prices can be

used for all diets. This latter method was used for the current study, and the results show that at 7 months of age there was no statistically significant difference in the actual cost of the diet, either offered, consumed, or leftover, between the two groups. However, the BLISS group were more likely to perceive the method as expensive. It is possible that this difference in perception stems from the significant increase in food dropping in the BLISS group. Therefore, the BLISS participants may have viewed this as an increased amount of waste, an increased loss in money, and thus an increased overall cost for the diet. However, the cost of leftover food was not different between the two groups.

5.6 Strengths and Limitations

The BLISS study has several strengths, one of them being the randomised controlled trial (RCT) design. To date all other studies investigating the baby-led feeding method have been observational, which includes greater bias as the participants have chosen to use particular feeding methods. Qualitative data were collected in addition to quantitative data, which provides a fuller picture of the experiences of the participants. Research assistants were also blinded during data collection to prevent measurement bias. Another strength was that dietary data were collected by 3-day weighed diet record. These three days were randomly allocated over two week days and one weekend day, to account for differences in diet on weekdays and weekends. Importantly, leftovers were also weighed, to give more accurate data on food consumed by the infant.

Limitations for the study included the study design not being a cross over trial. This would have allowed participants to experience both feeding styles and therefore form a judgement on which of the two they preferred. However, cross-over trials are virtually impossible in infants as they are developing so fast that their diets and requirements would differ between the interventions. It is also possible that participants met at mutual baby and parent groups where they may have discussed the study and the resources they were provided with. While participants were encouraged not to discuss these with other people, there was no way of measuring adherence to this request, although the main findings for the BLISS study do suggest substantially greater adherence to a baby-led approach in the BLISS than control groups at multiple ages (Taylor et al., 2017). It is noticeable in the

qualitative answers that many participants in the BLISS group also used spoon feeding some of the time, and this mixed feeding may have increased the acceptability of the BLISS method. In addition, the BLISS group had a higher percentage of working mothers (81% vs 67% in the Control group), therefore the ease of having the child feed themselves family foods may have increased the acceptability in this group, although this was not specifically investigated. The acceptability was only measured by the self-completed questionnaire, therefore participants may not have given such thorough answers as they may have done in a structured interview. As food prices vary throughout New Zealand, these were mainly collected at one supermarket in Dunedin, known to have middle range prices. While this makes the prices more accurate for the participants, it does mean that the results cannot be generalised to the wider population of New Zealand. For results to be applicable to the whole country, the study would need to have been conducted in multiple locations throughout the country, with all relevant local prices. As the BLISS study used a modified version of baby-led weaning, it is possible that other results could be found with un-modified baby-led weaning. Finally, the small sample size is also a limiting factor.

6 Conclusion

In conclusion, parents did not find a baby-led approach to introducing solids any less acceptable than Control parents following more conventional infant feeding guidelines. This finding can be viewed as a positive outcome, as the majority of parents randomised into the intervention group had not planned to feed their child in this way. Interestingly, parents reported high levels of frustration with complementary feeding no matter what method they were using. However, each group also had their own way of finding positives in the method they were following, with both groups reporting increased autonomy, improved fine motor skills, and benefits to their child's health. Although the BLISS group were more likely to consider their method expensive, there was no difference in the actual cost as measured by 3 day diet records linked to supermarket prices. These results show that a baby-led approach to complementary feeding can be as acceptable for parents as a standard approach, and does not differ in cost. It also shows that while frustrations arise in each method, parents are resourceful in managing these and accept them as part of the process. This study shows that it is feasible to run studies where parents are randomised to follow a baby-led approach to complementary feeding. As this was a small localised study, further research with a larger and more geographically diverse population is recommended. This study also used a modified version of baby-led weaning, therefore studies using an unmodified approach would better represent how the general population uses baby-led weaning, and their acceptance of the approach. These would need to be observational rather than intervention studies, however, until it has been shown conclusively that unmodified baby-led weaning does not increase the risk of iron deficiency, growth faltering and choking.

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8 Appendices

- Appendix A: Instructions for food price collection
- Appendix B: BLISS 9 month old questionnaire
- Appendix C: Open ended responses to questions on acceptability of complementary feeding method

Appendix A: Instructions for food price collection

- ❖ Creating the Excel spreadsheet
 1. Open an Excel spreadsheet.
 2. Title the first column 'Food item' and list here in alphabetical order all food items as listed in dietary analysis software.
 3. Title the next column 'unit' and list here whether the price is per weight and what weight (eg. Per 100g, per kg, or 'each').
 4. Title the next column 'Cost per unit'.

- ❖ Collecting price data from supermarket website
 1. Open the supermarket website.
 2. If collecting local prices only, create an account setting it for the area the prices are to be collected from.
 3. Go to the online shopping section of the website.
 4. Search for each food item in the list.
 5. Enter the unit and cost information.

- ❖ When no exact match is possible
 1. If an exact food description, brand, or variety is given, but is not available, choose the most similar item available.
 2. If there are multiple similar items available, take an average price of all the similar items available.
 3. Create a new food item in the spreadsheet. If for example the item is Apple, then make an entry titled 'Apple, assorted variety' and list the average price here.
 4. If no exact food description, brand, or variety is given create or use the average price as outlined in the point above.

- ❖ When a food item is not available on the website
 1. Make a visit to the physical supermarket and check the shelves for the item and record price if item is available.
 2. If food item is not available, check at one other local supermarket.
 3. If food item is not available at the other supermarket, substitute price for something similar, for example if Bok Choi is not available, substitute with the price of similar leafy vegetable such as silverbeet.

