

Healthcare professionals' and mothers' knowledge of, attitudes to and experiences with, Baby-Led Weaning: a content analysis study

Sonya Lynne Cameron,¹ Anne-Louise Mary Heath,¹ Rachael Waring Taylor²

To cite: Cameron SL, Heath A-LM, Taylor RW. Healthcare professionals' and mothers' knowledge of, attitudes to and experiences with, Baby-Led Weaning: a content analysis study. *BMJ Open* 2012;**2**:e001542. doi:10.1136/bmjopen-2012-001542

► Prepublication history for this paper are available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2012-001542>).

Received 23 May 2012
Accepted 4 October 2012

This final article is available for use under the terms of the Creative Commons Attribution Non-Commercial 2.0 Licence; see <http://bmjopen.bmj.com>

¹Department of Human Nutrition, University of Otago, Dunedin, New Zealand

²Department of Medicine, University of Otago, Dunedin, New Zealand

Correspondence to

Dr Anne-Louise Mary Heath; anne-louise.heath@otago.ac.nz

ABSTRACT

Objective: Baby-Led Weaning (BLW) is an alternative approach for introducing complementary foods to infants that emphasises infant self-feeding rather than adult spoon-feeding. Here we examined healthcare professionals' and mothers' knowledge of, attitudes to and experiences with, BLW.

Design, setting and participants: Healthcare professionals (n=31) and mothers who had used BLW (n=20) completed a semistructured interview using one of two tailored interview schedules examining their knowledge of, attitudes to and experiences with, BLW. Interview notes and transcripts were analysed using content analysis to identify subcategories and extract illustrative quotes.

Results: Healthcare professionals had limited direct experience with BLW and the main concerns raised were the potential for increased risk of choking, iron deficiency and inadequate energy intake. Although they suggested a number of potential benefits of BLW (greater opportunity for shared family meal times, fewer mealtime battles, healthier eating behaviours, greater convenience and possible developmental advantages) most felt reluctant to recommend BLW because of their concern about the potential increased risk of choking. In contrast, mothers who had used this style of feeding reported no major concerns with BLW. They considered BLW to be a healthier, more convenient and less stressful way to introduce complementary foods to their infant and recommended this feeding approach to other mothers. Although mothers did not report being concerned about choking, 30% reported at least one choking episode—most commonly with raw apple.

Conclusions: Given the lack of research on BLW, further work is needed to determine whether the concerns expressed by healthcare professionals and potential benefits outlined by mothers are valid. The current study suggests that there is a mismatch between healthcare professionals' and mothers' knowledge of, attitudes to and experiences, with BLW.

INTRODUCTION

Traditionally, the method of infant feeding recommended to mothers in most developed countries, including the UK and New Zealand,

ARTICLE SUMMARY

Article focus

- Healthcare professionals are an important source of information for mothers during the complementary feeding period.
- The literature suggests that there is a mismatch between healthcare professionals' and mothers' knowledge and attitudes to infant feeding.
- Baby-Led Weaning (BLW) is an alternative approach for introducing complementary foods to infants that is becoming increasingly popular with mothers.

Key messages

- Healthcare professionals identified a number of potential benefits of BLW including more shared family meals, promotion of healthier eating behaviours and greater convenience for mothers. However, healthcare professionals also had strong concerns about the risk of iron deficiency, inadequate energy intake and choking, and as a result most felt reluctant to recommend it.
- Mothers who had practised BLW reported more benefits and had fewer concerns about BLW than healthcare professionals.
- Some parents reported offering raw apple to their infant when they were following BLW. This practice should be discouraged because raw apple is a choking hazard at this age.

Strengths and limitations of this study

- This is the first study to interview healthcare professionals about BLW.
- The healthcare professionals and mothers were self-selected.

has been to spoon-feed the infant puréed food before moving on to mashed and finger foods as the child grows.^{1–3} Recently an alternative approach, known as Baby-Led Weaning (BLW), has emerged^{4 5} and anecdotal evidence suggests that many mothers are attempting BLW.⁶ BLW recommends that instead of spoon-feeding, mothers encourage their infant to self-feed, from about 6 months

of age. Although infants following the more traditional method of infant feeding may be offered finger foods, in many countries, including New Zealand, it is recommended that this does not occur until 8–9 months of age, long after the introduction of puréed food. In contrast, BLW, in its purest form, does not include any spoon-feeding by the adult. The infant is only offered pieces of whole food, appropriately prepared, so that the infant can feed themselves right from the start of the complementary feeding period.

The small body of existing research suggests that BLW is feasible for most 6-month-old infants from a motor development point of view.⁷ It also suggests that BLW is associated with lower levels of maternal anxiety, restriction, pressure to eat and monitoring during the complementary feeding period;⁸ and perhaps healthier eating patterns and body mass index.⁹ However, in the absence of any longitudinal or randomised controlled trial data, it is not possible to determine whether these associations are causal.

