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Parental intentions to implement vegetable feeding strategies at home: A cross sectional study

L.R. Chawner *, P. Blundell-Birtill, M.M. Hetherington

School of Psychology, University of Leeds, Leeds, West Yorkshire, UK

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ABSTRACT

In order to increase vegetable intake by children, parents are encouraged to implement strategies that promote trying and eating vegetables at mealtimes. Qualitative studies have previously highlighted barriers parents face in implementing healthy eating practices, such as time, monetary costs and child factors (e.g. fussy eaters). This study aimed to specify the relationships between child and parent factors and their effects on parental intentions to implement vegetable feeding strategies at mealtimes. Parental intentions to implement meal service (serving larger portions, offering variety, serving vegetables first) and experiential learning (repeated exposure, games, sensory play) strategies were examined. Parents (N = 302, 73 male, Mage = 33.5) also explained reasons why certain strategies may or may not work for their child (4-7y). For both types of strategy, higher food fussiness of the child predicted higher parental intentions to implement strategies at home. However, this was competitively mediated by low beliefs that the strategy would work for their child, resulting in weaker overall positive effects on intentions. In the meal service model, parental beliefs that healthy eating is important for their child had a positive, indirect effect on higher intentions, through involved parental feeding practices. However, this was not significant in the experiential learning strategies model. Written parental responses suggest that this may be due to meal service approaches being viewed as easier to implement, with little additional effort required. Increasing parental confidence to implement strategies successfully and managing expectations around successful outcomes of strategies (e.g. tasting, eating) may be important focuses of future interventions to support parents implementing vegetable feeding strategies at mealtimes.

1. Introduction

Children's cumulative daily vegetable intake in the UK is around one full portion (Chawner, Blundell-Birtill, & Hetherington, 2021), which is lower than government recommendations of five portions of fruit and vegetables per day (NHS, 2018). Systematic reviews highlight the importance of feeding strategies that utilise repeated exposure, adapting foods (e.g. flavour-flavour learning) and social techniques such as modelling and reward (Bell et al., 2021; Holley, Farrow, & Haycraft, 2017; Nekitsing, Blundell-Birtill, Cockroft, & Hetherington, 2018) for parents to encourage acceptance of new vegetables and to increase intake of familiar vegetables. However, in contrast to evidence from systematic reviews, strategies to encourage vegetable acceptance through meal service and experiential learning techniques are often omitted or addressed in little detail. Research studies have previously assessed the effectiveness of different strategies to encourage young children to consume more vegetables such as offering vegetables first in a meal (Spill, Birch, Roe, & Rolls, 2010), serving larger portions (Mathias et al., 2012), providing sensory play (Coulthard & Sealy, 2017) and offering a variety (Roe, Meengs, Birch, & Rolls, 2013). Applying these strategies at home may help to promote vegetable intake for both children and their families (Cravener et al., 2015; Holley, Haycraft, & Farrow, 2015; Varman et al., 2021). However, there are a range of parent feeding and child eating factors that could influence how effective parents believe some strategies will be, and their intentions to implement these at home. A better understanding of these relationships could help to provide caregivers with guidance on serving vegetables in ways that will encourage their children to consume more vegetables. This study aims to examine child eating and parental feeding factors that may predict whether parents hold intentions to implement different types of vegetable feeding strategies at home mealtimes.

Implementing vegetable feeding strategies at mealtimes requires parents to change their serving and feeding behaviours (McGowan et al., 2013). For vegetable feeding strategies to increase intake, vegetables

* Corresponding author.
E-mail address: L.R.Chawner@leeds.ac.uk (L.R. Chawner).

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must be served in adequate portion sizes (40–60g of vegetables is one portion for a 4–10yr old child: PHE, 2018), however actual portion sizes are often predicted by parental intake of vegetables (Trofholz, Tate, Draxten, Neumark-Sztainer, & Berge, 2016) and availability in the home environment (Kininmonth et al., 2021). Parents often report practical barriers to providing vegetables, such as monetary cost and parental time constraints (Nepper & Chai, 2016), meaning that it may not be feasible for parents to serve vegetables to their children at each meal. Additionally, parents know that their child's characteristics, such as being a 'picky' or 'fussy' eater, or having strong preferences for energy dense foods, could present barriers to attempts to increase vegetable intake (Jarvis, Harrington, & Manson, 2017; Ling, Robbins, & Hines-Martin, 2016). In these cases, parents may anticipate that their child will refuse or waste the vegetables, leading parents to pre-empt these behaviours and avoid serving vegetables. This is because many parents view consuming any food as more desirable than consumption of no food when vegetables are served (Moore, Tapper, & Murphy, 2010). Implementing different vegetable feeding strategies may encourage parents to serve vegetables in new ways at home, whilst also encouraging children to taste, try and eat vegetable portions that are served.

Parents that have children who express traits of food avoidance (food fussiness, slowness in eating and satiety responsiveness; Tharner et al., 2014) may experience the greatest benefit from employing vegetable feeding strategies, as food avoidant children often have lower intakes of vegetables than non-food avoidant children (Cardona Cano et al., 2015; Galloway, Fiorito, Lee, & Birch, 2005; Haszard, Skidmore, Williams, & Taylor, 2015; Taylor, Wernimont, Northstone, & Emmett, 2015). This has been attributed to food avoidance traits being underpinned by similar genetic mechanisms to liking of vegetables (Fildes, van Jaarsveld, Cooke, Wardle, & Llewellyn, 2016) and children tend not to eat foods that are disliked (Keller, Shehan, Cravener, Schlechter, & Hayes, 2022). Food fussy children therefore require many more exposures and experiences with new foods and disliked vegetables in order to accept or consume them (Caton et al., 2014; Dovey, Staples, Gibson, & Halford, 2008). Therefore, simply offering more vegetables may not increase intake in these children, and other strategies may be needed alongside offering to achieve healthier eating outcomes.

Parents generally identify vegetable intake as important for their child's health (Hingle et al., 2012). Once this belief is held, parents may adopt suitable feeding goals (what parents aim to achieve through feeding) that centre on the importance of healthy eating. These goals may then inform both the types of food that parents choose to feed their children and the feeding methods that parents employ at mealtimes. Parental healthy eating goals (e.g. it is important that my child eats foods that are healthy) have previously been shown to positively predict reported healthy food (fruits, vegetables, grains) intake in children (Hoffmann, Marx, Kiefner-Burmeister, & Musher-Eizenman, 2016; Kiefner-Burmeister, Hoffmann, Meers, Koball, & Musher-Eizenman, 2014). Whereas, convenience feeding goals (e.g. it is important that foods are simple to cook or easy to prepare) have been associated with self-reported lower healthy food intake (Hoffmann et al., 2016). These findings illustrate that the types of feeding goals held by parents can influence not only which foods parents serve, but also which foods children consume. Therefore, if parents hold healthy eating goals, they may also be willing to implement vegetable feeding strategies to facilitate healthy eating by their child.

Parental feeding practices at mealtimes may further reflect feeding goals held by the parent and help to determine whether parents are likely to implement vegetable feeding strategies. Positive practices such as involving children in meal preparation (Shim et al., 2016) and modelling vegetable consumption (Gregory, Paxton, & Brozovic, 2011) have previously been associated with higher reported child vegetable intake. Similarly, child-centred approaches to encouragement (e.g. saying something positive about the food), compared with parent-centred feeding practices (e.g. instructing a child to eat what is on their plate) are also linked with larger reported vegetable consumption (Vereecken, Rovner, & Maes, 2010). In contrast, negative feeding practices (practices that use pressuring, restriction, instrumental or emotional feeding: Wardle & Carnell, 2007) may reduce intake of healthy foods by children. Although research is limited, there is some evidence that negative feeding practices (e.g. the use of food as a reward) may mediate the relationship between healthy eating goals and lower intake of energy dense foods (Kiefner-Burmeister et al., 2014), as negative feeding practices were found to be associated with greater consumption of high energy dense foods. Therefore, the role of parental feeding practices requires further investigation for its potential effects on parental intentions to implement new feeding strategies (for a comprehensive review of parental feeding practices on general child eating behaviours, see Vaughn et al., 2016).

