Predicting successful introduction of novel fruit to preschool children

FUNDING SOURCE: This project received no external funding.

Abbreviations: NF: Novel fruit, FV: fruits and vegetables

Keywords: novel food, feeding practices, parenting, preschool children

Word count for the abstract: 244

Word count Text: (excluding references, tables, and figures): 4623

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Abstract

Background: Few children eat sufficient fruits and vegetables despite their established health benefits. The feeding practices used by parents when introducing novel foods to their children, and their efficacy, require further investigation. Objective: The current study aimed to: 1) establish which feeding strategies parents commonly use when introducing a novel fruit (NF) to their preschoolers; 2) assess the effectiveness of these feeding strategies on children's willingness to try a NF. Design: Correlational design. Participants and Setting: 25 parents and their 2-4 year old children attended our laboratory and consumed a standardized lunch, including a novel fruit. Interactions between parent and child were recorded and coded. Statistical analyses performed: Pearson's correlations and multiple linear regression analyses. Results: The frequency with which children swallowed and enjoyed the NF, and the frequency of taste exposures to the NF during the meal, were positively correlated with parental use of physical prompting and rewarding/bargaining. Earlier introduction of solids was related to higher frequency of child acceptance behaviours. The child's age at introduction of solids and the number of physical prompts displayed by parents significantly predicted the frequency of swallowing and enjoying the NF. Age of introduction to solids and parental use of rewards/bargaining significantly predicted the frequency of taste exposures. Conclusion: Prompting the child to eat and using rewards or bargains, during a positive mealtime interaction, can help to overcome barriers to novel fruit consumption. Early introduction of solids is also associated with greater willingness to consume a NF.

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Food preferences developed during childhood are stable and enduring, influencing food choices in adulthood.[1] Many parents find it difficult to introduce fruits and vegetables (FV) successfully into their children's diets. Only 21.5% of 5-15-year-olds in England consume the recommended five or more portions of FV a day.[2] In the US, under 25% of 6-11 year olds eat the minimum recommended number of daily FV servings.[3] FV are essential to a healthy diet, playing a role in preventing chronic cardiovascular disease and protecting children from some types of cancer in adulthood.[4]

Whilst a number of factors intrinsic to the child, such as neophobia or sensory sensitivity, play an important role in children's consumption of FV[5,6] these are not readily modified by public health interventions. In contrast, potentially modifiable extrinsic factors, such as exposure to flavours through breastmilk,[7,8] and age at weaning[9,10,11] affect food acceptance. In particular, babies who are introduced to solids relatively early show greatest acceptance of foods later in childhood, whereas those weaned onto solids after 9 months show greatest feeding problems.[10,11] Furthermore, those infants who are both breastfed and introduced to a wide variety of vegetables early in weaning show greatest acceptance foods later in infancy,[8] suggesting that introducing solids early within the period recommended by health professionals may confer advantage for later feeding. Finally, some parental feeding practices,[12] may also affect FV consumption, and have great potential to be manipulated in interventions. However, we know very little about the type of feeding practices commonly used by parents when introducing novel foods to

46 their children in early childhood, and we know even less about their relative
47 effectiveness.

48 One primary predictor of children's eating behaviour is not what, but how parents feed
49 their children.[13] Pressure is commonly used by parents of preschool children in both
50 novel and familiar food consumption interactions[14] but the effectiveness of this strategy
51 for facilitating FV intake is equivocal. Pressure to eat has been negatively associated with
52 children's FV consumption and preference.[12,15,16,17,18] However, it is likely that a degree
53 of pressure or prompting is necessary to encourage children to taste novel foods, leading
54 to the exposure necessary to facilitate novel food acceptance,[19] and there is some
55 evidence that certain pressurising behaviours and encouragement to consume FV predict
56 a greater intake of FV.[20,21] Furthermore, the use of tangible rewards for eating has yielded
57 mixed evidence. Some findings suggest that giving children food rewards for eating a
58 target food will lead to the devaluation of the target food, while increasing the liking for
59 the reward food.[22] Other evidence suggests that rewards do not decrease liking and are an
60 effective means to increase short-term consumption of foods.[23,24] Finally, observing
61 others, particularly parents or trusted adults, eating novel or less well liked foods, has
62 been shown to facilitate children's consumption of that food.[25,26]