Healthcare professionals are an important source of information for mothers during the complementary feeding period, and can potentially have as much influence on decisions around milk feeding and introducing solids as cultural values or material resources.^{10–11} However, healthcare professionals' knowledge and attitudes about infant feeding often differ from those of mothers.^{12–13}

Previous studies on healthcare professionals' knowledge and attitudes towards infant feeding have focused on milk feeding or timing of the introduction of complementary food.^{14–17} To date, no study has examined attitudes to BLW in healthcare professionals working with young families.

The aim of this content analysis study was to examine the knowledge of, attitudes to and experiences with, BLW of healthcare professionals and of mothers who had used this style of feeding with their infant.

METHODS

Participants

The participants were 31 healthcare professionals who were working with infants and families, and 20 mothers who had used BLW when introducing solids to their infant. Mothers could be part of the study if they considered that they had used BLW, so BLW was self-defined.

Participants were recruited by word of mouth (healthcare professional peer-to-peer networks, parenting groups, La Leche League), email 'snowballing', or newspaper advertising. Twelve parenting groups were approached as a starting point to recruit directly mothers who had tried BLW and to start snowballing. Parenting groups were SPACE (Supporting Parenting And child Education) groups established to assist mothers (usually first-time mothers) with all aspects of parenting young children, and were not specifically advocates of BLW, although BLW was a topic addressed

throughout the parenting programme. Recruitment of the health professionals was undertaken via established clinical relationships, and via snowballing through practice nurses. The study was approved by the Human Ethics Committee of the University of Otago, Dunedin, New Zealand.

Data collection

The data were collected during 2010 in Dunedin, New Zealand. Healthcare professionals were interviewed at their place of work and mothers in their own home. The same researcher (SC) conducted all interviews, which typically lasted 1–1.5 h. Field notes were taken during the interviews with healthcare professionals and extended immediately following the meeting. Interviews with mothers were tape-recorded and transcribed verbatim.

Interview schedule and process

Two interview schedules, one for health professionals and one for parents, were developed from the existing literature about BLW^{7–8–18} and the expert opinion of the authors (boxes 1 and 2). As some healthcare professionals had not heard of BLW, a brief description of BLW was given at the start of the interview when necessary.

We used a semistructured interview as outlined in Patton¹⁹ to include, in the first part, a structured framework to cover the same basic lines of inquiry around knowledge, attitudes and experiences, for which participants could express their own ideas and understandings. The second part of the interview followed an unstructured format to allow for probing and further questioning of ideas or individual circumstances that were not included in the original interview outline.

Data analysis

The main lines of inquiry (knowledge, attitudes and experiences) from the interviews were used as an initial guide in a directed content analysis,²⁰ and are referred to here as categories. Content analysis¹⁹ was performed on all interviews by reviewing all transcripts several times

Box 1 Questions used in interviews with healthcare professionals

1. What is your professional role?
2. Have you heard of Baby-Led Weaning (BLW)?
3. Where did you hear about BLW?
4. When did you hear about BLW?
5. If somebody asked you what BLW is, how would you describe it?
6. What do you think of BLW as an alternative method for introducing solid foods to infants?
7. Do you consider there may be benefits of BLW?
8. Do you consider there may be disadvantages of BLW?
9. Do you have any concerns about BLW?

Box 2 Questions used in interviews with mothers who had used Baby-Led Weaning

1. If someone asked you: 'What is Baby-Led Weaning (BLW)?' What would you tell them?
2. How did you hear about BLW?
3. Why did you decide to try BLW?
4. How old was your baby when you started BLW?
5. How old is she now?
6. How much of her food do you feed her and how much does she feed herself?
7. Where did/do you get most of your information about BLW?
8. What were the first foods you offered your baby?
9. What form were the foods in that you first offered your baby?
10. Were there any foods you avoided because you were using BLW?
11. Did your baby eat at the same time as the rest of the family?
12. Do you think your baby is a fussy or picky eater?
13. Were you worried about BLW in any way?
14. Did your baby gag on food?
15. Was it food she had fed herself?
16. Did your baby ever choke on food?
17. Was it food she had fed herself?
18. Do you consider there were advantages of BLW for you and your baby?
19. Do you consider there were disadvantages of BLW for you and your baby?
20. Overall, do you think BLW worked for you and your baby?
21. Would you recommend other mothers try BLW?
22. Do you have any useful tips for other mothers trying BLW?
NB: 'She' or 'he' was used appropriately for the sex of the child.

for recurring subcategories (reviewing the two groups separately). Subcategories were identified from manifest content (the visible, obvious components),²¹ because the aim was to extract and report on the descriptive level of content and not to provide a deep level of interpretation and underlying meaning. Participants were recruited until we reached saturation of subcategories, and we ensured that subcategories were, as far as possible, defined so that they were exhaustive and mutually exclusive. Data analysis was led by one member of the research team (SC); and interpretation was verified during research team meetings (with RWT and ALH) to scrutinise subcategories as they were identified. Each category and its subcategories have been summarised, and illustrative quotes are included.