Child and parental factors are likely to operate together to predict parental intentions to implement vegetable feeding strategies at mealtimes. When considering intentions within the theory of planned behaviour, there are three suggested antecedents: attitudes, subjective norms and perceived behavioural control (Ajzen, 1991). Although these antecedents are not tested directly in this study, the concepts within the child eating and parental feeding literature indicate some similarities with concepts from the theory of planned behaviour (e.g. healthy feeding goals may be similar to parental attitudes towards feeding strategies and beliefs that each the strategy will change their child's vegetable consumption could be similar to measuring perceived behavioural control by the parent). Therefore, the theory of planned behaviour may be useful to contextualise findings in predicting future parental feeding behaviours and their intentions to implement vegetable feeding strategies.

This study aims to specify the relationships between child food avoidance traits (fussy eating, satiety responsiveness and slowness in eating), parental healthy eating goals and parental feeding practices (positive and involved practices) and their effects on parental beliefs regarding the effectiveness of strategies to increase child vegetable intake, and parental intentions to implement those strategies at mealtimes. These relationships will be tested for intentions to implement two types of vegetable feeding strategy: meal service (strategies focused on changing aspects of how vegetables are served) and experiential learning (strategies focused on how children are exposed to vegetables through learning). The initial framework to be tested is presented in Fig. 1. It is hypothesised that parents will hold stronger beliefs that a strategy will increase their child's vegetable intake if their child scores lower on traits of food avoidance. Consequently, parents will report higher intentions to implement a vegetable feeding strategy if they believe the strategy will work for their child. However, lower intentions to implement strategies will be reported if parents also score lower on the use of positive and involved parenting practices. Additionally, the effect of child food avoidance on beliefs and intentions will be mediated by parental healthy eating goals and positive parental feeding practices. Furthermore, open ended questions will be asked to explore the reasons why parents may or may not implement vegetable feeding strategies and reasons behind beliefs that each strategy would, or would not, succeed in increasing vegetable consumption by their child.

2. Methods

2.1. Participants and design

Participants were recruited to complete an online, cross sectional survey via Prolific (www.prolific.co). The study invited adults living in the UK, with a child aged between 4 and 7 years and a household income of less than £50,000. This age group was selected as it is an appropriate age range to implement experiential learning strategies with children at meal times. Using younger children that may primarily eat using their hands may have affected the data. Parents might expect younger children to play with foods at mealtimes and therefore could be more comfortable with implementing experiential learning strategies. Income

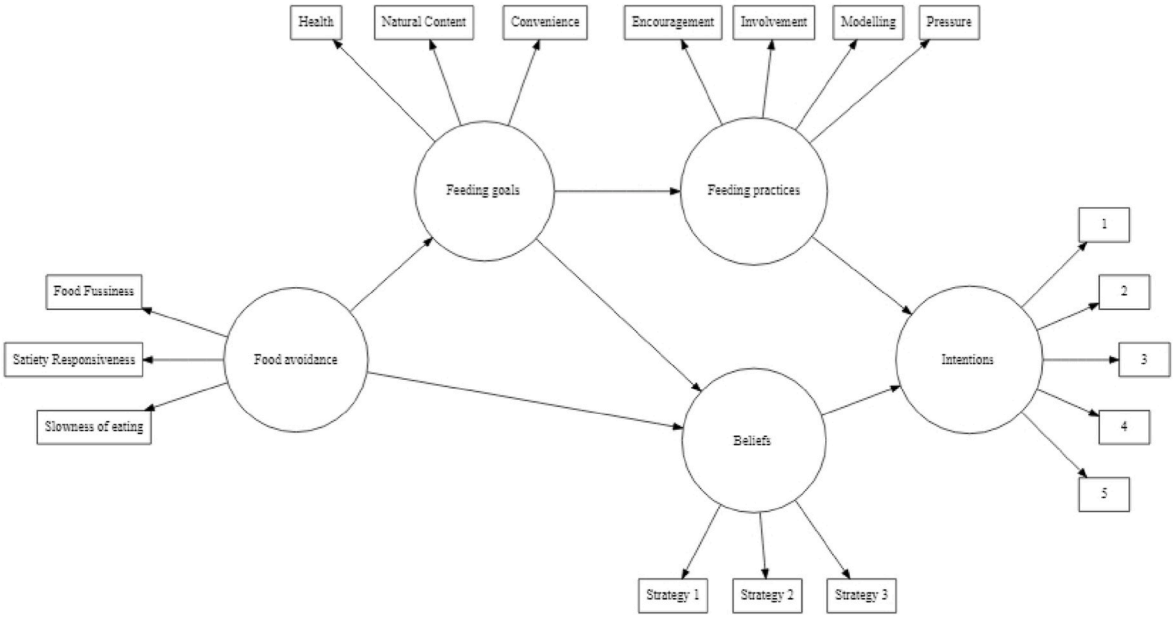

Fig. 1. The original model to be tested to examine the associations between child eating and parental feeding factors, with parental beliefs and intentions. Parental beliefs that vegetable feeding strategies would be effective for their child (strategies 1–3 indicate three individual vegetable feeding strategies) and whether parents intend to implement these strategies (1–5 represent the five intention questions asked to parents) were the main outcomes of interest. Circles indicate latent variables, boxes represent measured items, arrows from circles to boxes indicate factor loadings and arrows between circles indicate the direct effects between latent variables.

was chosen as a criterion to diversify this sample from other studies that usually include participants with higher household incomes, as there are well documented links between social inequalities and health outcomes, including consumption of vegetables (Giskes, Avendaño, Brug, & Kunst, 2010; Rasmussen, Pedersen, Johnsen, Krølner, & Holstein, 2018; Sausenthaler et al., 2007). The income bracket itself was chosen for practical reasons to match the sample size from the power calculations with the number of potential participants on Prolific. Those willing to participate completed a survey hosted on Qualtrics (www.qualtrics.com). A power analysis was calculated using SemPower in R. To detect a medium sized effect (.05) using absolute fit indicies (RMSEA), alpha = .01, power = .90 and df = 129, a sample size of 217 was calculated. Therefore, we aimed for a total of 300 participants to account for quality of responses and loss of information where ordinal data were used.

2.2. Materials

The online survey was comprised of a series of questionnaire subscales.

2.2.1. Intention and belief questionnaires

Parental ***intentions*** to implement meal service (serving vegetables first, serving larger portions, offering variety) and experiential learning (repeated exposure, games, sensory play) strategies were examined with 5 questions. Participants were provided with a scenario, "Imagine that you are informed from a reliable source that you could increase your child's vegetable intake at mealtimes by 1 portion (40g), by ….[*strategies here*]. Given that information, over the next month to what extent would you try it? Reading the statements below, let us know whether you would agree or disagree with these statements". The five questions were rated on a 7-point Likert scale from Strongly disagree to Strongly agree. These questions included, "I would make an effort to try it", "I would insist on trying it once" and "I would try it even if it involves some extra effort at mealtimes".

Parental ***beliefs*** that the strategies would increase their child's vegetable intake were examined in a similar manner. For each of the three meal service strategies and three experiential learning strategies, parents were asked, "If the methods mentioned by the reliable source included … [*strategies here*], what effect would it have on your child's intake of vegetables?" Parental responses on a 7-point Likert scale ranged from "My child would eat fewer vegetables" to "My child would eat the whole portion". Full information on questions used can be found in **Supplemental material 1**.

The intentions and beliefs questions were developed specifically for this study based on guidelines from Fishbein and Ajzen (1977) and Ajzen (1991). Question content and design were also influenced by other studies that have tested aspects of the Theory of Planned Behaviour from various literatures (e.g. Irwin, O'callaghan, & Glendon, 2018; Menozzi, Sogari, Veneziani, Simoni, & Mora, 2017).

2.2.2. Open ended questions

For both parental intention and beliefs questions, parents were requested to provide written responses as to why they would/would not intend to implement strategies ("In the space below, please let us know why you would OR would not plan to try these methods at mealtimes"), and whether they thought that each individual strategy would work for their child ("Please suggest reasons why you think that [strategy] would OR would not work for your child").