63 There has been little work which observes parents interacting with their children
64 whilst introducing novel foods, with much of the work in the field relying upon
65 retrospective self reports. The current observational study therefore aimed to establish
66 which feeding strategies parents commonly use when trying to introduce a novel fruit
67 (NF) to their 2-4-year-old children, and also to assess the relative effectiveness of these
68 feeding strategies on children's willingness to try a NF. We selected novel fruits as our

target novel food because we wanted a target food that children would be neither enthusiastic nor very reluctant to try. Given that fruits are relatively well accepted but still present some challenge for parents, and are also easy to find novel versions of, we chose to test our hypotheses with this target food. We hypothesized that pressure to try the NF and reward for trying the NF would be related to the frequency of children's acceptance and rejection behaviours towards the NF. Furthermore, we hypothesized that parental feeding strategies aimed at increasing children's familiarity with the NF, such as teaching about the NF and comparison of the NF to familiar foods, would be associated with a higher frequency of NF acceptance, and a lower frequency of NF rejection behaviours. We also hypothesized that role-play, parental modeling, and early introduction of solids would be positively correlated with NF consumption. Finally, we developed models to assess the best predictors of 'successful' NF introductions and the frequency of NF taste exposures during the mealtime.

Method

Participants

Twenty-five parent-child dyads were recruited through the Infant and Child Laboratory database, which contains information on families in which parents have indicated an interest in research participation at the University of Birmingham, UK. Ninety-eight parents were contacted and the response rate was 35.7%. The parents who participated in this study were the primary caregivers of their children; where fathers participated (n=2) these were primary or equal caregivers. Inclusion criteria were that the child was in the age range 2-4 years and that the family spoke English sufficiently well to complete the questionnaire measures and to converse in English during the mealtime

92 interaction. Exclusion criteria for children included known food allergies or disorders
93 affecting eating, current or recent major illness or diagnosed intellectual disabilities, or
94 familiarity with all 3 novel fruits used in the study. Of the 35 parents who expressed
95 willingness to participate, five parents could not participate due to their availability at
96 times of testing, three parents did not attend, and two children had to be excluded due to
97 food allergies. Pre-screening questions determined whether children had eaten all of the
98 lunch foods and any of the three NFs (Date, Physalis or Sharon fruit) before. The
99 demographic characteristics of the final sample can be seen in **Table 1**. Overall,
100 participants had high socio-economic backgrounds, were predominantly white British and
101 had a healthy weight, and introduced their infants to solid food at a mean age of 5.27
102 months (range 3-6 months). During 9 of the 25 sessions, one sibling was present. All
103 information pertaining to interactions between the parent and the sibling were excluded
104 from the data analysis.
105
106 Table 1 about here
107
108 *Materials and Procedure*
109 The Ethical Review Committee of the University of Birmingham approved this study and
110 all parents provided informed signed consent prior to participation.
111
112 Parents and children were welcomed into our child friendly laboratory where each
113 received a standardised lunch. Parents were told we were interested in the types of
114 strategies parents use to encourage their children to try new foods, and were told to do

what they would normally do to encourage their child to try the novel food. All lunch items were weighed prior to and after consumption. Depending on the parents' pre-indicated preference, the children's lunch consisted of half a ham or cheese sandwich made with white bread (approximately 120kcal or 125kcal respectively, J. Sainsbury Plc.), 10g ready salted potato crisps (approximately 53kcal, Walkers Snack Food Ltd.), two chocolate-chip cookies (approximately 114 kcal, Burtons Foods Ltd.), five milk-chocolate buttons (approximately 35kcal, Cadbury Plc.) and five green grapes (approximately 18kcal). These foods are the standard offered within our laboratory for studies of this kind, and were selected to reflect typical familiar and palatable foods offered to UK children for lunch. Mothers received a lunch identical to that of their child, except that they were given a whole ham or cheese sandwich depending on their pre-indicated preference (approximately 240kcal or 250kcal respectively, J. Sainsbury Plc.). A whole date (approximately 23kcal), a physalis fruit with the leaf (approximately 2kcal), or a quarter of a sharon fruit (approximately 3kcal) were presented as NFs, on the same plate as the rest of the lunch. These fruits were selected as they have unusual characteristics and are novel to most children within the described age range in the UK. We checked with the parent prior to the study that the specific fruit used was novel for that individual child. Dates are eaten dried, resembling very large raisins with dark brown wrinkled texture. A physalis resembles an orange cherry tomato and has a papery leaf which surrounds it. Sharon fruits are orange/yellow, seedless, resemble the shape of a tomato and have a texture similar to apple. Due to the seasonal nature of sharon fruit, it was only used in three of the 25 lunch sessions. Dates were used in 13 lunch sessions and physalis used in 9 lunch sessions, the slight imbalance in frequency being due to