RESULTS

Thirty-one healthcare professionals were interviewed, comprising: practice nurses (n=11), Well-Child providers (a government-funded service supporting families with young children and assessing health status, see: <http://www.wellchild.org.nz/>) (n=4), dietitians (n=4), general practitioners (n=5), paediatricians (n=2), lactation consultants (n=2), midwives (n=2) and a paediatric speech-language therapist (n=1). The mothers were 20

mothers who had a child aged 8–24 months (mean=13 months).

Healthcare professionals

The subcategories that emerged were remarkably consistent across the interviews with healthcare professionals.

Knowledge

Nearly half (n=13/31) of the healthcare professionals had heard about BLW. Most of these had been introduced to the concept by their colleagues or friends and family (rather than patients). The healthcare professionals who knew about BLW described it as the child feeding themselves whole foods, instead of being spoon-fed purées. There was little discussion on the other aspects of BLW.

Attitudes

All healthcare professionals considered that BLW could be beneficial for the family and the child.

Healthcare professionals considered that shared family mealtimes would be the main advantage of BLW. They were aware of the nutritional and psychological benefits of family meals and they envisaged family mealtimes would be easier and more pleasant with BLW:

The best thing is that an adult can eat their meal while the child is having theirs. There's no juggling trying to feed the baby while shoving a spoonful for yourself. (General Practitioner 3)

Some healthcare professionals thought mealtime battles would be less likely with BLW for two reasons: mothers would have an alternative approach to try if their child refused to be spoon-fed; and because BLW allows the child to eat at their own pace and stop when they have had enough, they would not be "bribed" (Dietitian 2) or "forced" (Lactation Consultant 1) to eat food:

I think it's healthier that the baby is in control of what they eat... and you aren't forcing them to eat...there's far too many of us who just finish our plates instead of stopping when we are full. (Dietitian 2)

Overall, healthcare professionals thought BLW would encourage healthier dietary behaviours by promoting a wider variety of foods and allowing the child to explore and learn about food at their own pace:

Being able to look at it, hold it and see it as food, instead of slop must have advantages? (Paediatrician 2)

They also considered BLW would encourage better appetite and self-regulation skills, as mothers would be less able to control the child's food intake. They saw similarities between BLW and breastfeeding on

demand and thought the two would complement each other well.

A number of healthcare professionals who had children of their own thought BLW would be more convenient than the conventional method of spoon-feeding purées:

It sounds so much easier. Making purées is time consuming, and then they hardly eat anything and you have to throw it all out or you buy those jars of food, which are really expensive. (Dietitian 4)

Healthcare professionals suggested two developmental advantages: BLW might encourage better oral and chewing skills because the child is offered pieces of food to eat so they may have more opportunity to develop their mouth and jaw movements instead of sucking food from a spoon as they do with purées; and enhanced fine motor skills as the child has greater opportunities to manipulate food with their fingers and practice their fine motor movements:

The BLW method could have real advantages for coping with food and learning to eat i.e. for oral development. If babies are fed purées for too long they miss important windows for introducing different food textures. (Speech-Language Therapist 1)

There must be some sort of fine motor benefits for baby being able to play, essentially, with its food. (General Practitioner 5)

However, in addition to these potential benefits, strong concerns about BLW were also expressed.

Choking was a major concern expressed by many of the healthcare professionals, particularly those who had not observed BLW. The potential risk of choking meant most healthcare professionals felt reluctant to recommend BLW:

The potential for choking would make me feel very hesitant about giving my child whole food at 6 months. As a health professional I'd need to see some sound evidence before I could endorse this method [BLW]. (Dietitian 2)

The specific concerns voiced regarding choking were that a 6-month-old infant would not be developmentally ready to chew whole pieces of food and that mothers may leave the infant alone in their highchair with their food. In addition, healthcare professionals considered that mothers may become competitive about their infant's BLW progress, considering that their child is more advanced if they have certain foods or a greater variety of foods earlier than other children, and therefore might be motivated to offer unsafe foods that would increase the child's risk of choking:

Just give the baby that food, she'll be fine. Sometimes it's almost like a challenge to see how they cope, another

one of those competitive parenting things...oh look she's eating raw carrot at age 6 months. (Dietitian 1)

However, one healthcare professional considered that BLW may work well for parents whose infant experiences feeding problems when spoon-feeding is used:

I know of similar feeding methods which are often used with children whose parents are having feeding difficulties with spoon-feeding and these can work very well. (Speech-Language Therapist 1)

Healthcare professionals considered that there were two possible dietary disadvantages with BLW: the potential for growth faltering, and for poor iron status. There was concern that adopting BLW would mean forgoing any iron-fortified infant cereal, and that a BLW diet would comprise low-energy low-iron fruits and vegetables and include very few iron-rich foods. In addition to low-energy foods, clumsy self-feeding (particularly at the beginning of BLW) might lead to growth faltering:

The two parents I know who have chosen BLW are offering only fruits and vegetables. Although fruits and vegetables are great foods, babies need more nutrients... So I wonder how they would get these [nutrients] if they were only having fruits and vege...nutrients could be limited. (General Practitioner 1)