2.2.3. Child and parental feeding questionnaires

To examine children's eating behaviour traits, parental healthy eating goals and positive parental feeding practices, a series of questionnaire subscales were employed. Children's food avoidance was measured using the Food Fussiness, Slowness in Eating and Satiety Responsiveness subscales of the Child Eating Behaviour Questionnaire (CEBQ: Wardle, Guthrie, Sanderson, & Rapoport, 2001). Parental healthy eating goals were examined using the Health, Natural Content and Convenience subscales of the Food Choice Questionnaire (FCQ: Steptoe, Pollard, & Wardle, 1995). Lastly, to assess parent's positive feeding practices, the Encouraging Balance and Variety, Modelling, Child Involvement and Pressure subscales of the Comprehensive Feeding Practices Questionnaire (CFPQ: Musher-Eizenman & Holub, 2007) were used. A vegetable food frequency questionnaire (adapted from Hammond, Nelson, Chinn, & Rona, 1993) was also used to describe how often different types of vegetables were eaten by children in the sample.

Each questionnaire has been validated with low-income samples (although not UK low-income samples) and show good validity and reliability (Domoff, Miller, Kaciroti, & Lumeng, 2015), however validity of the CFPQ may be worse in samples of mixed ethnicities (Arlinghaus et al., 2019).

2.3. Procedure

This study's protocol was previously uploaded to the Open Science Framework (https://osf.io/a2rfp/?view_only=7bc5a9892aab4ff6984f86874572a074). Participants consented online on the first page of the survey before answering some general demographic questions about themselves and their child, including their age, gender, education, ethnicity and household income. This was followed by a series of questionnaires, noted in section 2.2. Questions about parental intentions were answered, followed by questions examining parental beliefs. The questions were randomised such that participants answered about the different strategies in a random order. Participants were then requested to complete the CEBQ, CFPQ and CFQ subscales, randomised both at the scale and question levels. Participants were prompted to answer all questions but were free to skip questions that they preferred not to answer. The survey took approximately 10–15 min to complete and participants were compensated £1.52 for their time. The study was approved by the University of Leeds School of Psychology Research Ethics Committee (Reference: PSYC-278).

2.4. Data analyses

2.4.1. Data preparation

Mean subscale scores were created for CEBQ, CFPQ and FCQ subscales. Appropriate items on each scale were reverse scored. For SEM analyses, the Convenience subscale of the FCQ and the Pressure subscale of the CFPQ were reverse scored for easier interpretation (as these scales are conceptually different to the other subscales loading onto the same latent variable).

2.4.2. Structural Equation Modelling of parental intentions

Structural Equation Modelling (SEM) was used to specify the relationships between child food avoidance, parental healthy eating goals, parental feeding practices and parental beliefs and intentions. The original model which was assessed separately for both meal service and experiential learning strategies (two models were tested) is provided in Fig. 1. The two types of feeding strategy were assessed separately as both meal service and experiential learning strategies have different levels of input by the parent and therefore different child experience with vegetables. Meal service strategies are often focused on changing the way the food is presented (less parental effort is required), whereas experiential learning strategies are focused on positive experiences with the vegetables and learning about their characteristics (more parental effort is required in comparison). Due to the differences between strategies, parental beliefs and intentions to implement could differ, necessitating two separate models. The models were fit with a robust diagonally weighted squares method (WLSMV), that performs well with ordinal data and smaller sample sizes (Finney & DiStefano, 2013; Flora & Curran, 2004). Overall model fit was examined holistically, with general rules for appropriate values being considered (CFI and TFI >0.95, RMSEA and SRMR <0.08 are considered as good fit). After examining overall model fit, the measurement and structural models were assessed and respecified based on both theory and modification indices supported by theory. Lastly, both direct and indirect pathways of endogenous to exogenous variables were examined using bootstrapped confidence intervals (BCa) (Cheung & Lau, 2008; Zhao, Lynch, & Chen, 2010).

All quantitative analyses were conducted in R version 4.1.0, using packages semPower 1.1.0, tidyverse 1.3.1 and lavaan 0.6–8 and graphics were produced using DiagrammeR 1.0.6.9000.

2.4.3. Analyses of written responses

For the written responses, the first author initially sought to acquire an overview of responses through the use of text mining. This allowed exploration of the most frequently used words (and two consecutive words: digrams), correlations of words used between strategies and sentiment analysis (whether words used were positive or negative). All text mining was performed in R using packages Tidytext 0.3.2, tm 0.7–8 and qdap 2.4.3.

After exploring the data more generally, content analysis was used to categorise participant responses. Codes (categories) were identified inductively from the data and participant responses were assigned to the relevant code. The same codes were used for both questions regarding parental intentions to implement either meal service or experiential learning strategies. However, different sets of codes were identified for each of the six strategies relating to parental beliefs that the methods would work for their child. This is because for each strategy, parents gave different reasons as to whether the strategy would work for their child. Initially, a large number of codes were constructed to account for the variety of answers parents provided. However, these were later collapsed into fewer codes that were similar to each other, to help with interpretation. All codes were discussed and agreed upon by all authors. Finally, in order to summarize the large number of codes identified between strategies, general themes were created to encapsulate overall trends within the data.

3. Results

3.1. Participants and descriptive statistics

Three-hundred and two parents completed the online survey. Parents were mostly female (75.8%), white (88.7%), and had a household income of less than £50,000 (GBP) (91.7%). The UK national median household disposable income for comparison is £31,400 (ONS, 2022).

Table 1
Participant demographic information.

Participant Characteristics.	
Total Parents, Male (%)	302, 73 (24.2)
Total Children, Male (%)	302, 157 (52.0)
Parent Age, Mean (SD) [Range]	33.5 (5.5) [22–51]
Child Age, N (%)	
4	101 (33.4)
5	97 (32.1)
6	64 (21.2)
7	40 (13.2)
Ethnicity of parent, N (%)	
White/White British	268 (88.7)
Black/Black British	14 (4.6)
Asian/Asian British	12 (4.0)
Mixed ethnic Group	6 (2.0)
Other	2 (0.7)
Ethnicity of child, N (%)	
White/White British	259 (85.8)
Black/Black British	12 (4.0)
Asian/Asian British	10 (3.3)
Mixed ethnic Group	19 (6.3)
Other	2 (0.7)
Household Income, N (%)	
Less than £25,000	94 (31.1)
£25,000 to £49,999	183 (60.6)
£50,000 to £74,999	22 (7.3)
Above £75,000	1 (0.3)
Prefer not to answer	2 (0.7)
Parental Education, N (%)	
Some High School or Less	35 (11.6)
A-level	72 (23.8)
Bachelor's degree	88 (29.1)
NVQ, BTEC, National Certificate/Diploma or Vocational licence	61 (20.2)
Graduate or professional degree	46 (15.2)

Full demographic details are presented in Table 1.

Modes, means, medians, standard deviations, ranges and reliability (Cronbach's alpha) for each questionnaire subscale are presented in Table 2. Overall, parents reported agreement with the intention to implement both meal service and experiential learning strategies. However, for both types of strategy, on average, parents believed that their child would only "try the vegetables", or "eat a few bites more" than they currently would eat. For the food frequency questionnaire, parents most frequently reported their child to eat each category of vegetables "once per week", with the exception of "other cooked vegetables (e.g. carrots, onions etc.)", where the majority of parents reported their child eating "daily". However, it is important to note that the questionnaire only obtained information for how often each vegetable was eaten, and not how much was eaten. Reliability for each validated scale, measured using Cronbach's alpha, was similar in this sample to values reported in the literature. Reliability was high for intentions questions created for this study, however values were lower for the beliefs questions developed for this study. This is understandable because parents were asked whether very different strategies would benefit their child. Parents may believe that whilst some strategies may work, other will not.

When asked to choose which vegetable feeding strategy (from all six strategies) parents thought would work best for their child, vegetable related games (n = 89, 29.5%) was most popular, followed by offering a variety of vegetable types (n = 75, 24.8%) and offering vegetables as a starter (n = 62, 20.5%).

