

## 1 INTRODUCTION

2 Adolescence is a period of physical, developmental, and social changes, which can notably  
3 affect a young person's food choice behaviour and nutritional health <sup>1</sup>. Food choice behavior  
4 in adolescence is particularly important as behavioural patterns acquired during this time are  
5 likely to persist into adulthood <sup>2</sup>. A range of individual, interpersonal, physical,  
6 environmental, and societal influences have been identified as factors affecting adolescent  
7 food choice behavior <sup>3,4</sup>.

8 At least 2.3% of teenagers in the UK <sup>5</sup> live with an additional factor influencing their food  
9 choices – food allergy. Since there is currently no available cure for food allergies, dietary  
10 avoidance of the culprit food remains the mainstay of treatment <sup>6</sup>. Management of food  
11 allergy involves careful label reading, adaptation of recipes, prevention of cross-  
12 contamination, and increased alertness when eating away from home <sup>7,8</sup>. During adolescence,  
13 the responsibility for allergen avoidance is handed over from the parents to the young person,  
14 which can cause anxiety and stress on both sides <sup>9-12</sup>. As has recently been shown,  
15 independence and social well-being are among the foremost issues in terms of health-related  
16 quality of life in food-allergic teenagers <sup>13</sup>. Reduced parental oversight tempts some to  
17 engage in risk-taking behaviour in the management of their food allergies <sup>14,15</sup>, and indeed,  
18 teenagers are the highest risk group for fatal, food triggered anaphylactic reactions <sup>16</sup>.  
19 Previous studies have explored the experiences of teenagers with food allergies <sup>17,18</sup>, the  
20 psychosocial impact of food-induced anaphylaxis <sup>9</sup>, and the practical challenges teenagers  
21 with food allergies face <sup>14</sup>. These studies, however, do not specifically illuminate how food  
22 allergies affect the eating habits of teenagers. Healthcare professionals and policy makers  
23 have developed guidelines for the dietary management of food allergies <sup>6,19</sup>, but it remains to  
24 be assessed how teenagers with food allergies are able to adapt their behaviour to them. Food  
25 choice behaviour is embedded in cultural, social, economic, psychological and biological

26 influences<sup>20</sup> that might have an impact on how recommendations are put into practice. There  
27 is a need to identify in which ways food choice decisions of teenagers are informed by their  
28 allergies so that their dietary management and quality of life can be improved. Thus, the  
29 purpose of the present study is to gain insight into the food choice behaviour of food-allergic  
30 teenagers, from their own perspective, using a qualitative approach.

## 31 METHODS

32 Qualitative research is a naturalistic, interpretative approach aiming to provide an in-depth,  
33 complex understanding of how people see and interpret their social world<sup>21</sup>. In recent years,  
34 qualitative research has penetrated traditional quantitative disciplines, including health  
35 research<sup>22</sup>. There, it can explore behaviours that are inaccessible to quantitative research  
36 techniques such as treatment adherence or use of clinical guidelines<sup>23</sup>. An understanding of  
37 the patient's perspective is particularly important in the case of people with allergies, where  
38 management of the condition is based on long-term strategies undertaken by the patients  
39 themselves<sup>24</sup>. Table 1 contrasts the key characteristics of quantitative and qualitative  
40 research.

### 41 Participants

42 This study included two sets of population samples: food-allergic teenagers and non-food-  
43 allergic teenagers. The sample size of this study was determined by data saturation but also  
44 by its exploratory nature and was intentionally kept small. Teenagers were purposely sampled  
45 to achieve a maximum variation in age, gender, socio-economic status, and for those with  
46 food allergies, in the range of foods to which they were allergic. The study sample was  
47 recruited from local schools (Portsmouth, Isle of Wight, Southampton), through advertising  
48 (non-food-allergic) and invitation letters that were sent to parents and/or teenagers (food-  
49 allergic), and a national support charity (The Anaphylaxis Campaign) that contacted eligible

50 food-allergic teenagers with an invitation letter. Additionally, participants from an earlier  
51 population-based cohort study on the Isle of Wight (FAIR study), which included both food-  
52 allergic and non-food-allergic teenagers, <sup>5,25</sup> were invited to participate. Food-allergic  
53 participants included those who had evidence of IgE-mediated allergy to egg, milk, peanuts,  
54 tree nuts, sesame, crustaceans, fish or wheat. Their diagnosis needed to be confirmed with a  
55 positive Skin Prick Test (SPT) /serum specific IgE results plus a convincing clinical history  
56 or a positive food challenge. Participants who had another disease affecting their food choice  
57 behaviour (e.g. diabetes) were excluded. The Southampton and South West Hampshire NHS  
58 Research Ethics Committee (A) approved this research project. Written informed consent and  
59 a completed screening questionnaire were obtained from all subjects to assess for eligibility.