Contrasting this, a few healthcare professionals thought BLW infants could consume energy beyond their needs as a result of poor food choices:

Young children arrive here and they're under-two eating twisties [an extruded cereal snack], chocolate biscuits—would BLW be that for some mothers? (Practice Nurse 2)

At the other extreme, some healthcare professionals commented that mothers (especially first-time mothers) are often apprehensive about their infant's growth and compare it with that of other infants and that a 'chubby' or 'bonny' baby is viewed as healthy even when it reflects overweight or obesity. Some healthcare professionals suggested that BLW may increase parental anxiety. They thought mothers would struggle watching their infant learn to eat, especially at the start when they might eat very little:

Parents expect to see their child growing consistently—linear growth—and if they do not this evokes anxiety. How would you know if the child was eating enough? Parents would not cope with the child playing with food and not eating it. (Practice Nurse 7)

Finally, some healthcare professionals thought BLW would be messy for the mothers and suggested that there would be a lot of food wasted, which many mothers would not tolerate:

I could imagine in the first couple of weeks that the infant wouldn't eat much and that there would be an

awful lot of playing and squashing. Some mothers may not be able to cope with this. (Practice Nurse 11)

I would be concerned about the mess and wastage of food. Some of our families live on a very tight food budget and I've seen the mess when doing BLW and I think a lot of food gets wasted. (Well-Child Provider 1)

Mothers

The subcategories that emerged were very consistent across the interviews with mothers.

Most mothers (n=18/20) started BLW when their child was 5.5–6 months of age and all mothers had exclusively breastfed their child up until this age. The BLW approach advises mothers to watch for signs of developmental readiness before introducing their child to solid food. However, most mothers recalled starting solids at an age based on advice from their healthcare professional or because they were following the World Health Organisation (WHO) guidelines, although a small number (n=2/20) of mothers started solids when their infant started reaching out for food.

The most commonly offered first foods were vegetables (steamed or boiled pumpkin, potato, kumara (New Zealand sweet potato), broccoli and carrot; n=13/20) and fruit (avocado, banana; n=11/20). Most mothers (n=16/20) reported that their child shared every meal with one or more family members. Mothers liked that their child could feed themselves with BLW; however, many (n=15/20) also reported some spoon-feeding, although this was infrequent or only in unusual circumstances, such as when their child was sick. Mothers reported doing this to avoid mess, to increase iron intake by spoon-feeding iron-fortified infant cereal, or to increase energy intake especially when their infant was sick or appeared too tired to self-feed.

Knowledge

The majority of mothers defined BLW as having three main components: offering finger-sized pieces of food, allowing the child to be in control of how much they ate, and not spoon-feeding purées:

Letting your baby lead in terms of the pace and amount of solids eaten ... offering them whole, safe foods when they are physically ready to feed themselves... keeping milk [breast/formula] as their main food source until they naturally increase the amount they eat and drop milk feeds on their own. (Mother 2)

Nearly half the mothers first heard about BLW through a parenting group while others had discovered it online or were told about it by their Well-Child provider. One mother had not heard of the term 'Baby-Led Weaning' but said "it was instinctive" (Mother 1) to offer her child pieces of food and allow them to feed themselves. The majority of mothers obtained their BLW information from online sources, drawing on other mothers' experiences through blogs, threads and forums.

Attitudes

The main reason mothers chose to follow BLW was because it "made sense" (Mother 7) and "seemed logical" (Mother 13). Lifestyle reasons also motivated mothers to follow BLW. They considered that BLW was less time consuming and less expensive than making puréed food:

With three other children, I was way too busy to prepare special foods i.e. purées and also I didn't want to buy them—they're expensive. (Mother 15)

Mothers considered that there were advantages of BLW during the complementary feeding period, and also in the future. During the complementary feeding period, mothers reported less meal preparation (the baby ate what the family was eating, there was no purée preparation) and reduced mealtime stress because they were not spoon-feeding the baby and eating their own meal simultaneously. Some mothers (n=6/20) reported it was liberating that BLW does not include a detailed step-by-step weaning protocol and instead promotes responding to the infant and thought that fewer 'rules' made the transition to food less frightening and complicated:

With my first child I became so worried about getting the food [purées] to exactly the right consistency. It [BLW] made sense to me, because she was demand fed so it seemed like the natural progression. (Mother 8)

In addition, mothers believed that BLW had encouraged their child to develop healthier eating behaviours, for example, being able to respond appropriately to hunger and satiety cues, sharing family meals and eating a wider variety of foods:

I felt it would give my daughter the opportunity to experience, from the outset, everything that is pleasurable about food, the textures, colours, individual tastes ... a lovely way to have them be a real participant in the meal—eating what we eat, copying us, and really joining in ... not being fed separately. (Mother 2)

Most mothers had no concerns with BLW (n=15/20). Those mothers who did have concerns were worried about the appropriateness of certain foods, for example, raw apple. Current guidelines on types of BLW foods to offer are incomplete and some mothers reported not knowing what foods to offer at what age:

I wasn't worried but a bit concerned that some of the advice was conflicting e.g. the book says apple is fine and people I've spoken to who have used BLW have said no apples. (Mother 7)

One mother was concerned about her infant's iron intake, so she spoon-fed her infant iron-fortified rice cereal daily while following BLW. Other mothers felt that

the iron from breast milk would be adequate until the infant started eating high iron meat or meat alternatives:

Solids are just a taste and texture thing, breast milk or formula being their main nutrition until 9 months, so don't worry if your baby takes their time adjusting to solids. (Mother 6)

Nearly all mothers (n=19/20) reported that their infant gagged on food. Some mothers had completed a first aid course prior to their infant starting BLW to equip themselves for dealing with gagging or choking. Gagging was not a concern to mothers, instead they considered it was a natural part of a child learning to eat and adapting to new textures that are quite different to milk. Mothers were aware that an infant's gag reflex is much further forward on their tongue when they first start eating and because of this, they understood gagging was highly likely:

I felt like I was really prepared, I had read the book⁴ so knew about gagging and choking and that mostly it is gagging because the baby's gag reflex is much further forward than an adult's...gagging is a very important learning process. (Mother 12)

Mothers viewed gagging as an innate safety mechanism that is activated when food has not been sufficiently chewed for swallowing. One parent explained that gagging returned the food to the front of the mouth for further chewing and that if the infant did not gag then the food could cause obstruction and possibly choking.

Mothers were aware choking was a common criticism of BLW, and although most reported that choking did not occur, 30% (n=6/20) reported one or more episodes. Although choking can be very serious, all mothers who reported choking (n=6/20) reported that the infant independently dealt with the choking by expelling the food from their mouth through coughing and mothers did not have to intervene with first aid. All mothers who could recall the food that was responsible (n=4/6) reported that raw apple was the food their infant had choked on. Mothers expressed feeling more relaxed around 4 weeks after introducing complementary foods; they saw that their infant could manage different textures, and was developing more coordinated eating skills. Mothers also felt that by this time the difference between gagging and choking was more obvious and that they realised it was mostly gagging.

Many of the mothers reported that mealtime mess was the main disadvantage of BLW. Infants were able to pick up their food and "squash, smear and throw it" (Mother 19). Some mothers were apprehensive about their infant eating in public or at other people's homes because of the mess. Mess was more of a problem in the early phases of BLW when the infant had not mastered the coordination skills needed to get food to their mouth, and mothers said as the level of skill improved the mess declined. Mothers who also had experience with the

conventional method of starting solids thought finger foods and self-feeding were messy whatever the age:

As someone who's done it both ways [BLW and spoon-feeding], I think they're both pretty messy and wasteful! (Mother 5)

Some mothers recalled feeling impatient during the first month of BLW as their infant, while learning to eat, could spend long periods of time at the table and appear to be "playing with food" (Mother 3).. Additionally, mothers reported that some family meals were not appropriate for their baby and that at these times knowing what to offer the infant was a challenge:

I struggled with the "baby eats what the family eats" concept.... Most of what we really eat has a lot of salt, sugar, sauces, etc in it, and it takes work to think of how to adjust it or intervene in the cooking process to fit baby. (Mother 5)

Mothers recalled encountering both positive and negative experiences during the BLW period; however, all the mothers concluded that they would recommend BLW to other mothers:

I couldn't imagine any other way of introducing solids and will certainly do BLW with any future children. I think the fact that our son has control over eating means that he doesn't have to fight for control...food is not a battleground here. (Mother 19)

Two mothers added that they would recommend supplementing BLW with some spoon-feeding for reassurance about nutrients:

I say to people to use a combination. I felt good about this because she was able to explore food and learn about it but at the same time get the nutrients that she needed. (Mother 15)

Experiences

Table 1 presents practical recommendations mothers offered for overcoming challenges when using BLW.

DISCUSSION

Although anecdotal reports suggest that the use of BLW is increasing, fewer than half of the healthcare professionals in the current study had heard about this approach. Those who were aware of BLW had limited knowledge of the details and were not aware of all the practices promoted as part of BLW.^{4 5} Healthcare professionals suggested potential benefits of BLW (greater opportunity for shared family meal times, fewer meal-time battles, healthier eating behaviours, greater convenience and possible developmental advantages) but most felt reluctant to recommend it because of their concern about the potential increased risk of choking. Most healthcare professionals had not seen BLW in

Table 1 Practical recommendations from mothers for successful Baby-Led Weaning (BLW)