3.2. Specifying the relationships between child and parental factors and parental beliefs and intentions

The initial model (Fig. 1.) that was specified as a SEM was a very poor fit for both meal service ($\chi^2[df = 129] = 280.10$, $p < .001$, CFI = 0.79, TFI = 0.75, RMSEA = 0.06, SRMR = 0.07) and experiential learning ($\chi^2[df = 129] = 226.62$, $p < .001$, CFI = 0.82, TFI = 0.78, RMSEA = 0.05, SRMR = 0.07) strategies (these two SEM models can be found in **supplemental material 2**). As the model fit was poor, the measurement models were examined. The measurement models were similarly a poor fit, therefore factor loadings were checked. Both Convenience and Pressure subscales did not load on to the healthy eating goals and parental practices latent variables respectively. This is likely due to these concepts being orthogonal (rather than opposite) to the other subscales loading onto the same latent variable. Therefore, these two subscales were removed from the model. Similarly, low factor loadings were seen for the food avoidance latent variable. The decision was made to change this latent factor to "food fussiness" and to use each of the six CEBQ Food Fussiness scale items to load onto this new latent variable. This was because support in the literature is stronger for food fussiness affecting children's eating and parental feeding factors, compared with the child eating slowly or getting full up easily. After these changes, the measurement model fit well and the structural model was re-examined. Modification indices were then examined, which suggested that Food Fussiness of the child may have a direct effect on parental intentions to implement vegetable feeding strategies. This effect was therefore added to the model in Fig. 1. Final model fit indices are presented in Table 3, along with final SEM models presented in Figs. 2 and 3.

3.2.1. Meal service model mediation pathways

The final SEM for meal service strategies is presented in Fig. 2. Mediation pathways are presented in detail for effects of each latent variable on parental intentions.

3.2.1.1. Food fussiness (FF). The SEM suggests that the effect of child FF on parental intentions to implement vegetable feeding strategies (direct effect = 0.46, CI = 0.23,0.68, p < .001) is mediated through parental beliefs that meal service strategies will increase vegetable intake by their child (indirect effect = −0.24, CI = −0.40,-0.08, p = .003). This suggests that parents are less likely to believe that meal service strategies will work for food fussy children, therefore reducing intentions to implement meal service strategies at mealtimes. Other pathways showing the direct effect mediated by parental healthy eating goals and beliefs (indirect effect = −0.02, CI = −0.04,0.01, p = .14) and parental healthy eating goals and positive feeding practices (indirect effect = −0.04, CI = −0.09,0.002, p = .06) were non-significant. The total effect of child FF on parental intentions was reduced compared with the direct effect, but non-significant (total effect = 0.16, CI = 0.01,0.31, p = .04), suggesting that there is a ***competitive mediation*** via beliefs, as the direction of the

Table 3
Absolute and incremental fit indices for the final structural equation models regarding meal service and experiential learning strategies.

Final model	$\chi^2(df)$, p-val	CFI	TFI	RMSEA	SRMR
Meal service	$\chi^2(df = 145) = 180.53$, p = .024	0.972	0.967	0.029	0.043
Experiential learning	$\chi^2(df = 145) = 212.98$, p < .001	0.937	0.926	0.039	0.054

Table 2
Descriptive statistics (*Mode*, *M*, *SD, Median* and *Range*) for each questionnaire subscale that participants completed, along with reliability (Cronbach's alpha) from the literature and our sample.

Scale	Mode	M	SD	Median	Range	Cronbach's alpha		
						Sample	Literature	Reference
Intentions – Meal service	"Agree"	5.55	1.06	5.8	1.8–7	.90	NA	
Intentions –Experiential learning	"Agree"	5.52	1.13	5.8	1–7	.92	NA	
Beliefs - Meal service	"Eat a few bites more"	3.56	1.27	3.33	1–7	.66	NA	
Beliefs - Experiential learning	"Eat a few bites more"	3.66	1.06	3.67	1–7	.48	NA	
Vegetable Food Frequency	"Once per-week"	3.66	0.91	4.0	1–5	NA	NA	
CEBQ – Food fussiness	"Sometimes"	3.15	0.89	3.0	1.17–5	.91	.91	Wardle et al. (2001), Sample 3
CEBQ – Slowness in eating	"Sometimes"	3.29	0.88	3.25	1–5	.86	.80	
CEBQ – Satiety responsiveness	"Sometimes"	3.07	0.68	3.0	1.4–4.6	.78	.83	
CFPQ - Encouraging balance and variety	"Always"/"Agree"	4.43	0.55	4.5	1.5–5	.70	.58	Musher-Eizenman and Holub (2007), Study 3 mothers
CFPQ – Modelling	"Agree"	4.34	0.74	4.5	1–5	.85	.80	
CFPQ – Child involvement	"Slightly agree"	3.68	1.00	3.67	1–5	.73	.77	
CFPQ - Pressure	"Slightly disagree"	3.40	0.94	2.5	1–5	.78	.79	
FCQ - Health	"Very important"	3.37	0.51	3.42	1–4	.85	.81	Steptoe et al. (1995), Study 2
FCQ – Natural content	"A little important"	2.80	0.81	3.0	1–4	.90	.86	
FCQ - Convenience	"Moderately important"	2.88	0.69	2.0	1–4	.85	.84	

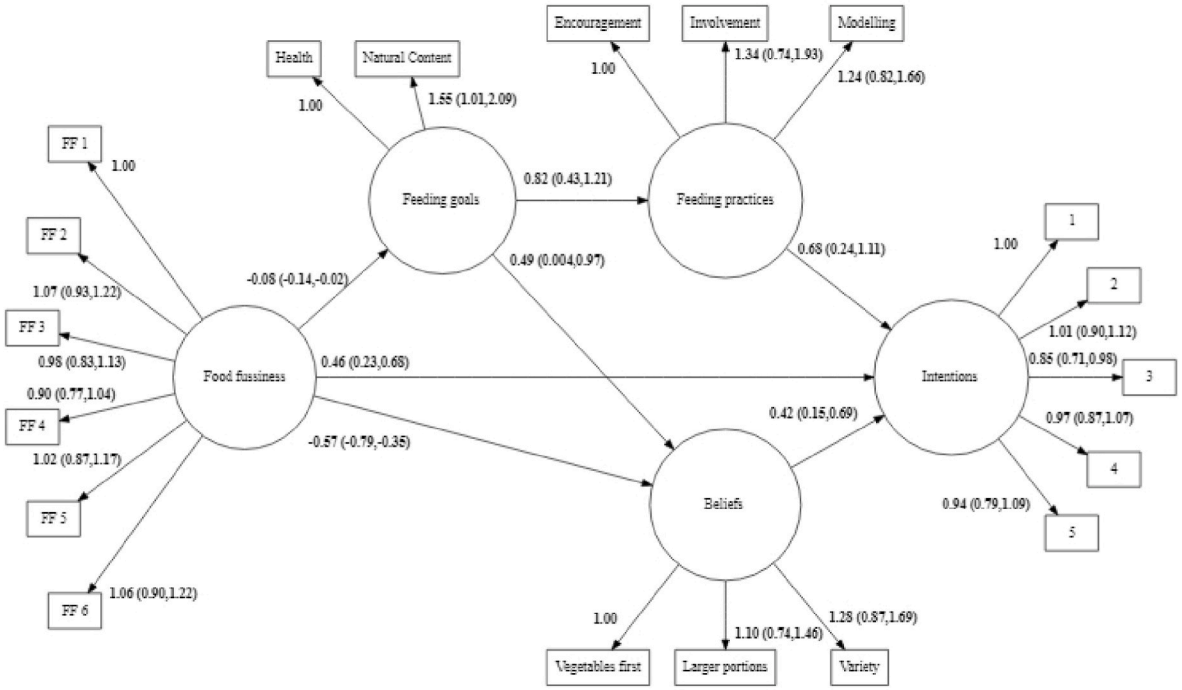

Fig. 2. The results of the final Meal Service model, examining the associations between child and parental factors with parental beliefs that vegetable feeding strategies will be effective for their child, and whether parents intend to implement these strategies. Circles indicate latent factors, boxes represent measured items, arrows from circles to boxes indicate factor loadings (95% BCa confidence intervals, one measured variable for each latent variable is fixed to one) and arrows between circles indicate the direct effect expected between latent variables (interpreted as a regression coefficient, with 95% BCa confidence intervals).