#### 60 Focus group discussion and interviews

61 Data was collected using one focus group discussion (FGD) and fourteen semi-structured  
62 interviews. Participants were asked to prepare a simple worksheet on which they recorded  
63 what they had eaten the previous day, which was used to initiate the discussion during the  
64 FGD and interviews but not to assess the actual dietary intake. The FGD was conducted with  
65 non-food-allergic teenagers only and was held in a local school from which the FGD  
66 members were recruited. It was facilitated by the first author (IS) who had training and  
67 experience in focus group moderation. The third author (CV) attended the FGD and took  
68 field notes. A topic guide was prepared to elicit discussion of a wide range of attitudes,  
69 beliefs and behaviours related to daily eating habits. It was informed by the literature <sup>26,27</sup> and  
70 modified on the basis of the investigators' past clinical and research experience.

71 Due to organisational difficulties as well as considerations in respect to age and gender  
72 differences that became evident after the FGD, it was decided to use interviews instead of  
73 FGD as data collection method. The FGD was conducted at a school; it was mixed-sex, with

74 pupils from similar years and the same peer group. Since teenagers with food allergies were  
75 recruited from various routes, it was feared that they would not have felt comfortable in an  
76 unfamiliar group of teenagers with different age and sex.

77 Thus, a total of fourteen semi-structured interviews were conducted by IS, seven with food-  
78 allergic and seven with non-food-allergic teenagers. The interviews took place at the  
79 participants' homes without parents present (with the exception of two teenagers who  
80 preferred to have their mothers present). The interview protocol was developed from the topic  
81 guide used in the FGD (Table 2). As far as possible, interviews were participant led. Both the  
82 FGD and the interviews lasted approximately one hour. They were audio taped and  
83 transcribed verbatim for analysis. Participants of the interviews were sent a copy of the  
84 resulting transcript to verify that it agreed with their memory.

#### 85 Data analysis

86 The theory or conceptual model guiding the investigation and analysis was proposed by  
87 Story, Neumark-Sztainer, French<sup>4</sup> and conceptualises adolescent eating behaviour as a  
88 function of individual and environmental influences. The model rests on social cognitive  
89 theory (SCT) and ecological theory and consists of four levels of influence: individual  
90 influences, social environmental influences, physical environmental influences and societal  
91 influences.

92 Data analysis was performed using Braun and Clarke's criteria for thematic content analysis  
93<sup>28</sup>. It was aided by NVivo 8 software (QSR International Pty Ltd; Doncaster, Victoria,  
94 Australia). At the beginning, the FGD and interviews were analysed separately for each  
95 population (food-allergic and non-food-allergic). The transcripts were first read to become  
96 familiar with the data. Meaningful text segments were then identified and coded. The next  
97 step involved collating generated codes into potential subthemes for each sample. The second

98 author (HM) reviewed the codes, and emerging subthemes were compared. The subthemes  
99 that were agreed on were then grouped into overarching themes related to the food choices of  
100 both samples. A comparison between the two groups to highlight similarities and differences  
101 was performed as mapped out in Table 4. Participants were given the opportunity to review  
102 the themes.

### 103 RESULTS

104 Twenty-five teenagers (aged 12-18 years) participated in this study (seven with food allergy  
105 and 18 without, of which 11 participated in the FGD). The characteristics of all teenagers can  
106 be found in Table 3.

107 Six key themes affecting adolescent food choices emerged from the FGD and interviews  
108 (Table 4), and are discussed further below.