Practical recommendation	Supporting quote
Place a large cloth under the infant's highchair to collect spilled food—the cloth could be shaken outside and washed in the machine. Use full cover (sweatshirt) bibs. In the warmer (summer) months the family could try eating outside. Put the infant in their highchair with their nappy on. Then follow with a bath to wash off any food mess. Put infant in the highchair in the kitchen so they can begin their meal while the family meal is being prepared and interact with them while they are eating.	<i>Prepare for mess with bibs, strip the child, messy mats, have a washcloth handy, a hungry dog to eat scraps helps too and then relax and let them go for it.</i>
Seek advice from parenting groups and others doing BLW. Collect and share food and recipe ideas.	<i>Watch your baby but don't interfere, I wouldn't like someone picking food off my plate and putting it into my mouth because they thought I was eating too slowly. Not to worry too much about quantities—remembering that milk is still on offer. Sometimes you get stuck for ideas of what to offer and talking to others doing BLW can get the creativity going again It's amazing how many ways there are to cook and present food.</i>
Mothers, whether following BLW or not, should complete a first aid course. This should teach the difference between gagging and choking, and can improve confidence for dealing with choking (if it occurs). Have realistic expectations about mess and your infant's eating progress. Mothers need to appreciate that starting solids is a transition period which may last many months.	<i>Go to a first aid course, preferably one targeted at parents. This will give you confidence to deal with choking if it happens.</i>
Try and enjoy the BLW experience by allowing the baby to explore food and have fun with eating.	<i>Don't think that things will be heaps easier in the short-term than the conventional way. A baby with finger food will still need a lot of support, because they'll drop things a lot and need you to pick them up. Don't stress about the quantities they eat, the mess they make or the seemingly frequent gagging episodes.</i>

action and therefore had difficulty understanding how a 6-month-old infant could possess the mastication and coordination skills needed to safely manage whole pieces of food.

Overall, mothers reported that using BLW had been a positive experience, that they recommended it to other mothers, and would follow it again if they had another child. Interestingly, many of the mothers in this study did not follow BLW strictly as outlined by Rapley.⁴ Although they generally embraced BLW techniques, many also reported using a small amount of spoon-feeding. This suggests that, in practice, many parents following a BLW approach are probably somewhere along the continuum of some spoon-feeding to total self-feeding, albeit much more at the latter end. As well as it being described as the "logical way" (Mother 13) to introduce complementary foods, mothers reported that BLW was less time consuming, involved less meal preparation, caused less stress and resulted in fewer meal time battles. Although some mothers struggled with drawn-out mealtimes and the food mess created by the self-feeding infant, these disadvantages did not discourage these mothers from following BLW. Furthermore, mothers who had previously used the conventional method (spoon-feeding purées) with one of their older children considered both approaches (BLW and conventional) to be messy.

Healthcare professionals' and mothers' attitudes towards BLW were similar, in some respects. Both agreed that BLW may promote shared family meals, reduce mealtime battles and be more convenient than spoon-feeding purées, they also agreed that the mess produced when an infant self-feeds could be substantial. Furthermore, both groups considered BLW could encourage healthier eating patterns, including better self-regulation of energy intake. However, there were some noticeable differences in the attitudes of the two groups, particularly concerning safety and nutrient sufficiency. Healthcare professionals had serious concerns about potential choking and low iron intake, as well as the ability of an infant to self-feed at 6 months. Although some mothers had considered the potential problems raised by healthcare professionals they were not as concerned by these. Moreover, they reported that these concerns decreased as they followed BLW and their baby appeared happy and healthy.

The healthcare professionals' concern about a possible increased risk of choking aligns with opinions expressed by other healthcare professionals.^{5 22 23} Choking is more likely with very hard foods such as raw apple or round coin-shaped foods such as sausage.²⁴ Children develop the ability to chew before they develop the ability to hold food in their mouth or to move it backwards for swallowing.²⁵ At about 6 months of age,

infants develop a munching type oral-motor action; this movement, in conjunction with the ability to sit unsupported, promotes swallowing of thicker, chunkier pieces of food.²⁶ The founder of BLW, Gill Rapley, disputes that a healthy 6-month-old infant would be at increased risk of choking with BLW.^{4 5} Rapley acknowledges gagging is common with BLW because at 6 months of age the baby's gag reflex is further forward on their tongue than it is at 1 year.⁵ However, based on her personal observations, Rapley considers choking is more likely with spoon-feeding because the baby learns to use suction to take the purée from the spoon, which causes food to be taken to the back of the throat where it is swallowed, encouraging the infant to learn to swallow food without chewing first.⁵

Interestingly, most mothers in the current study were not concerned about choking. Although some had initial concerns, these quickly diminished when they witnessed how proficient their infant was at bringing food forward and expelling it out of their mouth if needed, and all mothers felt prepared for dealing with a choking incident if it happened. Others have reported similar findings with mothers following BLW initially being concerned about choking but over time becoming less nervous and more able to distinguish between the action of gagging to move food and actual choking.²⁷ Furthermore, 93.5% of the BLW group in the recent study by Townsend and Pitchford⁹ reported never having experienced a choking incident. It is of concern, however, that in the current study, 30% of mothers reported at least one choking incident, most with raw apple. No serious incidents were reported and this raises the question of whether mothers correctly identified choking or whether they had instead witnessed the less serious action of gagging. However, given that raw apple was the cause of most reported choking incidents, and fulfils the criteria of a high-risk food, being hard and in small pieces when bitten, it would be sensible to discourage parents who are following BLW from offering raw apple to their infant.