- ❖ When the weight of the item is not listed on the website
 1. Make a visit to the physical supermarket, locate the item and check if a weight is listed.
 2. If the weight is not listed, weigh a minimum of five different randomly selected pieces of the item and record the average weight (this should only occur for fruit and vegetables).

- ❖ How to account for seasonal variation for fruit and vegetables over the whole year

1. Create a new spreadsheet as outlined above, and only list fruit and vegetables.
2. Collect prices, as outlined above, at the mid-point of each season.
3. After the last price collection, average the prices.
4. If price collection begins before food item data is available from participants, prices for all fruit and vegetables available at the supermarket must be collected. Once food item data is available from all participants, food items not relevant can be disregarded.

Appendix B: BLISS 9 month old questionnaire

Office use only



Date:

9 month Questionnaire

Thank you for being part of the BLISS study.

This questionnaire is split into 3 sections and should take about 15 minutes to complete.

Please answer every question - *there are no right or wrong answers.*

Please press the SAVE button each time that you see it.

Please ask the researchers if you have any questions - thank you for your time.

Section 1: Feeding and health

- 1 Since you answered the “8 month Questionnaire”, has your baby had any illness that affected their feeding for more than 5 days?

- No (please go to question 3)
- Yes

If yes, please describe the illness

.....

If yes, please state how long it lasted days weeks

2 Were they hospitalised for this illness?

No

Yes

If yes, for how many days?

3 In the past week, how often has your baby drunk all of his or her cup or bottle of milk?

- Always
- Most of the time
- Sometimes
- Rarely
- Never
- [Not applicable]

4 Has your baby gagged on food or drink in the past month?

- No (please go to question 5)
- Yes

If yes, how many times? per day OR
..... per week OR
..... per month

5 Has your baby choked on food or drink in the past month?

- No (please go to question 11)
- Yes

If yes, how many times?

6 Thinking of the *most serious* choking episode in the past month, which of the following did your baby do?

(Choose as many as apply)

- Eyes watered
- Pushed tongue out
- Coughed
- Gasp
- Retched
- Vomited
- Cried
- Went silent
- Other Please state

7 Thinking again of the *most serious* choking episode in the past month, which of the following happened?

(Choose as many as apply)

- Baby resolved it themselves
- Parent resolved it
- A health professional resolved it
- Another person resolved it
- A health professional was involved
- Baby was admitted to hospital
- [Other Please state

8 Thinking again of the *most serious* choking episode in the past month, what was the food or drink responsible (please state whether it was raw or cooked)?

.....

9 Thinking again of the *most serious* choking episode in the past month, what form was the food or drink in?

- Thin* liquid
- Thick* liquid
- Puréed
- Mashed
- Diced
- Sliced
- Whole

10 Thinking again of the *most serious* choking episode in the past month, who fed the baby the food or drink that was responsible?

- Baby him/herself
- Parent
- Another adult
- Brother or sister
- Another child

11 Has your baby eaten anything with *wheat* in it for the *first time* in the past month? (e.g., bread, toast, rusk, baby muesli, cake, biscuit, pikelet, flour)

- Yes
- No (please go to question 13)

12 How old were they when they first ate something with wheat in it?

_____ weeks OR _____ months

1
Suits me very
well

2

3

4

5
Doesn't suit me
at all

19 What is it about this approach to giving your baby solids that you like?

.....

.....

.....

.....

20 What is it about this approach to giving your baby solids that you don't like?

.....

.....

.....

.....

21 Where does your baby sit to eat their solids? (tick all that apply)

- Highchair
- Chair attached to table
- Baby sized chair on floor
- Floor
- Someone's knee
- Other Please state

22 How often do you, or another adult, sit with your child when they're eating?

- Never
- Occasionally
- About half the time
- Almost always
- Always

23 Overall, how acceptable do you find the amount of mess your baby makes when eating?

1 2 3 4 5
Very acceptable Neutral Very unacceptable

24 How uncomfortable do you feel about the amount of mess your baby makes when eating *at home*?

1 2 3 4 5
Very uncomfortable Neutral Very comfortable

25 How uncomfortable do you feel about the amount of mess your baby makes when eating *away from home*?

1 2 3 4 5
Very uncomfortable Neutral Very comfortable

26 Do you do anything to make the mess more manageable when your baby is eating *at home*?

No

Yes Please state

.....

27 Do you do anything to make the mess more manageable when your baby is eating *away from home*?

No

Yes Please state

.....

28 Does your baby drop food on the floor?

Yes, most meals

Yes, some meals

Rarely

Never

29 Does your baby throw food around?

Yes, most meals

Yes, some meals

Rarely

Never

30 Do you currently have a partner?

Yes

No (please go to question 34)

31 Thinking about the way your baby is being given solids, overall how *happy* do you think your partner is with this way of giving solids?

1
Very happy

2

3

4

5
Very unhappy

32 What do you think it is about this approach to giving your baby solids that they like?

.....

.....

.....

33 What do you think it is about this approach to giving your baby solids that they don't like?

.....

.....

.....

34 It takes a while for babies to learn to eat solids. How long did it take after your baby started solids before you felt that they were eating enough?

- less than a week
- 1 week
- 2 weeks
- 3 weeks
- 4 weeks
- 5 weeks
- 1½ months
- 2 months
- 2½ months
- 3 months
- more than 3 months

they are not eating enough solids

35 Has your baby been offered any “finger foods”? Finger foods are foods that your baby can pick up and feed themselves. (If your baby picks up a spoon and feeds themselves with it then include that as well).

No (Thank you – you have finished the questionnaire)

Yes

36 How old was your baby when they first had finger foods (or fed themselves with a spoon)?

..... weeks

..... months (please be as exact as possible, for example, 8½ months rather than “around 8 months”)

37 How much of the food baby eats now is finger food they feed themselves (or food that baby feeds themselves with a spoon)? (Do not count drinks, including milk).