#### 109 *Variety and Enjoyment of Food as Learning Process (Individual and social environmental* 110 *influences)*

111 The majority of teenagers from both allergic and non-allergic groups considered varying their  
112 food choices and learning to enjoy foods to be a part of growing up. Many would purposely  
113 try new foods to widen their palate, but not all felt very confident in doing so. Most of the  
114 food-allergic teenagers stated that they were cautious with trying new foods, especially when  
115 outside their home and on holidays abroad. As a consequence, they chose foods that were  
116 safe for them to eat or relied on parental judgement. A few thought their allergy hindered  
117 their ability to vary their diet and enjoy foods. While some teenagers had learned to cope with  
118 their situation, others would develop a fear of new foods or feel obliged to like foods they  
119 could eat:

120 *I (Interviewer): 'Do you consider yourself picky?'*

121 *P (Participant): 'Um, no but I think that's coz I feel guilty when I don't like something I*  
122 *sometimes feel I like I have to like it because, you know, it's hard to find, I probably won't*  
123 *find it again so, there have been times when I have been at school and I haven't liked what*  
124 *they've given me, but I feel like I have to, which may sound not right but I guess that's*  
125 *something, I've got into my mind.'* (Emily, 12 years, food-allergic)

126 The majority of teenagers from both groups noted that their eating habits had changed over  
127 the years. Those food-allergic teenagers who believed their diet had changed highlighted that  
128 this was due to other reasons than their allergies.

129 Taste, smell, texture, and presentation of foods seemed to be the most important reason cited  
130 for choosing particular foods among food-allergic and non-food-allergic teenagers:

131 *'There is always something about certain fruit that puts me off, like, there is only, I can eat*  
132 *strawberries, strawberries are ok but bananas, they sort of make your mouth or teeth go all*  
133 *weird and...'* (FGD member, non-food-allergic)

134 In addition, many of them felt it was important that foods provide them with energy. The  
135 majority of those who had food allergies emphasised that their allergy came second to  
136 enjoyment as a motivation for choosing foods:

137 *'Just, if I like it or not, I'll just like see what I like and then see if it's got nuts in it, first, I*  
138 *won't pick it all out with nuts first...'* (Ryan, 14 years, food-allergic)

139 Although their food allergy deprived them from certain foods, food-allergic teenagers had  
140 accepted their situation and did not have a desire to consume the foods they were allergic to.  
141 Only those who had to give up their favourite food said that they would miss it.

142 Another aspect of foods and eating that some teenagers from both groups had discovered was  
143 that the whole experience of foods as such could be enjoyable. This involved preparing and  
144 sharing meals, as well as eating out.

145 *Body Awareness, Feelings, and Temptation of Foods (Individual, social environmental and*  
146 *societal influences)*

147 Almost all teenagers from both groups had substantial knowledge of healthy foods and  
148 considered healthy eating to be important for well-being and positive body image. However,  
149 following a healthy diet meant that consumption of their preferred foods (which included  
150 crisps, chocolate, and fast foods) should be limited. Teenagers with food allergies did not  
151 show a different attitude towards healthy eating than their non-allergic peers. A few indicated  
152 that their food allergy would either automatically ensure that they ate healthier or it had made  
153 them think about the quality of their diet:

154 Many times, teenagers referred to availability as a reason for choosing foods. They would eat  
155 food that was around or offered; it often tempted them. Some also saw a close link between  
156 food choices and feelings, and would use certain foods to deal with boredom or sadness.  
157 Teenagers with food allergies did not see any difficulties in finding safe foods in those  
158 offered at parties or age-related events.

159 Having a food allergy and, consequently, choosing foods that do not pose a health risk was  
160 perceived as an important, but not dominant factor affecting eating habits. Some of the  
161 teenagers seemed to undervalue their allergy, and checking labels, avoiding may contain  
162 products, and asking for ingredients in restaurants was not done routinely:

163 *'...I think the only time I tend to read label is if I've eaten it and I think I'm reacting [...] but*  
164 *that's the only time I would ever read the label for food.'* (Jack, 17 years, food-allergic)

165 *Parental Control vs. Convenience (Individual, social environmental and physical*  
166 *environmental influences)*

167 Most teenagers from both groups thought that their parents ultimately had a lot of control  
168 over their food choices. While non-food-allergic teenagers expressed the wish to take over  
169 the responsibility for their food choices, food-allergic teenagers felt safe under their parents'  
170 control, and would not necessarily seek independence. The majority of teenagers also enjoyed  
171 the convenience of being served a warm meal at the end of the day.