Healthcare professionals expressed concern about whether BLW infants would be able to consume sufficient iron. In New Zealand, spoon-feeding iron-fortified baby rice cereal is a popular way for mothers to increase their infant's iron intake. Healthcare professionals in this study quickly recognised that this would not be possible with BLW and they speculated that this would put the infant at risk of suboptimal iron status, which is already a concern for many New Zealand infants (6.9% having iron deficiency anaemia, and a further 12.5% having suboptimal iron status²⁸). Most mothers in the present study believed that the breast milk their infant was receiving would supply enough iron until meat or other high-iron meat alternatives were introduced. Similarly, mothers from Brown and Lee²⁷ were not concerned about iron intake. Although healthy, term, normal birthweight infants are considered to obtain enough iron from their mother's breast milk and from

the redistribution of iron from haemoglobin to iron stores during the first 6 months of life,²⁹ from 6 months of age, iron becomes a critical nutrient and all infants should receive iron-rich complementary foods such as meat, meat alternatives or iron-fortified foods.^{2 29-32}

Many of the healthcare professionals were not convinced that a 6-month-old infant could eat enough to keep pace with growth when self-feeding, particularly in the early days of complementary feeding. Only one study appears to have examined this, and suggested that there may be an increased incidence of underweight in BLW children (3/63) compared with spoon-fed children (0/63), although most children were of normal weight, and as acknowledged by the authors, the numbers were small, and the cases and controls drawn from different populations. It has been suggested that purées (which are frequently made of fruit or vegetables and thinned down with water or milk) are often very low in energy, meaning that the small volume of purées typically consumed in the early weeks would contribute relatively little to meeting a conventionally fed infant's nutrient requirements.⁷ In contrast, finger foods, if carefully chosen, can be very nutrient dense, so an infant who appears to be eating little when self-feeding may potentially be closer to meeting their nutrient requirements.⁷ Only one parent in the current study reported being concerned about her child being able to eat enough, although many mothers reported spoon-feeding their infant at times when they were potentially at greater risk of under eating, that is, when they were unwell or very tired. Because of the nature of this self-selected sample it is possible that mothers with concerns about this issue may have discontinued or chosen not to follow BLW. At this point, no research has examined the actual food and nutrient intake of children following a BLW approach compared with a more traditional method of infant feeding.

The healthcare professionals and mothers who took part in the current study were self-selected. Furthermore, the sample size was small. Although this study is not intended to present representative results given its qualitative nature, participants were recruited in a number of different ways, and the interviews were continued until well after saturation for both healthcare professionals and mothers, suggesting that the majority of views of BLW in these groups are likely to have been captured. The first author conducted the content analysis of the transcripts, and although the coauthors discussed the interpretation of individual participant quotes, they did not conduct a separate full analysis of the transcripts. However, we consider that this was sufficient to ensure that the findings are trustworthy, both because our aim was to capture manifest (ie, description of the visible, obvious components), rather than latent (ie, interpretation of underlying meaning) content,³³ and because we have provided direct participant quotes for each subcategory so that the reader can judge for themselves the appropriateness of the coding.

Although there was some agreement between healthcare professionals and mothers that BLW was likely to lead to more shared family meals, fewer mealtime battles, potentially healthier eating patterns, and to be more convenient, although messy, the healthcare professionals were, overall, reluctant to recommend the method. They were concerned that BLW could potentially increase choking and adversely affect the infant's iron status and energy intake. In this context, it is interesting that the UK Department of Health has supported the inclusion of some hand-held first foods in their most recent recommendations for infant feeding.^{34 35} Undoubtedly, further research of BLW is warranted especially concerning its potential to positively influence eating behaviours, as well as its safety and nutrient sufficiency.

Acknowledgements We would like to thank all the families and healthcare professionals who contributed to this study.

Contributors SC, ALH and RWT were all involved in the conception and design of the study, the analysis and interpretation of the data and the writing and editing of this paper. SC conducted the interviews with participants and was responsible for the analysis and interpretation of the data. SC wrote the first draft of the paper, and ALH and RWT made important intellectual contributions to the content and approved the final version.

Funding This research was conducted using the authors' (RWT) resources and received no specific grant from any funding agency in the public, commercial or non-profit sectors.

Competing interests None.

Ethical approval Ethical approval was obtained from the University of Otago Ethics Committee.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