- None of it (Thank you – you have finished the questionnaire)
- Some of it (Thank you – you have finished the questionnaire)
- Most of it
- All of it

38 How long did it take after your baby started feeding themselves finger foods before you felt that they were eating enough to only need finger foods? (Do not count drinks, including milk).

- less than a week
- 1 week
- 2 weeks
- 3 weeks
- 4 weeks
- 5 weeks
- 1½ months
- 2 months
- 2½ months
- 3 months
- more than 3 months
- they are not eating enough finger foods to only need finger food

Thank you for completing this questionnaire



Appendix C: Open ended responses to questions on acceptability of complementary feeding method

Table 1 Open ended responses on what the adult participant likes about the approach – theme ‘Benefit to the child’

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Autonomy	Control	19	15	21	55	Mum gives baby a turn - enjoys this. Baby gets an idea of putting spoon in his mouth	Let him try to feed himself at least half of meal and doing well with it	encouraging him to hold the spoon when he wants
	BLISS	36	29	36	101	Baby can have a chance to understand what he is eating/have control, empowered	She knows when she is finished - no force feeding and more independence	She is in control and is teaching herself how to do it
Increased variety	Control	5	3	7	15	good to be able to choose different flavours and combinations	The variety of the foods she eats	lots of mixed foods - anything and everything - can be given
	BLISS	10	8	12	30	Gives her more opportunity to try things - not restricted on foods.	introduces him to a wide range of foods early on	Know she's getting a wide range of foods. She's not worried about the texture of foods.
Improve fine motor skills	Control	6	3	4	13	She is now grasping at the spoon and starting to feed herself, developing hand-eye coordination	learning handeye coordination	I can see his fine motor skills improving

	BLISS	10	10	9	29	really good for fine motor skills - able to pick up small dropped pieces of food and finish eating it	motor skills from feeding are transferring through to playing	Can see fine motor skills developing as a result
Health	Control	5	9	2	16	mostly whole foods (not a whole lot of chemicals)	More nutritious buying products because we know the vitamins and minerals are in the NZ baby food products	ITS HOME MADE FOOD
	BLISS	4	3	1	8	healthy foods to offer	helps him get nutrients	Food not as processed
Child willing to eat	Control	4	5	1	10	like to see baby eat the food - reassuring	he eats food!	know he's eating
	BLISS	1	1	1	3	The fact that he actually eats	no food that baby won't eat	He eats anything and everything
More sleep	Control	0	1	0	1		Sleeps well afterwards	
	BLISS	1	0	1	2	Helps her sleep longer		Sleep.
Other benefit to child	Control	0	2	1	3		its a learning thing, she's moving towards development goals she's meant to reach.	new learning curve for her, trying something new
	BLISS	5	1	3	8	learning a lot from the way of solids, stimulating for her, more than just flavours. Fun	Good for baby to learn about food, feel, textures, her body	learning more

Table 2 Open ended responses on what the adult participant likes about the approach – theme ‘Convenience’

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Fits in with family	Control	15	15	18	48	generally feeding her a modified version of what the family eats	it is easy that she is now eating some of the same food as the rest of the family	good now mostly eating similar to the rest of the family
	BLISS	43	47	41	131	she can eat same foods as family, at same time.	she's eating the same food and don't have to buy baby foods. Eats what the children are eating.	She can eat with the family most of the time. seems more like real food and is readily available
Convenience	Control	20	25	21	66	Find it easy	Easy and flexible	it's done for me, I only have to open a jar
	BLISS	23	19	24	66	it's really easy	Convenience: can eat anything	becoming easier as she gets older
No extra meal prep	Control	2	4	1	7	Mum does not have to prepare separate food	Mum does not feel she has to make other meals	Not having to puree up foods
	BLISS	19	22	17	58	not making/pureeing up extra food	not having to prepare extra foods or buy much separate food	I don't have to cook separate foods
Don't feed	Control	2	1	3	6	don't have to sit & feed	Packets of food easy when out as he feeds himself	Don't have to sit and feed them.
	BLISS	3	7	17	27	Don't have to sit with her for half an hour and try to feed her; can pop her in	mum does not have to sit down and give it.	That she's doing it, no-one has to sit there and feed her: very convenient.

						highchair and do other jobs ie prep the adult's dinner			
Quick	Control	2	5	7	13	eats quickly	eats fast and quick	Time-wise it's easier because I haven't been cooking much	
	BLISS	5	2	3	10	Quick. Doesn't take long to prepare	Time efficient	quick and easy to prepare.	
Less Mess	Control	2	5	4	11	less mess with spoonfeeding	less messy than it could be	she doesn't make much mess.	
	BLISS	0	1	1	2		Lack of mess	she makes less mess than if she was on puree	
Not expensive	Control	2	2	1	5	very inexpensive	Cheaper than jars.	food is cheap (we've blended and frozen)	
	BLISS	1	1	0	2	Cheap	simple fact that I don't have to spend too much money		
Don't know any other way	Control	4	0	1	6	Only way I know, have done it this way twice before		Mum has done it before	
	BLISS	0	0	1	1			don't know any other way of doing it.	