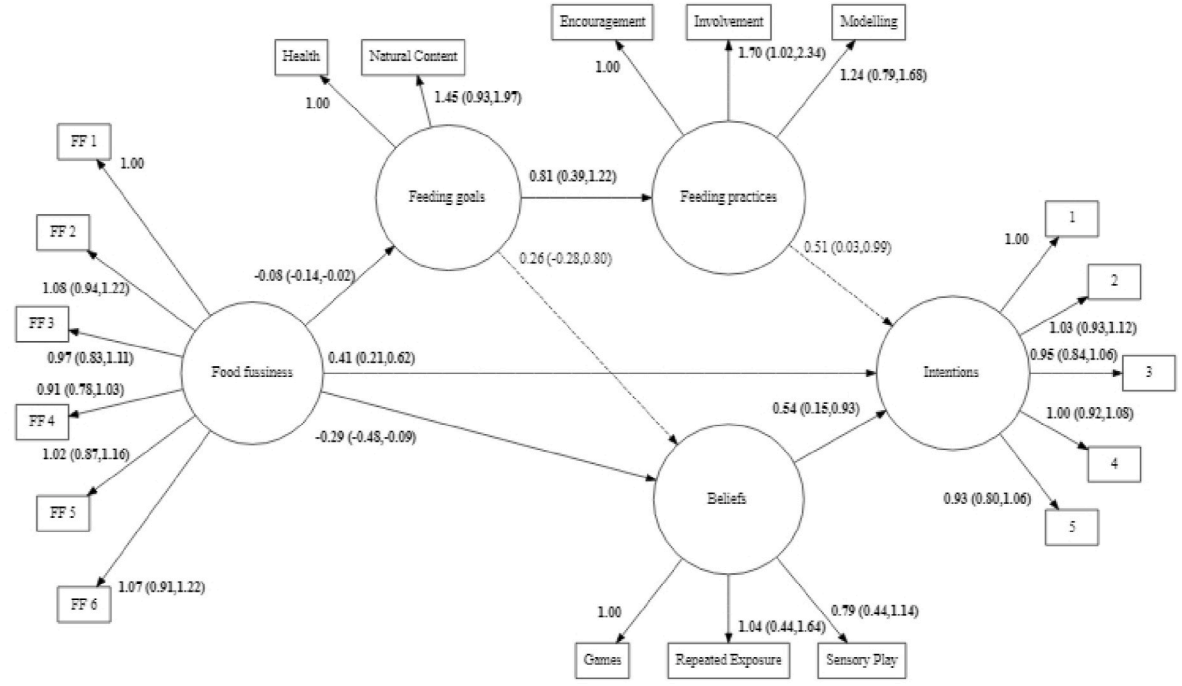

Fig. 3. The results of the final Experiential Learning model, examining the associations between child and parental factors with parental beliefs that vegetable feeding strategies will be effective for their child, and whether parents intend to implement these strategies. Circles indicate latent factors, boxes represent measured items, arrows from circles to boxes indicate factor loadings (95% BCa confidence intervals, one measured variable for each latent variable is fixed to one) and arrows between circles indicate the direct effect expected between latent variables (interpreted as a regression coefficient, with 95% BCa confidence intervals).

indirect effect is opposite to that of the direct effect.

3.2.1.2. Healthy eating goals. Healthy eating goals (it is important that my child eats healthily) were proposed to have an indirect effect on parental intentions. There was a significant indirect effect through positive feeding practices (indirect effect = 0.55, CI = 0.15,0.96, p = .01), yet indirect effects through beliefs was non-significant (indirect effect = 0.20, CI = −0.03,0.43, p = .08). Parents who thought it was

important for their child to eat healthily also reported more positive feeding practices, therefore resulting in higher intentions to implement meal service strategies. The total indirect effect through both pathways was positive and significant (total indirect effect = 0.76, CI = 0.31,1.21, p = .001), suggesting an **indirect-only mediation** through positive feeding practices.

3.2.1.3. Positive feeding practices. Positive parental feeding practices was found to have a direct positive effect on parental intentions (direct effect = 0.68, CI = 0.24,1.11, p = .002). The more parents reported using positive mealtime feeding practices, the higher their intentions to implement meal service strategies to increase child vegetable intake. This suggests a ***direct only non-mediation relationship***.

3.2.1.4. Beliefs. Parental beliefs that meal service strategies would increase their child's vegetable consumption was found to have a direct and positive effect on intentions (direct effect = 0.42, CI = 0.15,0.69, p = .003). If parents believed the meal service strategy would increase vegetable intake by their child, they reported higher intentions to implement the strategy. This is another example of ***direct only non-mediation***.

3.2.2. Experiential learning model mediation pathways

The final SEM for experiential learning strategies is presented in Fig. 3 and mediation pathways are described below.

3.2.2.1. Food fussiness (FF). Similar to the meal service model, the experiential learning model also suggests that child food fussiness had a direct effect on parental intentions (direct effect = 0.41, CI = 0.21,0.62, p < .001). However, the mediation pathways through beliefs (indirect effect = −0.15, CI = −0.30,-0.01, p = .04), via parental healthy eating goals and beliefs (indirect effect = −0.01, CI = −0.04,0.02, p = .40) and via parental healthy eating goals and positive feeding practices (indirect effect = −0.03, CI = −0.08,0.01, p = .11) were all non-significant. Although, the total indirect effect was negative and significant (total indirect effect = −0.198, CI = −0.35,-0.047, p = .010). The significant total effect (total effect = 0.22, CI = 0.06,0.37, p = .006) again suggests that there is ***competitive mediation***, however the effect may be weaker than the same effect in the meal service model.

3.2.2.2. Healthy eating goals. The effect of parental healthy eating goals on intentions was not mediated by beliefs (indirect effect = 0.14, CI = −0.18,0.46, p = .39) or positive feeding practices (indirect effect = 0.41, CI = −0.003,0.83, p = .05). The total indirect effect was positive yet also non-significant (total effect = 0.55, CI = 0.12,0.99, p = .013). Individually, these factors did not mediate the relationship between healthy eating goals and intentions.

3.2.2.3. Positive feeding practices. Positive feeding practices had a positive but non-significant effect on intentions to implement experiential learning strategies (direct effect = 0.51, CI = 0.03,0.99, p = .04).

3.2.2.4. Beliefs. Parental beliefs that experiential learning strategies would increase vegetable intake by their child at mealtimes had a positive and significant direct effect on intention to implement these strategies (direct effect = 0.54, CI = 0.15,0.93, p = .007).

3.3. Findings from open ended questions

3.3.1. Parental intentions

Table 4 shows the different categories of parental response when asked whether they intended to implement vegetable feeding strategies at home or not. Similar responses were given the same code. Where parents were equivocal about a strategy, this was combined with "No" responses, as the qualifying reasons were most similar to each other.

Table 4
Using content analysis, codes are presented that were derived from written responses to parental intentions questions. The number of participant's reporting each code as a reason to intend/not to intend on implementing meal service and experiential learning strategies is also presented.

Do I intent to implement the strategy?	Reason/code	Type of strategy	
		Meal service (n)	Experiential learning (n)
–	Left blank/not sure	6	9
No/Maybe	Child already eats vegetables or I already do this	13	13
	Child is too fussy or will waste the food	16	6
	Due to hassle, stress, monetary or time costs	31	34
	Strategy will not work or not guaranteed to work	46	44
Yes	Strategy is easy to do or worth a try	50	30
	For my child to eat or try more vegetables specifically	89	68
	For my child to eat a healthy, balanced diet more generally	45	37
	For my child to enjoy vegetables without pressure	6	61

The degree of intentions to implement both types of strategy were similar, with the majority (64%) of parents stating that they intended to try the suggested strategies. Of parents that did not intend to implement the strategies, a few parents reported that their child was too fussy and that the strategies would lead to waste:

(e.g. "I feel like it could create a lot of extra food waste if he doesn't eat any of it", [P280, 4yr, M, meal service]).

However, more parents were concerned about the cost, time commitments and any extra stress or hassle that the strategies would incur:

(e.g. "my child refuses to eat vegetables so I would love to try it. However, I am worried that I might waste time & money", [P55, 4yr, M, meal service].