children's prior exposure: if a child had previously consumed a date, a physalis was used, and vice versa. The lunch sessions were recorded using two unobstrusive, remotely adjustable cameras located in two opposite corners of the observation room which ensured that the mother's and child's faces could be recorded at the same time. The participants were left to consume the lunch foods alone.

After the parent indicated that the meal was finished, they completed a set of questionnaires, providing demographic details and early feeding history. Parents provided information on their age, ethnicity, household income and level of education. Parents also reported their child's age and gender. Children and parents were measured and weighed by a trained researcher. Parents provided information on whether or not the child had been breastfed, the duration of breastfeeding, as well as the age at which it was stopped, if applicable, and the child's age at introduction of solid foods.

Analysis

Video Analysis. An adaptation of the Family Mealtime Coding Scale (FMCS[27]) was used to code the parental feeding strategies observed during the lunch sessions. Parental feeding strategies were grouped into seven categories: teaching about the NF, verbal pressure, physical prompts to encourage consumption, rewarding/bargaining, comparison of the novel NF to other foods, role-play and modeling (including comments, facial expressions and verbalizations). Detailed descriptions and corresponding examples for each category of strategies within the video-coding schedule can be seen in **Table 2**. Additional codes and definitions were added to the FMCS for any variables that we

161 wished to code but that were not present in the original coding scheme (including
162 modeling, role play, comparison, teaching). Children's behaviours towards the NF were
163 grouped into nine categories; physical refusal: e.g. turning head away from offered NF
164 (1), verbal refusal e.g. 'I don't want it' (2), touched/held but refused e.g. picks up the NF
165 but refused to taste (3), smelled but refused to taste (4), licked but refused to take a bite
166 (5), smelled and licked but refused to take a bite (6), held in mouth but refused to
167 swallow (7), swallowed but refused further or expressed dislike (8) and swallowed and
168 enjoyed, defined as the child's consumption of some, or the entire NF without a negative
169 reaction (9). Higher category scores therefore indicated greater exposure to and/or
170 willingness to try the NF. We assessed the frequency with which these behaviours were
171 displayed. NF consumption was defined as any occurrence of the child biting off,
172 chewing and swallowing bits of the NF, regardless of whether this was enjoyed or
173 whether further consumption of it was refused. Finally, we calculated the frequency of
174 any taste exposure to the novel fruit during the meal based on the sum of frequency of
175 categories 5-9 above. The time at the beginning and the end of the session as well as the
176 time at the introduction and consumption (if applicable) of the NF, were also noted. The
177 introduction of the NF was defined as any comment made by the mother or the child
178 regarding it. All mealtimes were coded by a single observer (CB). A proportion (25%) of
179 the videos were coded by a second coder (JB). The average intra-class correlation was
180 r=.87 (range .78-.94) indicating very good inter-rater reliability.
181
182 Table 2 about here
183

Statistical Analysis. Stem-and-leaf plots were inspected and indicated that the majority of data were normally distributed; parametric tests were therefore conducted on all variables. Initially, one-way ANOVAs were carried out to ensure that parental feeding strategies and the frequencies of children's behaviours towards the NF did not differ based on child and parent gender or their weight categories. Differences in parent and child behaviours based on breastfeeding history, the presence of a sibling and the types of NFs were also assessed using one-way ANOVAs. Partial Pearson's correlation coefficients were calculated to examine the relationships between parental feeding strategies and the frequencies of children's behaviours towards the NF. Two tailed analyses were conducted to test our non-directional hypotheses concerning the relationships between verbal pressure, physical prompting, and rewarding/bargaining with children's acceptance of the NF. All other correlational analyses were one tailed in line with our directional hypotheses for the remaining relationships. All correlational analyses controlled for the influence of annual income and duration of mealtime. Finally, two multiple linear regression analyses were carried out to predict: 1) the frequency of swallowing and enjoying the NF and 2) the total frequency of taste exposure to the NF during the mealtime. Predictor variables were entered if they were significantly correlated with the dependent variable in the preliminary analyses. Age of introduction to solids, annual income and duration of mealtime were also entered as covariates. Age of introduction to solids was added as a covariate in the frequency of exposure analyses despite the fact that the correlation between age of introduction to solids and frequency of taste exposures was approaching significance rather than statistically significant, because of the research evidence which strongly links age of introduction to solids and later food