Table 3 Open ended responses on what the adult participant likes about the approach – theme ‘Pleases the parent’

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Child enjoys food	Control	6	8	6	20	Baby loves it, eats happily - baby enjoys method	He's happy after feeding.	Baby seems to enjoy himself. likes the food
	BLISS	10	14	6	30	Seeing her positive reactions and enjoyment of food, and seeing her enjoy healthy foods such as vegetables	He really enjoys it not fussy	She is happiest when she is eating the same as everyone else and more enthusiastic about eating.
Monitor amount	Control	8	11	10	29	Know he is actually getting some food instead of playing with it	I know that he's eating a good amount of food	feel like I am giving enough food and nutrients to meet her needs
	BLISS	0	0	3	3			Like mix of finger foods and puree so I know he is eating enough as he cries when hungry
Parent bonds with child	Control	12	10	5	27	mum gets 1-on-1 chatting/bonding time. Others can help feed him.	Closeness, spending time feeding them	Get to interact in different ways.
	BLISS	4	1	1	6	good bonding time	Mum enjoys eating with baby	good family time
Know what child is getting	Control	8	5	4	17	Easy - as all food from supermarket is the same.	know what he is getting and where it's going	like being able to control the texture and consistency

	BLISS	0	0	1	1			I know that he's getting it into his belly
New foods	Control	9	3	2	14	Interesting to see the way he reacts to tasting new foods	baby is pretty easy to please so has tried a variety of foods	tries new things
	BLISS	6	1	1	8	fun to watch her exploring new foods	baby will try anything	trying a lot more different foods
Increased safety	Control	4	1	1	6	do not have to worry about choking/gagging	reduces choking	reduces risk of choking
	BLISS	1	0	0	1	Good for baby to learn about food, gag reflex,		
Influence amount	Control	2	2	0	4	can control amounts eaten and can encourage more or less food	I am the one controlling putting the food into his mouth can get more into him. Tried to let him feed himself but unsuccessful (struggled to swallow)	
	BLISS	0	0	0	0			
Other pleases parent	Control	1	2	3	6	It's fun, it's part of development. Enjoy watching her develop	enjoyable	Good
	BLISS	7	5	6	18	Fun to watch.	Process can be fun	It's fun. Feels natural.

Table 4 Open ended responses on what the adult participant doesn't like about the approach – theme 'Disadvantage to the child'

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Child not eating enough	Control	2	0	1	3	don't like it when she doesn't eat much		He is a baby on the go. Sometimes I don't pack food for him. Daughter has sport, so he misses out on food
	BLISS	4	6	1	11	She doesn't always eat much	Possibly doesn't eat enough	doesn't eat very much
Child frustrated when hungry	Control	0	0	0	0			
	BLISS	6	1	2	9	baby gets frustrated when really hungry	At the moment he's not able to get as much as he would like, which makes him cranky	her frustration when she can't get some foods in her mouth
Poor self-feeding	Control	0	2	0	2		When there are items which require a spoon (yoghurt, Farex etc) Mum feels frustrated by not being able to spoon feed. Baby can't successfully get spoon to mouth yet	
	BLISS	5	2	1	8	He gets cross when I give him finger foods because he can't eat them.	At the moment he's not able to get as much as he would like so parents have to spoon feed	When letting him feed himself, you can't control how much actually gets in his mouth

Constipation	Control	0	0	1	1			1.She's had a lot of constipation this month which worries me.
	BLISS	2	1	1	4	constipation - has needed prune juice	Won't drink water bowel movements harder.	constipated with finger food, had to give lactulose. Slowly introducing finger foods again
Feel like child is forced to eat	Control	1	2	1	4	other approaches are not BL so can sometimes feel quite forceful (ie getting baby to do something that he doesn't want)	sometimes have to force feed which Mum doesn't like	Taking away his independence
	BLISS	0	0	0	0			
Child not willing to eat	Control	0	0	1	1			Some days she doesn't want to eat
	BLISS	2	0	1	3	frustrating that baby is not interested/into it		some days she doesn't eat anything which can be frustrating.

Table 5 Open ended responses on what the adult participant doesn't like about the approach – theme 'Not convenient'

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Mess	Control	17	13	16	46	A bit messy but we have the dog	the mess	How far the food can go. So much to clean up
	BLISS	23	27	32	82	mess, changing her clothing every time I feed	the mess and the washing	the mess! - and cleaning it up
Slow	Control	2	7	2	11	time it takes baby to eat	it takes a long time to feed him	time factor
	BLISS	7	8	5	20	Can be time consuming as she takes a long time to eat.	That she takes forever to eat	the time it takes for baby to feed himself.
More work	Control	6	5	4	15	the fact that she wants us to feed her first that I have to prep meals for her separately	Having to prepare food is a little bit annoying and time consuming	having to make a different food/buy a jar when the family meal isn't suitable
	BLISS	3	6	6	15	Mum prepares different foods than what family eats	If the family food is not appropriate then have to find her something else, easier to open a jar of puree	The time it takes to prepare food
Increased waste	Control	4	0	1	5	does not always finish everything, waste of food		waste of finger foods
	BLISS	2	3	5	10	waste quite a bit of food	There is also a lot of food wastage	Wastes a lot of food

Won't feed self	Control	2	2	4	8	Doesn't like finger food; only spoon feeding	he likes to be served and sometimes doesn't eat if you just place food in front of him sometimes it would be nice if he was more independent	I would like it if he was feeding himself
	BLISS	0	0	1	1			Sometimes I know she's hungry but she won't pick the food up herself. With new foods she needs prompting.
Struggle for food ideas	Control	1	1	2	4	Challenging to think of different ideas to feed baby.	trying to keep it interesting and give her variety is hard	Trying to come up with interesting ways to serve her the same sorts of foods
	BLISS	2	3	2	7	Thinking of new ideas can be a headache	Sometimes its hard to think about what to give her for variety.	Thinking of new foods every day
Increased cost	Control	4	1	2	7	cost	the cost	cost.
	BLISS	1	0	1	2	can get a wee bit expensive (although for us this isn't really a problem)		is a bit expensive, but now he is starting to eat what Mum and Dad eat
Child will not allow feeding	Control	1	1	1	3	I have tried but she won't let me (feed her). She won't have a bar of eating puree	(baby won't take anything on a spoon from Mum)	refusing to eat from a spoon and tries to get out of his highchair