REFERENCES

- World Health Organization. *Infant and young child feeding: model chapter for textbooks for medical students and allied health professionals*. Geneva, Switzerland: World Health Organization, 2009.
- Ministry of Health. *Food and Nutrition Guidelines for Healthy Infants and Toddlers (Aged 0–2): a background paper* 4th edn. Wellington: Ministry of Health, 2008.
- Department of Health (DoH). *Infant feeding*. London, UK: Department of Health, 2003.
- Rapley G, Murkett T. *Baby-Led Weaning: helping your child love good food*. London: Vermilion, 2008.
- Rapley G. Baby-led weaning: transitioning to solid foods at the baby's own pace. *Community Pract* 2011;84:20–3.
- Sachs M. Baby-led weaning and current UK recommendations—are they compatible? *Matern Child Nutr* 2011;7:1–2.
- Wright CM, Cameron K, Tsiaka M, et al. Is baby-led weaning feasible? When do babies first reach out for and eat finger foods? *Matern Child Nutr* 2011;7:27–33.
- Brown A, Lee M. Maternal control of child feeding during the weaning period: differences between mothers following a baby-led or standard weaning approach. *Matern Child Health J* 2011;15:1265–71.
- Townsend E, Pitchford N. Baby knows best? The impact of weaning style on food preferences and body mass index in early childhood in a case-controlled sample. *BMJ Open* 2012;2:1.
- Abel S, Park J, Tipene-Leach D, et al. Infant care practices in New Zealand: a cross-cultural qualitative study. *Soc Sci Med* 2001;53:1135–48.
- Campbell ND, Soeken KL, Rankin EAD. Infant weaning patterns and related maternal-infant health outcomes. *Public Health Nurs* 1986;3:57–63.
- Arden MA. Conflicting influences on UK mothers' decisions to introduce solid foods to their infants. *Matern Child Nutr* 2010;6:159–73.
- Wright C, Parkinson K, Drewett R. Why are babies weaned early? Data from a prospective population based cohort study. *Arch Dis Child* 2004;89:813–16.
- Hellings P, Howe C. Assessment of breastfeeding knowledge of nurse practitioners and nurse-midwives. *J Midwifery Womens Health* 2000;45:264–70.
- Freed GL, Clark SJ, Lohr JA, et al. Pediatrician involvement in breast-feeding promotion: a national study of residents and practitioners. *Pediatrics* 1995;96(3 Pt 1):490–4.
- Freed GL, Clark SJ, Sorenson J, et al. National assessment of physicians' breast-feeding knowledge, attitudes, training, and experience. *JAMA* 1995;273:472–6.
- Schanler RJ, O'Connor KG, Lawrence RA. Pediatricians' practices and attitudes regarding breastfeeding promotion. *Pediatrics* 1999;103:E35.
- Brown A, Lee M. A descriptive study investigating the use and nature of baby-led weaning in a UK sample of mothers. *Matern Child Health J* 2011;7:34–47.
- Patton MQ. *Qualitative research and evaluation methods*. 3rd edn. Thousand Oaks, CA: Sage Publications, Inc., 2002.
- Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res* 2005;15:1277–88.
- Kondracki NL, Wellman NS, Amundson DR. Content analysis: review of methods and their applications in nutrition education. *J Nutr Educ Behav* 2002;34:224–30.
- Dietitians NZ Paediatric SIG convenor. Dietitians NZ Paediatric Special Interest Group Newsletter. In: NZDA, May edition, 2010.
- Rowell K, Becker H. Baby-led-weaning-or-starting-solids-book-review-and-nutritionist-weighs-in-with-her-7-month-old-daughter. 2011. <http://thefeedingdoctor.com> (accessed 22 Feb 2012)
- Byard RW, Gallard V, Johnson A, et al. Safe feeding practices for infants and young children. *J Paediatr Child Health* 1996;32:327–9.
- Naylor A, Morrow A. *Developmental readiness of normal full term infants to progress from exclusive breastfeeding to the introduction of complementary foods: reviews of the relevant literature concerning infant immunologic, gastrointestinal, oral motor and maternal reproductive and lactational development*. Washington, DC: Wellstart International, LINKAGES Project Academy for Educational Development, 2001.
- Pridham KF. Feeding behavior of 6-to 12-month-old infants: assessment and sources of parental information. *J Pediatr* 1990;117(2(Pt 2)):S174–80.
- Brown A, Lee M. An exploration of experiences of mothers following a baby-led weaning style: developmental readiness for complementary foods. *Matern Child Health J* 2011. doi: 10.1111/j.1740-8709.2011 (Epub ahead of print).
- Soh P, Ferguson EL, McKenzie JE, et al. Iron deficiency and risk factors for lower iron stores in 6–24-month-old New Zealanders. *Eur J Clin Nutr* 2004;58:71–9.
- Domellof M. Iron requirements in infancy. *Ann Nutr Metab* 2011;59:59–63.
- Leong W-I, Lönnnerdal B. Iron nutrition. In: Anderson G, McLaren G *Iron physiology and pathophysiology in humans*. New York: Humana Press, 2012:81–99.
- Kramer MK, Kakuma R. Optimal duration of exclusive breastfeeding. *Cochrane Database of Syst Rev* 2002;(1):CD003517.
- World Health Organization. *Guiding principles for complementary feeding of the breastfed child*. Geneva, Switzerland: Pan American Health Organization, 2004.
- Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today* 2004;24:105–12.
- Department of Health. Start4Life: No Rush to Mush. 2009. <http://www.nhs.uk/start4life/pages/no-rush-to-mush.aspx> (accessed 3 Mar 2012).
- National Health Service (NHS). Your baby's first solid foods. <http://www.nhs.uk/Conditions/pregnancy-and-baby/Pages/solid-foods-weaning.aspx> NHS, 2011