acceptance. [7-10] Significant predictors were chosen on the basis of backward elimination. This method of regression was chosen as it is suited to exploratory research, and because backward elimination is less likely to be affected by suppressor effects.[28] A priori power calculations were not possible because of a lack of similar literature upon which to base effect sizes. However, post hoc power calculations using G*Power 3. 1. 2 suggested that both regressions had adequate power (0.90 and 0.92, respectively). PASW (Predictive Analytics SoftWare version 17) was used in all analyses.

Results

Parental feeding strategies

Table 3 displays the number of parents displaying a feeding strategy and the means and *SD*s of their frequencies. Verbal pressure was the most frequently exhibited strategy that parents engaged in, while role-play was the least frequently observed strategy.

Table 3 about here

Differences in parental feeding strategies and child behaviour towards the NF based on parent, child and lunch session characteristics

One-way ANOVAs indicated that feeding strategies used by parents during the lunch sessions or children's behaviours towards the NF did not differ based on child or parent gender, child or parent weight category, the child's breastfeeding history, the presence of a sibling or type of NF that was used (data not shown). Annual income was positively associated with parental modeling ($r(25) = .60$, $p < .01$), and child smelling but refusing

the NF ($r(25) = .40$, $p < .05$). As a result of these associations the effect of annual income was controlled for in all further analyses.

Lunch sessions and children's behaviours towards the NF

Lunch sessions lasted between 11 and 34 minutes ($M = 20.68$, $SD = 6.01$), and the NF was introduced, by parent or child comment, between the 1st and 24th minute ($M = 4.13$, $SD = 5.2$). The time of introduction of the NF was not related to any aspect of the child's behavior towards the NF. The duration of the mealtime was related to the frequency of the children's physical (r=.50, p<.05) and verbal (r=.42, p<.05) refusal of the NF but was not related to any maternal behaviours or the frequency of food acceptance behaviours. Subsequent analyses were therefore adjusted for duration of mealtime. Eight of the nine predefined child behaviours towards the NF were observed during the lunch sessions; smelling and licking but refusing to bite the NF was not observed. The behaviours described are not mutually exclusive. The majority of children (80%, n=20) showed verbal refusal of the NF at some point during the mealtime (mean frequency =3.84 SD=5.28), 64% (n=16) of children physically refused the NF during the meal (mean frequency = 2.84, SD=4.57), 64% (n=16) touched/held the NF but refused to eat it at some point during the meal (mean frequency =1.92, SD=1.61), and 12% (n=3) smelled the NF but refused to eat it, at least once (mean frequency= .12, SD=.33).

In total, 80% (n=20) of children had at least one taste experience with the NF, including licking the food, or holding it in the mouth but not swallowing it. Forty percent (n=10) of children held the NF in their mouths but refused to swallow it (mean frequency =.68, SD=.75), 12% (n=3) of children licked the food but refused to eat it (Mean

frequency=.16, SD=.37) and 12% (n=3) of children swallowed the food but expressed dislike or refused to eat more (Mean frequency=.16, SD=.37). Seven children (28%) swallowed and enjoyed the NF (mean frequency =.72, SD=1.34). Five children (20%) did not taste the NF at all, including three children who touched the NF but would not taste, one who smelled it but would not taste, and one who had no interaction with the NF apart from verbal refusal of it.

Parental feeding strategies and children's behaviours towards the NF

Table 4 about here.

Table 4 shows that verbal pressure, physical prompts and rewarding/bargaining strategies employed by the parent were all positively associated with the frequency of physical and verbal refusal, while physical prompts and rewarding/bargaining were also positively associated with the frequency of swallowing and enjoying the NF and the frequency of taste exposures to the NF during the mealtime. Comparisons between the NF and other foods were positively associated with the frequency of verbal refusal of the NF, but also smelling and licking the NF. Teaching about the NF was positively associated with the frequency of smelling and licking the NF. Role-play was positively associated with both verbal refusal and the frequency of licking the NF. Furthermore, parental modeling behaviours correlated with the degree of verbal refusal, and the frequency with which the child smelled the NF and licked the NF.