						food which is frustrating at night because I'm busy and it would be easier if she did		
	BLISS	1	2	1	4	not being able to help	as gets so used to feeding herself doesn't want any help feeding.	baby very independent now - won't accept help
Time needed to supervise	Control	1	1	1	3	4 children - difficult to always have to be there.	I have to stay there,	Would be nice if he did more self-feeding
	BLISS	1	1	1	3	2.constant supervision to monitor choking/gagging esp with other children to look after and no open-plan living space	can't leave room, must be with them constantly.	1. Mum is busy and it sometimes feels like it takes a lot of time and effort to supervise: feeding him herself would be quicker.
Other not convenient	Control	1	1	3	5	Less convenient	have to be organised when you go out and have facilities to feed and clean	find it hard when out and about
	BLISS	6	0	4	10	with other kids, fed porridge with spoon - haven't been able to do this. With some foods, feel the urge to spoon feed, but this doesn't happen often.		can be a bit limiting, i.e would like to give porridge at breakfast. Hand-held items such as Mini-Wheats are high in sugar. Can be more difficult when out and about

Table 6 Open ended responses on what the adult participant doesn't like about the approach – theme 'Worries parent'

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Fear of choking	Control	5	1	2	8	Don't really like feeding rusks because they break and afraid he might choke	hesitant about choking possibility	can increase chance of gagging and choking but nothing has happened so far.
	BLISS	19	15	11	45	Worried about gagging and choking	At beginning, concern she'd choke, now less of a concern as she's been fine.	Am a bit concerned about choking risk with some foods, but he hasn't choked yet
Don't know how much child consumes	Control	4	4	3	11	not knowing how much he's eating	hard to know how much is being eaten	uncertainty of how much he's actually eating
	BLISS	10	3	3	16	Don't know if she is getting enough. If I spoon feed her she might eat more	Not sure he is getting enough	I have no idea if she's getting enough, I don't like not knowing. But not sure if this would be the same if I was feeding her.
Lack of knowledge	Control	3	1	3	7	Not knowing the right time/timing. Not knowing why she is eating, ie hunger vs taste	what to give her, how much and size and amount of food	unsure if to push her or just let her be
	BLISS	2	3	1	6	Not knowing exactly what to give baby	not too sure about how to feed him some foods	when she's sick. I wonder if she would be better to be spoonfed.

Don't know what nutrients child gets	Control	1	2	1	4	not knowing how much nutrition he is getting out of food	without a nutrition background it's hard to know if he's getting enough nutrients	wonder if he's getting enough nutrients - main food is still breastmilk
	BLISS	3	1	3	7	Concerned about sodium content in bread as a lot of BLISS foods are on toast	Adults vegetarian so worried about Fe levels.	Worried about iron because what we eat is not fortified. Not sure about how good some of the family foods are, salt and butter wise
Can't read food like cues	Control	2	0	1	3	not sure whether she really likes or enjoys food		hard to tell whether she actually likes a food
	BLISS	0	0	1	1			can he get enough food, or doesn't he like the food?
Can't read satiety cues	Control	1	1	1	3	Not knowing why she is eating, ie hunger	not sure if it's filling enough for him	hard to tell whether she eats it because she is hungry
	BLISS	1	1	0	2	hard to know if baby was getting enough food to satisfy hunger	(not sure if it was lack of hunger which determined intake)	
Child eating too much	Control	0	0	0	0			
	BLISS	0	1	2	3		I think she's eating too much.	Worry giving him more than required - over-riding satiety cues.

Concern/fear from wider family and friends	Control	0	1	0	1		Lack of knowledge and understanding from other family and friends who are worried she will choke. Mum and Dad aren't concerned at all.
	BLISS	1	1	0	2	concern/fear from wider family and friends	Can be difficult when out, other people's reactions.
Lack of confidence	Control	1	1	0	2	need a certain level of confidence (ie not scared of gagging)	I would like to be more confident in her ability to manage a wider variety of foods
	BLISS	0	0	0	0		
Guilt for not allowing freedom	Control	0	2	0	2		feels guilty that she isn't getting full freedom to explore the food
	BLISS	0	0	0	0		
Other worries parent	Control	0	0	1	1		I'm not controlling whats in his foods
	BLISS	2	0	0	2	Worried about allergies.	

Table 7 Open ended responses on what the adult participant thinks their partner likes about the approach – theme ‘Benefit to child’

Sub-theme	Group	Number of quotes			Quote 8 months	Quote 9 months
		8m	9m	Total		
Autonomy	Control	8	8	16	Baby can feed himself sometimes	likes that baby stops eating when full
	BLISS	15	13	28	independent, knows when it's feeding time and knows when she's full	she's learning to be independent, chew well. She lets us know when she's had enough.
Variety	Control	0	4	4		more variety and textures involved, rather than sloppy
	BLISS	9	6	15	good variety of food	she's learning to have a variety of food which will hopefully lead to her not being fussy.
Fine motor skills	Control	1	0	1	watching him learn to grasp for things	
	BLISS	4	5	9	That he is learning fine motor skills	development of fine motor skills and coordination
Child willing to eat	Control	5	4	9	he can give her anything and she will attempt to eat it	He likes how he can give her anything
	BLISS	3	0	3	Helps her be less picky	

Health	Control	2	2	4	Nutrition, make him grow	nutritious
	BLISS	2	0	2	Likes that baby can have vegetables with fibre	
Benefit to child	Control	1	0	1	brain development	
	BLISS	1	3	4	learning to be a good eater	learning aspect
Benefit to child	Control	1	0	1	brain development	
	BLISS	1	3	4	learning to be a good eater	learning aspect