"I wouldn't try this as it would seem like it's a lot of hassle and messing about and making meal times a game is not for me", [P177, 7yr, M, experiential learning]).

The most popular reason for not intending to try these strategies was that the parents believed the strategy would not work, or that there was no guarantee that their child would eat more vegetables:

(e.g. "I have bad experience with playing, it usually ends up playing without eating anything.", [P104, 5yr, F, experiential learning].

"I don't feel like serving veg or fruit before the meal or putting more of the intimidating food on their plate will create any positive attitudes to that particular food.", [P258, 5yr, F, meal service]).

Parents more often reported reasons why they would intend to implement the strategies. Parents reported meal service strategies as easy to try with little extra effort:

(e.g. "This … seems like it wouldn't involve changing the mealtime too much. Serving veg first sounds like an interesting idea and wouldn't need that much extra effort", [P41, 4yr, F, meal service])

Whereas, experiential learning strategies were seen as a way for children to enjoy vegetables, or to try them without pressure:

(e.g. "These methods sound more fun, which appeal to me more. They seem more like learning about the vegetable, presenting my child with them rather than pushing them to eat", [P232, 5yr, F, experiential learning]).

Many parents also reported intentions to try these strategies based on wanting healthier diets for their children:

(e.g. "Getting my boy to eat veg is a mission as it is and i'm always on the lookout for ways of trying to get him to at least try [vegetables]", [P39, 7yr, M, meal service].

"I would want to try and vary his diet", [P249, 7yr, M, experiential learning]).

3.3.2. Parental beliefs

Table 5 and Table 6 illustrate the different codes created from parents' reasons for whether each strategy would improve their child's intake of vegetables or not.

Table 5
Using content analysis, codes are presented that were derived from written responses to parental beliefs questions. The table illustrates reasons parents provided for why meal service strategies may or may not increase vegetable intake by their child and the number of parents reporting these reasons for each individual strategy.

Will the strategy work for my child?	Reason/code	Meal service strategy		
		Vegetables served first (n)	Serving larger portions (n)	Serving a variety (n)
–	Left blank/not sure	11	16	12
No	Parent does not like the strategy	26	–	–
	Child would not like the strategy	33	–	–
	Child would refuse to eat or say they are finished	51	–	–
	Child is fussy and would complain, be overwhelmed or leave leftovers	33	158	43
	Child only eats a certain amount/the child knows what they like	–	47	41
Maybe	Child will become too full and would not eat their main course	15	–	3
	No difference/child already eats what is served	35	23	45
	It depends on the vegetable type. Other methods or foods could work better	–	19	55
Yes	Child will eat if hungry	54	5	–
	No other options to eat	34	–	–
	Strategy is interesting, engaging and not boring	10	–	45
	Child would eat more due to more food on the plate or pre-set rules (e.g. to eat a certain amount)	–	34	–
	Child likes change, options or control at mealtimes	–	–	35
	Child will eat their preferred vegetable, there is no pressure to eat a specific vegetable	–	–	23

Table 6
Using content analysis, codes are presented that were derived from written responses to parental beliefs questions. The table illustrates reasons parents provided for why experiential learning strategies may or may not increase vegetable intake by their child and the number of parents reporting these reasons for each individual strategy.

Will the strategy work for my child?	Reason/code	Experiential learning strategy		
		Vegetable games (n)	Sensory play (n)	Repeated taste exposure (n)
–	Left blank/not sure	18	26	18
No	Parent does not like the strategy	26	21	–
	Child would not like the strategy	17	28	–
	Child will refuse or forget to eat	55	41	34
	Child is too fussy or the strategy too overwhelming	–	19	65
Maybe	Strategy would be better outside of mealtimes	–	8	–
	Child is sensory sensitive	–	4	–
	Strategy could work over time, but depends on vegetable type	–	–	20
	No difference or child already eats what is served	23	17	48
Yes	Child enjoys play, competition or reward	58	17	–
	Strategy is fun, engaging or distracting	75	60	–
	Strategy encourages eating or trying without pressure	30	37	–
	Strategy desensitises to sensory characteristics	–	24	–
	Child will eat more due to number of exposures	–	–	117

3.3.2.1. Meal service strategies

3.3.2.1.1. Meal service strategies will not work. Parents reported a range of reasons why meal service strategies would not work for their child. For a "vegetables-served-first" approach, some parents suggested that they, or their child, would not like the strategy:

(e.g. "My children don't eat starters. They would assume that I'm just serving them a dinner of vegetables. They wouldn't be happy with that" [P258, 5yr, F, vegetables-served-first],

"He would get upset that the rest of the food wasn't ready." [*P25 4yr M, vegetables-served-first)*

Many parents also mentioned that their child would say that they are finished, or refuse to eat and wait for their main meal:

(e.g. "I don't think this would work. He would want to wait for the better food." [P183, 7yr, M, vegetables-served-first].

"He would want to just eat the main meal so would say he is finished" [P127, 4yr, M, vegetables-served-first])

For all three meal service strategies (especially serving larger portions), parents suggested that the strategy would not work as their child

would be overwhelmed by large portions or complain about the way the vegetables are served:

(e.g. "This overwhelms them, they just see a mountain." [P200, 4yr, M, serving larger portions].

"She really doesn't like having mixed vegetables at home … she gets very upset, even if they're completely separated and not touching." [P236, 6yr, F, serving a variety])

For both serving larger portions and a variety, some parents reported that their child has a certain amount that they usually eat, and after they reach this point, the child will stop eating. Other parents suggested that their child already knows what they do and do not like to eat, and therefore would not eat anything else:

(e.g. "He would claim he was full after his usual amount and leave the rest" [P168, 7yr, M, serving larger portions].

"I have tried a range of vegetables and she knows what she does and doesn't like" [P58, 5yr, F, serving a variety])

3.3.2.1.2. Meal service strategies could work. A few parents, whilst thinking that the vegetables-served-first strategy would increase their child's intake, expressed concern that the vegetables would 'fill their child up', leading to fewer other food groups being eaten during the main meal:

(e.g. "He would probably eat all the vegetables but then not eat as much of his dinner which I wouldn't like "[P100, 6yr, M, vegetables-served-first])

Secondly, some parents reported that the effectiveness of the methods used will depend on the type of vegetables in the larger portion and variety strategies. Parents reported that if better liked vegetables are used, the strategy may have more success to increase intake:

(e.g. "If it's vegetables she likes she will eat more" [P234, 5yr, F, serving larger portions])

"If there are options I think it would encourage to eat the preferred one" [P270, 4yr, F, serving a variety]).

3.3.2.1.3. Meal service strategies will work. For parents that thought the vegetables-served-first strategy would work for their child, they attributed this to their child being hungry enough to eat the vegetables that are served:

(e.g. "if she was hungry she would have to eat them" [P188, 5yr, F, vegetables-served-first])

or that there were no other food options available to eat instead of the vegetables. This means that other more palatable foods are not available and therefore other foods cannot act as a distraction to eating vegetables:

(e.g. "I think this would work well with my child as she tends to eat her favourite elements of the meal first then claims to be full" [P77, 4yr, F, vegetables-served-first])

Some parents also reported that their child would eat more vegetables if served a larger portion because they have certain rules in place for how much (proportion) of their vegetables to eat at mealtimes:

(e.g. "Because he knows I like him to finish a certain amount of food. Like for him to try and eat half or 2/3 of his dinner if possible]" [P161, 6yr, M, serving larger portions])

For serving a variety, parents that thought this strategy would work for their child referred to reasons such as the child being in control of what they choose to eat and therefore eating more of the foods that they choose to eat:

(e.g. "We try to do this and then give him the choice of two. This seems to empower him as he can make the decision to pick his preferred option" [P164, 5yr, M].

"I think this would work because it gives illusion of choice." [P199, 5yr, M])

Lastly, because there are options available when serving a variety, parents further reported that their child will be able to eat the vegetables that they like without the pressure to eat a certain vegetable:

(e.g. "There would likely be at least one item that he would enjoy and would be finished." [P59, 7yr, M])

3.3.2.2. Experiential learning

3.3.2.2.1. Experiential learning strategies will not work. Parents often expressed that they themselves did not like certain strategies involving vegetable related games or sensory play, therefore the strategy would not work for their child:

(e.g. "Not sure how i feel about playing games when you're supposed to be eating" [P8, 4yr, M, vegetable related games]

"Wont be that helpful because some veggies like broccoli do not smell or look appealing" [P250, 6yr, M, sensory play]).