Early solid feeding history

One-tailed partial Pearson's correlations were carried out to examine whether children

279 who had later introduction to solid foods within the recommended weaning period would
280 show higher frequencies of food refusal and lower frequencies of food acceptance
281 behaviours. In line with this hypothesis, the child's age at introduction of solids was
282 negatively correlated with the frequency of a child swallowing but refusing more of the
283 NF, as well as with the child swallowing and enjoying the NF. There were no significant
284 associations between the age at introduction of solids and any other child behaviours
285 towards the NF (see **Table 4**).
286
287 *Predicting swallowing and enjoying of the NF and predicting frequency of NF taste*
288 *exposures during the mealtime*
289 Two multiple linear regressions were carried out in order to predict the frequency of the
290 child swallowing and enjoying the NF and the frequency of NF taste exposures during the
291 mealtime. The physical prompts applied by the parents to encourage NF consumption and
292 rewarding/bargaining strategies were entered into both models. Age of introduction to
293 solids, annual income and duration of mealtime were entered into the model as
294 covariates. Significant predictors were selected through backward elimination. The
295 results of the regression indicated that two predictors explained 49.4% of the variance in
296 the frequency of children swallowing and enjoying the NF ($F(2,21) = 10.24$, $p = .001$).
297 Physical prompts ($\beta = .56$, $p < .01$), as well as the age at which solids were introduced (β
298 $= -.55$, $p < .01$), significantly predicted the frequency of this behaviour. **Table 5** shows
299 the unstandardised (B), and standardised (β) regression coefficients and their associated
300 error, as well as the measure of explained variance (R^2) across models.
301

Tables 5 & 6 about here

The results of the second regression indicated that two predictors explained 51.4% of the variance in the frequency of taste exposures to the NF ($F(3,20) = 7.05$, $p = .002$). This time, the age at which solids were introduced ($\beta = -.39$, $p < .025$), as well as the use of rewards/bargaining ($\beta = .55$, $p < .002$), significantly predicted the frequency of taste exposures during the mealtime. **Table 6** shows the unstandardised (*B*), and standardised (β) regression coefficients, their associated errors and explained variance (R^2) for this model.

Discussion

This study aimed to assess the types of feeding strategies parents use to introduce a NF to their children and to establish the relative effectiveness of these feeding strategies on children's willingness to consume the NF. Swallowing and enjoying the NF, and the frequency of taste exposures to the NF during the meal were related to physical prompting and the use of rewards and bargaining. However, these practices were also associated with children's refusal behaviours such as physical and verbal refusal. Parental modeling and practices that were designed to educate children about the NF, such as using comparisons between the NF and other foods and teaching about the NF, were positively associated with increased exposure, such as smelling and licking (but not swallowing) the NF. Finally, as we predicted, earlier introduction of solids was related to a higher frequency of child acceptance behaviours.

Although parental feeding strategies during novel food introductions have previously

been assessed,[14] this is one of the first studies to assess these through observation of parent-child interaction. In line with other research,[14] pressuring strategies including verbal pressure and physical prompting were the most frequently and widely used feeding strategies, while rewarding/bargaining strategies were only used by around half of the parents. Where parents used greater verbal pressure and physical prompting, children more frequently refused the NF physically and verbally, while also swallowing and enjoying it more frequently if physically prompted. Similar paradoxical results have also been reported by other researchers.[29] It is likely that in the context of novel food introduction, these parental strategies were associated with child refusal earlier during the lunch session, and as the child became more familiar with the NF during the meal, physical prompting also became associated with consumption of the NF.

The observed association of physical prompting strategies with higher frequencies of child acceptance supports previous research[20,21] indicating that a degree of prompting may be required to initiate tasting of new foods, particularly fruits or vegetables. However, we did not measure children's liking of the NF in this study separate from consumption and the effects of prompting on liking for novel foods requires further work. Rewarding/bargaining was also associated with a higher frequency of refusal, but also acceptance behaviours. That parental use of rewards and bargains was associated with greater frequency of swallowing and enjoying the NF and NF taste exposure through the mealtime is consistent with other work which suggests that rewards are effective in the promotion of vegetable consumption in children.[23,24]

Modeling has previously been shown to be an important factor for increasing children's willingness to consume novel foods, fruits and vegetables,[25,26] but in our study,