Table 8 Open ended responses on what the adult participant thinks their partner likes about the approach – theme ‘Convenience’

Sub-theme	Group	Number of quotes			Quote 8 months	Quote 9 months
		8m	9m	Total		
Fits in with family	Control	10	9	19	eats the same meals but slightly different	easy to feed her with the other kids without too much thought
	BLISS	23	28	51	we can all eat at the same time	easy to give her bits off his plate, more natural way of feeding
Convenience for parent	Control	18	20	38	Easy and convenient	Flexibility.
	BLISS	10	30	40	convenient	it's easy - give her the food and watch!
Don't have to feed child	Control	3	2	5	He doesn't get stuck feeding baby with spoon	not having to sit there and feed her
	BLISS	5	7	12	frees up family to eat own meals as they are not spoonfeeding him	Doesn't have to sit down and physically feed baby herself
No extra meal preparation	Control	2	3	5	we don't have to make food for him	not having to puree foods
	BLISS	6	5	11	don't have to prepare anything separate for him,	Don't have to grind food - can give it off the parent's plate

Not expensive	Control	2	2	4	cheaper saving money	inexpensive way of feeding
	BLISS	4	1	5	he likes that we're not buying baby food	the fact it's not fussy or costly.
Quick	Control	1	1	2	does not take extra time	quick,
	BLISS	2	2	4	convenient to quickly grab foods. Good for time not having to sit and feed him	does not take up so much of parent's time
Can feed anytime/food always available	Control	3	1	4	he can feed him any time as his food is always in the fridge	Ease of finding stuff in the fridge and giving it to her
	BLISS	1	3	4	Dad can just grab something and give it to baby	easy for Dad to find things for him to eat
Less Mess	Control	3	2	5	he dislikes mess so likes this approach	he thinks it is less messy
	BLISS	0	1	1		Doesn't have food spat back at him

Table 9 Open ended responses on what the adult participant thinks their partner likes about the approach – theme ‘Pleases partner’

Sub-theme	Group	Number of quotes			Quote 8 months	Quote 9 months
		8m	9m	Total		
Partner bonds with child	Control	10	8	18	he likes spending time and talking to baby while feeding him	likes playing games with baby while feeding him
	BLISS	6	3	9	getting to sit with her and communicate about what she's eating	Partner gets to spend more time with baby
Contribute to feeding	Control	7	8	15	that they are able to be more part of feeding now	He is able to get involved
	BLISS	5	3	8	he can help decide what baby eats too	he can be involved
Monitor amount	Control	5	5	10	know how much baby is having if spoon fed	We know how much he's eating
	BLISS	0	2	2		know how much she's eaten
Child tries new foods	Control	2	2	4	watching her try new stuff	enjoying it when she tastes new foods
	BLISS	4	5	9	Likes watching baby try new foods	Likes him exploring the food
Child enjoys food	Control	2	3	5	baby likes it	He can see that the baby likes it

	BLISS	4	4	8	Likes to see her enjoying the food	is enthusiastic about eating the same as everyone else
Know what child is getting	Control	1	3	4	he knows what baby is getting	seeing what he's eating
Don't have to do anything	BLISS	0	0	0		
	Control	1	3	4	Fact that he doesn't have to do anything	enjoying that he doesn't have to do much.
Increased safety	BLISS	2	1	3	He doesn't have to do anything	likes that Mum gives baby the messy foods
	Control	1	2	3	Like that he's not constantly choking on stuff, like his sister did.	No risk of choking,
Making food	BLISS	0	0	0		
	Control	2	1	3	He enjoys making the food	He loves preparing food
Support partner	BLISS	1	0	1	Dad does all the cooking so likes having control of what baby eats.	
	Control	0	0	0		
	BLISS	1	1	2	He wants Mum to be happy and is supporting her.	Mum does so much (childcare) that he is stoked with whatever works

Baby gets fed/is not hungry	Control	2	0	2	knows baby is getting food inside	
	BLISS	1	1	2	baby is getting food	Likes to make sure child is actually eating (so spoon feeds - not spoon loads)
Less waste	Control	1	1	2	less waste,	less wastage, guess how much he can eat
	BLISS	0	0	0		
Other pleases Partner	Control	1	4	5	Mum/baby happy, natural	she seems happy and Mum is happy
	BLISS	5	2	7	fun as there are no restrictions	happy with it

Table 10 Open ended responses on what the adult participant thinks their partner doesn't like about the approach – theme 'Disadvantage to child'

Sub-theme	Group	Number of quotes			Quote 8 months	Quote 9 months
		8m	9m	Total		
Child not eating enough	Control	1	1	2	when baby won't eat it	would like to see him eating a bit more also
	BLISS	3	3	6	amount of food baby gets in, i.e. not getting enough	Concerned that he is not eating enough
Other disadvantage to child	Control	2	0	2	giving some food items for baby to selfselect from might be good for baby's independence (because Mum is spoonfeeding most of the time)	
	BLISS	0	0	0		

Table 11 Open ended responses on what the adult participant thinks their partner doesn't like about the approach – theme 'Not convenient'

Sub-theme	Group	Number of quotes			Quote 8 months	Quote 9 months
		8m	9m	Total		
Mess	Control	12	17	29	the mess part	doesn't like mess on her face (a wee bit grossed out)
	BLISS	21	17	38	The mess all over her hands, sleeves, face.	very messy
Slow	Control	5	3	8	Length of time taken to feed baby	Takes a long time to feed child
	BLISS	2	3	5	time if you're in a hurry.	Takes longer
More work	Control	3	0	3	remembering to adapt her portion to exclude salt, sugar etc	
	BLISS	2	4	6	sourcing ingredients is sometimes difficult!	doesn't like cleaning her up
Increased cost	Control	2	2	4	The cost	Having to pay for it
	BLISS	0	0	0		
Won't feed self	Control	1	3	4	He might prefer it if baby could feed himself ie finger foods	that he has to sit there and spoon feed it to him
	BLISS	0	0	0		
Increased waste	Control	1	1	2	the amount that baby throws away!	Doesn't like the waste of good food