Other parents thought that their child would play with the food and not eat, the food would get cold and therefore unappealing, or that their child would be distracted and forget to eat completely:

(e.g. "My child would 100% muck about with it and wouldn't eat them" [P267, 5yr, M, vegetable related games].

"playing will make her forget to eat." [P104, 5yr, F, vegetable related games])

Parents that did not think that sensory play would encourage their child to eat more based their responses on child fussiness or not liking to play with their food, stating that their child is too old for the strategy, or that playing would lead to not eating for a variety of reasons:

(e.g. "my child he doesn't like anything dirty and is very particular about the state of his food so I feel like this would put him off …" [P91, 4yr, M, sensory play],

"I don't think it would work as she's that little bit older now, when she was younger yes I think it would have worked" [P296, 7yr, F, sensory play],

"if they have time to go cold, she wouldn't eat them" [P263, 7yr, F, sensory play])

Parents that did not think that repeated taste exposure would work for their child reported this to be because their child is too fussy or that they would become overwhelmed at repeatedly being offered the same vegetables at each meal:

(e.g. "My child is very stubborn and would not try anything that he didn't want to." [P26, 5yr, M].

"I feel it would be vegetables overload and she would refuse all" [P129, 7yr, F])

3.3.2.2.2. Experiential learning strategies could work. Parents that thought repeated taste exposure could work stated that it would depend on the type of vegetables or that it would only work after a period of time:

(e.g. "It could work, but it depends on the vegetables really. If after multiple attempts my child doesn't like something then I am not going to continue to try for 6 or 7 more times …"[P289, 7yr, F, repeated taste exposure]).

3.3.2.2.3. Experiential learning strategies will work. Many parents

responded positively to playing vegetable related games and sensory play at mealtimes, suggesting that the games could be fun and therefore, eating vegetables could become more enjoyable for their child:

(e.g. "Games may encourage future eating of veg as [it] is a game not [a] chore." [P123, 6yr, M, vegetable related games]

"He would enjoy the play idea as it is a more chilled and fun way of introducing vegetables" [P193, 4yr, M, sensory play])

Parents also said that this method would work as their child likes playing:

(e.g. "this would work, because my child enjoys learning through play, so vegetable games could be very encouraging" [P265, 4yr, M, vegetable related games])

These strategies were also highlighted to encourage children to try vegetables (although not necessarily consume the entire portion), without pressure to eat them:

(e.g. "I believe this could be a good way to introduce new vegetables to my child which she might otherwise be suspicious of." [P209, 6yr, F, vegetable related games]

"It may encourage him to try them as he will see they aren't there to hurt him or some may smell nice so it sparks interest to taste …" [P222, 6yr, M, sensory play]).

Sensory play in particular was reasoned to help overcome sensory sensitivities and assist the child in learning about the sensory characteristics of vegetables:

(e.g. "might help my child understand more about vegetables and their taste/texture" [P217, 4yr, F, sensory play].

Whereas repeated taste exposure was suggested to work for their child due to receiving more exposure to the vegetables, creating habits and eating vegetables at mealtimes becoming the norm over time:

(e.g. "I think this would show him that its a continued thing I am trying to do and he would eventually get used to it." [P158, 7yr, M, repeated taste exposure].

"This would help him understand that vegetables are a part of his dinner" [P193, 4yr, M, repeated taste exposure])

3.3.3. Summary of findings from open ended questions

Parents most frequently responded with decisive statements about their intentions to either implement or not implement the strategies and when suggesting whether or not the strategy would increase vegetable intake for their child. Parents rarely responded with statements that were unsure or undecided as to the potential effects of the strategies. For intentions, almost two thirds of parents reported that they would implement the strategies. However, beliefs that meal service strategies would work were reported in around one third of responses, and around half of responses for experiential learning strategies. To summarize the responses for beliefs, parental themes were developed based on whether the parent thought that the strategy would work for their child. Parents believing that the strategy would not work tended to either not like the strategy themselves (e.g. games are not for the dinner table), or they anticipated their child's negative response to the strategy (e.g. my child would complain, they would refuse to eat). However, parents that suggested the strategy would work for their child tended to identify positive aspects of the strategy (e.g. games are fun, engaging and enjoyable, therefore making eating vegetables less of a chore).

4. Discussion

This study aimed to explore and specify the relationships between child eating factors, parental feeding factors, parental beliefs that different strategies to encourage vegetable intake in children would succeed and whether parents intend to implement these strategies at home. Structural equation modelling and mediation analyses suggest that for meal service strategies, the effect of food fussiness on parental intentions was competitively mediated by parental beliefs. As food fussiness of the child increased so did parental intentions, however this was also associated with lower belief that the strategy will work. More moderate effects on parental intentions to implement strategies were also observed from parental feeding goals and practices, with more frequent positive parenting practices associated with higher intentions to implement. Written parental responses on why strategies would or would not work were varied. For experiential learning strategies, some parents reported that they would not work due to play conflicting with mealtime goals and appropriate behaviour, whereas meal service strategies were disliked due to the potential for extra food waste and costs. However, many parents believed their child would benefit from play to make eating vegetables more fun, exciting and pleasurable, whereas meal service strategies were seen by parents as easy to do and often parents believed their child would eat more as a result of serving more vegetables.

In both meal service and experiential learning models, the higher the child's food fussiness, the more parents reported a greater intention to implement vegetable feeding strategies. However, interestingly, in the meal service model this effect was reduced by parents having low belief that the strategies would work for their child. This illustrates a potential conflict between parent's having positive intentions to implement vegetable feeding strategies, but negative thoughts about how useful the strategies will be for their child. On one hand, parents may want their child to consume more vegetables and generally they will be willing to try strategies to encourage their child to eat healthily (Hingle et al., 2012). However, when presented with a range of strategies that could promote healthy eating, parents may not believe that they will work to increase vegetable intake by their child, especially if their child is fussy. The effect of lower beliefs further predicted reduced parental intentions to implement strategies. Low beliefs could be a result of past parental experiences with trying different strategies and not having any effect for their child's eating. Consequently, parents of fussy eaters could have developed either a learned helplessness (Duncanson, Burrows, Holman, & Collins, 2013; Russell & Worsley, 2013) or low perceived behavioural control (Ajzen, 1991) over their child's vegetable eating behaviours. Both mean that parents believe they can only influence or change what their child eats to a certain extent and this could in turn discourage parents from trying or persisting with new vegetable feeding strategies (e.g. due to low desire/motivation to implement; Hingle et al., 2012). From the written responses, some parents anticipated their child's negative responses to the strategy (e.g. my child will complain, or refuse to eat). It could be that these parents believe that no matter what they try, their healthy eating goals will be difficult or impossible to achieve (Duncanson et al., 2013). In a review of qualitative studies, parents with low self-efficacy to influence their child's eating habits often had an awareness of healthy eating concerns, but this was not reflected in their behaviours or feeding practices (Pocock, Trivedi, Wills, Bunn, & Magnusson, 2010).

In contrast to the meal service model, there was no mediation effect of beliefs in the experiential learning model. One reason for this difference may be that parents hold more positive beliefs about the effectiveness of experiential learning strategies. Analysis of written responses suggests that experiential learning strategies are regarded as being more engaging than meal service strategies and therefore parents may hold stronger beliefs that this type of strategy could work. Similarly, using concepts from the Theory of Planned Behaviour, parents that have more favourable evaluations of these strategies and therefore more positive attitudes towards them, will be more likely to intend on implementing the strategies. Another explanation is that although the effect was in the same direction as the meal service model, it may have been non-significant due to being a smaller effect. Similarly, due to the ordinal

nature of the data, there may have been reduced power to detect this smaller effect in the experiential learning model. This is possible because when examining the total indirect effect of food fussiness on intentions (through parental feeding goals, practices and beliefs) the competitive mediation is negative and significant (in the same direction as the meal service model).