349 we did not find evidence to suggest that parental modeling increased children's
350 willingness to try the NF, although it was associated with relevant exposure through
351 smelling and licking. Similarly, strategies to increase children's familiarity with the NF
352 (teaching, comparison) were also used fairly frequently, by around two thirds of the
353 parents, and were associated with some aspects of sensory exposure such as licking and
354 smelling. Taste exposure provides the child with the sensory experience in the
355 appropriate modality, necessary to facilitate future consumption by fostering familiarity
356 and enabling children to learn that the NF is "safe" to eat.[30] This exposure to the NF
357 through tasting rather than just seeing or holding it is crucial.[31] Furthermore, parental use
358 of comparison may be a useful technique because novel objects that are similar to a
359 familiar object lead to the retrieval of knowledge about and memories relating to the
360 familiar object and may lead to the inclusion of the NF into schemata of known and liked
361 foods, making the consumption of the NF more likely.[32] However, parents should take
362 care to compare novel foods with familiar foods that are similar and well liked by the
363 child, to avoid activation of schema and/or the retrieval of memories relating to non-
364 preferred foods, which may lead to the rejection of the NF.[32] This may explain the
365 associations between parental use of comparison strategies and higher frequencies of
366 verbal refusal behaviours in this study. These results indicate that parental modeling and
367 feeding strategies that aim to increase children's familiarity with a food through exposure
368 can be effective in encouraging children's interaction with novel fruits.
369 In line with our hypotheses, the age at which children had been introduced to solids
370 was significantly associated with the frequency with which children swallowed the NF.
371 Children who had been introduced to solids closer to 6 months less frequently consumed

372 the NF than children who had been introduced to solids closer to 4 months, further
373 limiting their exposure and sensory experience of the NF within the mealtime. Our results
374 therefore further support the suggestion that early introduction of solids into a child's
375 diet, within the age range for weaning recommended by health professionals, during a
376 specific sensitive period for solid food introduction,[33] and the child's associated exposure
377 to a range or flavours and textures, facilitates novel food introduction.[10,34]
378 Together, the use of physical prompting and the early introduction of solids were
379 strong predictors of the frequency with which children consumed and enjoyed the NF.
380 Similarly, early introduction of solids in combination with the use of
381 rewarding/bargaining techniques by the parent predicted children's overall frequency of
382 taste exposure. This suggests that children who are introduced to solids earlier in life,
383 within the recommended age range for weaning, are more accepting of novel foods[10,11]
384 and, in combination with parental strategies that promote interaction with the target food,
385 acceptance and tasting occurs more readily. It may even be the case that the taste and
386 or/texture experience is less aversive or more pleasant for children exposed to solids
387 earlier, thus reinforcing subsequent tasting.[35]
388 The current study has several limitations. Our sample was small, came from high
389 socio-economic backgrounds and was predominantly White British and therefore the
390 replication of our findings in a larger and more ethnically and economically diverse
391 sample is desirable. Furthermore, although observational methods hold many advantages,
392 the meal took place in an unfamiliar laboratory. Whilst the researcher was not physically
393 present while parents and children consumed their lunch, the cameras through which
394 sessions were filmed were visible and mothers were aware they were being recorded.

395 Furthermore, the study was cross-sectional and we did not assess the time sequences of
396 behaviours between mother and child in this study. Parents' behaviour may be both the
397 cause of, and response to, children's interactions with the NF, both in the short and longer
398 term. It is not unlikely that children who show greater refusal elicit greater verbal
399 pressure or greater prompting from their parents. The fruits in the study were chosen for
400 their novelty to the participants in our sample, but importantly, we did not find fruit-
401 specific effects in this study and therefore the effects we observed are likely to generalise
402 to other fruit that children are not familiar with. However, the practices demonstrated by
403 the parents in this study may be limited to introduction of novel fruits, not novel foods
404 more generally.
405 Despite these limitations, our study provides further information on the types of
406 feeding strategies parents commonly use, how they are related to NF acceptance and
407 which factors are especially relevant for the successful introduction of novel fruits.
408 Through this observational study we have provided support for previous findings that the
409 early introduction of solids can lead to a greater willingness to consume a novel fruit and
410 that prompting the child to eat and using rewards or bargains, during a positive mealtime
411 interaction, can help to overcome barriers to novel fruit consumption.

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