	BLISS	1	0	1	thinks its quite wasteful	
Struggle for food ideas	Control	0	0	0		
	BLISS	0	2	2		having to decide what to give her
Other not convenient	Control	3	1	4	when baby misbehaves when feeding	child won't sit still to eat unless he is in a highchair
	BLISS	3	3	6	what she has to have to meet guidelines feels restricted	is inconvenient

Table 12 Open ended responses on what the adult participant thinks their partner doesn't like about the approach – theme 'Worries partner'

Sub-theme	Group	Number of quotes			Quote 8 months	Quote 9 months
		8m	9m	Total		
Fear of choking	Control	7	6	13	worried about choking	Doesn't like it when Mum gives small foods which baby can choke on i.e. raisins
	BLISS	18	12	30	Worried about choking	Worried about gagging/choking
Don't know how much child consumes	Control	0	0	0		
	BLISS	3	2	5	I'm not sure of the amount that he's actually getting	If she is getting enough or not
Lack of knowledge	Control	2	2	4	Not 100% sure what to give him.	Partner unsure on how big/small to chop foods
	BLISS	1	1	2	Partner doesn't know what baby can and can't eat more cautious	Sometimes not sure what to offer
Lack of confidence	Control	3	0	3	Would like to feel more confident about the foods baby could manage	
	BLISS	0	0	0		

Don't know what nutrients child gets	Control	1	0	1	Concern she's not getting what she should	
	BLISS	1	1	2	worries about Fe, using middle ground approach best of both spoon and self feeding	Also slightly worried about iron intake. Good at using baby rice in various meals.
Other worries parent	Control	1	0	1	Not big on sugar not keen on convenience snacks which are easy for child to eat	
	BLISS	3	5	8	Disagrees with the variety of food so soon	Not being able to feed him

Table 13 Open ended responses on what the adult participant does to make mess more manageable when baby eats at home – theme ‘Avoidence

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Mat	Control	32	32	39	103	Messy mat under highchair.	messy mat, blanket when eating on the floor	waterproof mat under the chair,
	BLISS	55	55	54	164	mat under highchair	Use the mat on the floor	messy mat underneath
Bib	Control	34	31	33	98	bib, cloth nappy wrapped around	Full length bib,	bib with sleeves
	BLISS	28	32	28	88	Use a bib with sleeves	bib with a catcher, smock	Full length bib with arms.
Alter clothing	Control	8	5	6	19	jacket on him so don't have to worry about his clothes	take off nice clothes	roll sleeves up,
	BLISS	9	10	8	27	take some of his clothes off so they don't get messy,	sometimes strip baby off so only have to wash him, not clothes	clothing changes for feeding
Easy to clean ground	Control	4	10	5	19	Sometimes feed him outside or on hard ground.	feed him on lino floor	use highchair on hard floor (not carpet)

	BLISS	5	5	6	16	eat in dining room - easy to wipe (avoid carpet),	highchair on lino	Try not to eat on carpet - feed her in the kitchen
Limit amount	Control	5	4	5	14	Not put too much on the spoon.	smaller portions on teaspoons on front	only give parts of food at a time (vs whole plate of food)
	BLISS	3	2	0	5	Small amounts of food at a time, not whole plates.	small bits at a time	
Parent feeds	Control	4	3	5	12	spoon technique	if he is grumpy Mum will feed him instead of letting him feed himself	spoon feeding for messy foods,
	BLISS	0	1	4	5		holding the spoon	Spoon-feed the messy stuff
Limit messy foods	Control	2	3	4	9	Give less messy foods	less messy foods i.e. less avocado, banana	choose which foods baby gets to play with
	BLISS	4	2	3	9	give less messy foods with mealtimes when have less time	avoid smooshy things which she can throw	Give finger food - puree is messier
Bowl out of reach	Control	0	5	3	8		hands out of bowls	make sure bowl isn't on highchair

	BLISS	1	1	1	3	watch him as he eats, hold plates when he's flinging food around. Going to get a suction bowl!	food directly on tray (can't throw plate around)	Mum holds bowl.
Other avoidance	Control	3	1	1	5	Mum tries to feed him a tidy way	if reaches for the spoon take it away	tray
	BLISS	1	1	2	4	Keep the mess on his tray	sit her on the table so it's easier to clean her off after	moveable cleanable tray table

Table 14 Open ended responses on what the adult participant does to make mess more manageable when baby eats at home – theme ‘Cleaning’

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Wipes	Control	9	14	7	30	face cloths	have wipes on hand	keep cloth handy
	BLISS	7	6	1	14	Cloths on hand to wipe up big spills/messes.	baby wipes, flannel/paper towels	Face cloth nearby,
Dog	Control	4	6	9	19	let the dogs clean up after	let the dog in after he has eaten	dog to clean up mess on floor
	BLISS	5	2	6	13	the dog is the best for picking up mess	have dog to clean up	bring dogs in to clean up
Clean as you go	Control	8	3	4	15	Wipe as we are eating	clean up baby as you go	wipe down tray between courses
	BLISS	3	2	4	9	Wipe her up as she goes	wiping inbetween mouthfuls	clean and wipe as she's eating
Catch food	Control	2	0	0	2	Catch things before they get to the floor		
	BLISS	1	1	1	3	try to catch food if baby looks like he is going to throw it	Grab food before it falls	catch what you can
Other cleaning	Control	3	3	0	6	wash face, then hands, then highchair, then floor	easytoclean highchair	