In other mediation pathways, the indirect effect of healthy eating goals on intentions (via parental practices) was significant in the meal service model, but not the experiential learning model. Higher healthy eating goals were associated with more frequent use of positive feeding practices across both models, and this in turn predicted higher intentions to implement meal service, but not experiential learning strategies. It is possible that parents already modelling and encouraging vegetable intake (positive feeding practices) may find meal service strategies more readily acceptable to implement, as these strategies mainly involve changing what and how much is served at mealtimes. In comparison, experiential learning strategies are further removed from these positive feeding practices and may even take more time and effort to implement. This could deter parents from intending on implementing these types of strategy, despite higher beliefs that experiential learning strategies could work for their child. Furthermore, mediation analyses were non-significant and it is possible that these parental factors are underpinned by their child's eating behaviours and/or temperament (Holley, Haycraft, & Farrow, 2020). Our models show that higher food fussiness predicted lower healthy eating goals of the parent. If healthy eating goals are less important for parents, they may also perform fewer or more infrequent involved feeding practices at mealtimes (e.g. modelling healthy food intake), resulting in reduced intentions to implement new strategies. This is interesting as research examining the success of parent-led interventions on child vegetable intake found that success was not predicted by parental feeding practices, but instead by the food fussiness of the child (Holley, Farrow, & Haycraft, 2016).

When exploring the reasons parents gave for their intentions and beliefs, similar patterns were observed to the quantitative findings. Parents generally had high and positive intentions to implement strategies, whilst holding lower beliefs that the strategy would work for their child. For each question, parents mostly responded with decisive statements, with few parents being unsure of their intentions or potential outcomes of the strategy for their child. This could indicate that parents have very specific ideas about what they will and will not implement at mealtimes, as well as how they think their child will react to any mealtime changes. This could mean that encouraging parents to implement vegetable feeding strategies may first require overcoming parent's hesitancy to try these strategies and working with parents on developing strategies that might work for them. One factor from the Theory of Planned behaviour that was not measured was subjective norms. This could play a role in parent's intentions as they may be more likely to implement strategies if they think that other parents are implementing the strategies with their children. Parents that suggested strategies would not work sometimes reasoned that they did not like the strategy themselves (e.g. games are not for the dinner table). Although these parents may value healthy eating, play based experiential learning appears to be in opposition to their mealtime goals (Schuster, Szpak, Klein, Sklar, & Dickin, 2019). This is because play focuses on improving children's positive experiences with vegetables, rather than consuming all of the portion. In contrast, the parents that reported strategies would work for their child were more likely to identify the positive aspects of that particular strategy (e.g. games are fun, a distraction from thinking about eating the vegetables; when vegetables are served first, there are no other options to eat, etc.) it is more likely that children will eat more vegetables when offered in a positive and fun environment (see Chawner & Hetherington, 2021; Yee, Lwin, & Ho, 2017 for reviews), and this could predict more successful interventions if implemented at mealtimes.

When examining these findings in relation to the theory of planned behaviour, parents may have largely positive attitudes towards healthy eating and healthy eating strategies, which could explain their high intentions to implement these strategies (Ajzen, 1991). Parent's perception of subjective norms (that others may use similar strategies) was not tested, however if parents perceive other parents to be implementing vegetable feeding strategies with their children, parents may enhance their own intentions to implement these strategies through social pressure. Yet, low beliefs that the parent can change their child's eating behaviour (low perceived behavioural control) using these strategies may limit parent's intentions to implement them. This might predict a gap between high parental intentions and low behavioural implementation of strategies (Duncanson et al., 2013), although this was not tested directly in this study.

Lastly, it is important to consider these results in light of how the intentions questions were framed. We asked parents if they would intend on implementing these strategies if it would increase their child's vegetable intake by one portion, or 40g. This would be a large increase in consumption of vegetables by most children and may explain some of the high intentions of parents to implement the strategy. Children are much more likely to increase intake by a few bites, or increase their willingness to try the vegetables, especially in the short term as a result of using these strategies. Therefore, parental intentions may have been lower if the question was framed as encouraging your child to try vegetables, rather than eat 40g more of them.

4.1. Strengths and limitations

Prior qualitative studies have identified barriers and experiences of parents when serving vegetables, and quantitative studies have separately sought to link parent and child feeding factors to food intake. In this cross-sectional study, quantitative analyses allowed us to test a specific model examining the relationships between factors that could predict parent beliefs and intentions to implement strategies. Analyses of open ended questions then provided details that explained some of the observed associations, providing a fuller picture to the data and what might influence parents' beliefs and intentions surrounding vegetable feeding strategies.

One limitation of the study is that the impact of the sample characteristics on the model is not known. We do not know if the participants were single parents or if there were multiple adults in the house, whether participants were currently working or the geographical location of participants within the UK. These factors could influence the model as income may go further in certain areas of the country, where living expenses are lower. Single parent households may also have less time and help from family members to serve dinner and implement a new feeding strategy. Therefore, certain environmental factors that have not been accounted for could influence the model in ways that were not measured. Other factors that may influence parental intentions were also not the focus of this study (e.g. general parenting style, child temperament; Blissett, 2011). Similarly, we cannot confirm the income status of the households recruited to the study. In attempting to select a lower-income sample, the majority of participants were within the bracket of £25,000-£49,000 household income. This encompasses values around the median income for households in the UK, in which the median disposable income is around £31,400, but this is not total household income (before taxes) that participants reported. This could impact the generalisability of findings to parents with lower than average incomes in the UK.

4.2. Implications and future research

Although food fussiness may be heritable and to some extent, beyond parent's control, evidence generally suggests that intake of foods can change over time (Wardle & Cooke, 2008). Parents may benefit from support and guidance when introducing similar vegetable feeding strategies at home. This may include acknowledging that eating changes are more likely to happen over time, reassuring parents that strategies have

worked for other children and encouraging parents to make mealtimes more fun and encouraging for their child. This could include more tailored strategies for parents to adopt dependent on what their child's eating traits and temperament are perceived to be. For example, fussy eaters may begin with sensory play with a view to taste vegetables, rather than larger portions that focus on outcomes of increased intake. With this strategy, managing parental expectations and illustrating that tasting a vegetable is a success for many children (not just eating a large amount) may be beneficial for parents to consider when implementing vegetable feeding strategies. Without this support and information, parents may be more willing to continue with their current practices than implement new strategies, as they know what outcome they are likely to get and what amount of food waste might be expected (Russell, Worsley, & Campbell, 2015). Vegetable feeding strategies could be further tailored to parental goals and types of strategy that the parent believes could have an impact, as there appears to be a mismatch between intentions and beliefs - parents intend to implement strategies, but they do not believe they will work. This could have unintended consequences, such as either intentions not formulating into behaviour, or that parents will try strategies half-heartedly believing that they will not work in any case, and so the strategy may not be as effective as the literature suggests it could be.

Future research could examine parental intentions to implement vegetable feeding strategies when parents are told that the outcome will be different, such as the strategy will encourage my child to taste the vegetables; encourage my child to eat a few bites more; or encourage my child to eat half a portion. This has potential to identify what reward or outcome parents find acceptable so that they may then implement these strategies at mealtimes.

5. Conclusion

The current study examined parental beliefs that meal service and experiential learning strategies would increase their child's vegetable intake at mealtimes, and to what extent parents intend to implement these strategies. The relationships between child eating traits, parental feeding goals and practices were further explored for their associations with parental beliefs and intentions. It was found that overall, parents reported high intentions to implement vegetable feeding strategies, but intentions were reduced when parents did not believe that the strategy would increase their child's vegetable intake, especially for food fussy children. Higher intentions may also be explained by the ease of implementing some strategies by parents and making mealtimes more pleasurable for their child, whereas lower intentions could be explained by parental perception of higher costs and waste, along with strategies not aligning with parent's personal mealtime feeding goals.

Author contributions

Conceptualization and study design, L.R.C., P.B–B. and M.M.H.; Data curation and analyses, L.R.C.; Writing-Original draft, L.R.C.; Writing-Review and editing, L.R.C., P.B–B. and M.M.H.

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Ethical statement

Ethical approval was received from the University of Leeds Psychology Research Ethics Committee (reference number: PSYC-278).

Declaration of competing interest

None.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.appet.2022.106387.

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