BLISS

2

4

2

8

Clean him up afterwards

new highchair that cleans
easily

keep brush and pan handy

Table 15 Open ended responses on what the adult participant does to make mess more manageable when baby eats at home – theme ‘Modify behaviour’

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Restrain child	Control	3	3	5	11	try to stop him feeding himself	hold arms away from spoon	sit him in highchair,
	BLISS	8	3	3	14	always in highchair	feed her in the highchair	sits in highchair,
Distract child	Control	4	2	3	9	Another spoon, so he thinks he is in control	sometimes give him spoon	give another spoon to hold onto
	BLISS	0	1	0	1		give baby a toy or spoon to occupy herself	
Assist with feeding	Control	1	0	0	1	spoon load		
	BLISS	1	3	2	6	help him with messy foods that require a spoon	Sit with him to demonstrate how to eat. Fill the spoon guide him (hold his hand) to do this and eat it.	help him more with food which requires a spoon
Other modify behaviour	Control	0	1	1	2		make sure baby is not tired	stop feeding if she starts chucking food on floor
	BLISS	0	3	0	3		always monitor him	

Table 16 Open ended responses on what the adult participant does to make mess more manageable when baby eats away from home – theme ‘Avoidence’

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Bib	Control	24	28	26	78	be organised - bib, apron (Smock)	Bib	Bib with sleeves
	BLISS	17	17	22	56	full bib on	use a fullcovered in bib and towelling	Full length bib
Less messy food	Control	8	12	16	36	Give less messy foods,	tailor what I feed her	choose less messy foods
	BLISS	18	19	23	60	Give finger foods to make less mess	Use non messy foods, ie cheese, toast	the squeezee pouches are good when on the move
Mat	Control	7	12	12	31	towel or mat down	Floor mat	always put something on the floor - rug/mat/newspaper
	BLISS	12	14	15	41	put something down on floor	he sits on a mat on carpet at other people's houses	take mat with us
Parent feeds	Control	8	7	8	23	don't let him feed himself	feed her myself	feed him in a tidier way
	BLISS	4	5	8	17	more help eating when at someone's house	if eating messy foods mum or dad feeds him	Might spoon-feed him
Limit amount	Control	3	4	5	12	less on spoon	Don't put a lot on spoon or give too much to baby	manage foods given carefully - one piece of food at a time

	BLISS	5	4	5	14	Limit the amount she has to choose from	smaller pieces, one food at a time rather than a selection	give him smaller amounts at a time
Easy to clean ground	Control	1	3	0	4	Feed in kitchen on floor which can be cleaned	put in easy mopping areas to feed	
	BLISS	3	3	5	11	eat outside if possible	put baby in friend's kitchen or eat outside if possible	Pick an area that is easy to clean
Alter clothing	Control	2	2	2	6	jacket on him so don't have to worry about his clothes	roll up her sleeves	don't wear good clothes
	BLISS	3	0	1	4	always have a change of clothes		make sure she's not wearing clothing
Bowl out of reach	Control	0	4	2	6		keep bowl out of his reach	make sure bowl isn't on highchair
No solids while out	BLISS	0	0	0	0			
	Control	2	2	0	4	don't feed away from home except for breastfeeding	milk feeds + no solid foods,	
Other avoidance	BLISS	0	0	0	0			
	Control	1	2	1	4	On knee - easier to clean up	may have her on knee and keep mess off carpets etc	keep an eye on him more regularly,
	BLISS	0	0	0	0			

Table 17 Open ended responses on what the adult participant does to make mess more manageable when baby eats away from home – theme ‘Cleaning’

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Wipes	Control	13	14	9	36	use serviettes	baby wipes	lots of wipes
	BLISS	7	6	6	19	have wipes handy	Face cloth ready	cloths or wet wipes
Pick up food as dropped	Control	1	1	1	3	pick up food as she drops it	pick up stuff off the floor	pick up food as it drops
	BLISS	3	6	10	19	pick up food mess as shes eating	pick up food off the floor at cafe	pick it up as it hits the floor
Clean as you go	Control	5	1	1	7	wipe mouth after each spoonful	clean as you go	"clean as we go" - keep cloth handy
	BLISS	1	0	2	3	will clean as you go		clean and wipe as she's eating
Catch food	Control	0	0	3	3			catch food before hitting the ground
	BLISS	2	1	3	6	try and catch food before it flies!	catch food if she throws it	sit close to her and catch things before they fall on the floor,
Other cleaning	Control	3	4	2	9	tidy up after	clean up after	clean up mess baby makes
	BLISS	1	2	2	5	more vigilant about cleaning it up!	ask for supplies (shovel and brush) to clean up	dustbuster

Table 18 Open ended responses on what the adult participant does to make mess more manageable when baby eats away from home – theme ‘Modify behaviour’

Sub-theme	Group	Number of quotes				Quote 7 months	Quote 8 months	Quote 9 months
		7m	8m	9m	Total			
Restrain child	Control	1	5	10	16	hold him (ie no highchair) and hold his hand back	portable high chair	Hold onto him, use highchair when available
	BLISS	6	6	9	21	try and use a highchair if available. Otherwise sit her in pushchair.	In highchair or on knee	She sits on my knee
Distract child	Control	0	1	2	3		sometimes give him spoon	a toy to play with
	BLISS	0	0	0	0			
Other modify behaviour	Control	0	1	0	1		watch more closely	
	BLISS	2	3	2	7	sit with him while he eats	Twoperson job	give him foods that he likes so that he doesn't throw them away