172 Nearly all non-food-allergic teenagers liked the idea of eating out, as it gave them the  
173 opportunity to choose foods they wanted. For some food-allergic teenagers, this situation was  
174 generally described in the reverse. While the home environment would provide the security  
175 of being surrounded by only safe foods, eating out, especially when abroad, demanded higher  
176 levels of care:

177 *'Um , I'm much more nervous about eating out when I'm on holiday because like it's a*  
178 *different language and I don't really know how to, and I don't know how to ask, um, whether*  
179 *something has nuts in it, so normally I'd just kind of eat stuff that seems like very safe...'*  
180 *(Laura, 15 years, food-allergic)*

181 *Eating as Social Experience (Social environmental influences)*

182 Many non-food-allergic teenagers said that they enjoyed sharing meals with friends and  
183 family, and considered it to be a nice way of getting together. Nevertheless, such occasions  
184 could also turn out to be distressing if someone pressured them to try certain foods.

185 The majority of food-allergic teenagers stated that they enjoyed shared meals if they felt  
186 comfortable with the people they were with. With less familiar people, they feared the  
187 embarrassment of having a reaction in front of them.



188 In terms of actual food choices, a number of teenagers from both groups tended to have fast  
189 foods when eating with friends. The desire to be like everyone else, motivated many  
190 teenagers to make similar food choices to their friends. Some food-allergic teenagers would  
191 struggle in situations where this was not possible. In addition, they were often dependent on  
192 other people in providing them with safe foods.

193 *Routine, Traditions and Environment (Individual, societal and physical environmental*  
194 *influences)*

195 Influences on teenagers' eating habits also included: daily routine, family and cultural  
196 traditions, and environmental factors such as the weather. However, these did not seem to be  
197 affected by food allergies.

198 *Knowledge Shapes Understanding of Foods (Individual and societal influences)*

199 Although satisfying hunger was considered to be the main purpose of eating, some non-food-  
200 allergic but no food-allergic teenagers reflected on ethical issues arising from food.

201 In contrast, price was equally important to both groups. Those non-food-allergic teenagers  
202 who showed an interest in healthy eating used the TV as their primary source of information.  
203 Watching TV was also reported to influence the subconscious desire for food in both groups.

## 204 DISCUSSION

205 This qualitative study is unique in providing an in-depth account of young people's food  
206 choices from the viewpoint of food-allergic and non-food-allergic teenagers. By comparing  
207 the food choice behaviour between these groups, pivotal characteristics that determine food  
208 choice decisions of food-allergic teenagers could be identified. Previous research has mainly  
209 focused on quality of life and psychosocial effects of food allergies on children, teenagers  
210 and their families. A recent review of these studies concluded that a diagnosis of food allergy

211 has detrimental effects on daily family life, social events and certain aspects of quality of life  
212 <sup>29</sup>. The present study adds new knowledge to existing literature by giving prominence to a  
213 topic that will help improve the dietary management of food allergies in teenagers.

214 One of the major findings to emerge from this study is that teenagers with food allergies  
215 found it more difficult to be adventurous with new foods than non-food-allergic teenagers.  
216 Even though there were also some ‘fussy’ eaters among non-allergic teenagers, it was notable  
217 that food allergy can be a major obstacle to learning to introduce variety into the diet. This  
218 finding corroborates those from a French study showing that food neophobia can be a  
219 consequence of food allergies <sup>30</sup>.

220 Almost all teenagers from both groups described sensory preferences (such as taste and  
221 texture) as the main reason for choosing foods. Food-allergic teenagers who had been  
222 recently diagnosed mentioned that their allergy deprived them of certain foods, especially if  
223 they had to give up their favourite foods; a finding echoed in previous research <sup>17,18</sup>. In most  
224 circumstances, food-allergic teenagers have never acquired certain taste preferences and  
225 therefore also do not have the feeling of missing out on foods they were not allowed to eat.

226 Food allergies did not seem to have an effect on overall health awareness of teenagers. Only  
227 one food-allergic teenager felt that her allergy had made her automatically eat healthier.  
228 Similar thoughts have been expressed by families of food-allergic children <sup>31</sup>. Also emotions  
229 and feelings were discussed as influencing factors on food choices, but again no differences  
230 was observed between the groups.

231 Another interesting finding was that none of the food-allergic teenagers believed that finding  
232 safe foods at parties was particularly difficult. Previous studies have reported a negative  
233 impact of food allergies on the social activities of children and teenagers <sup>17,32,33</sup>, although  
234 some of them presented the parent’s perspective <sup>12,31,34,35</sup>. It is possible that these limitations

235 are due to the fear or anxiety of a reaction by family, friends or those catering rather than  
236 considerations made by the food-allergic teenager in terms of actual food choices.

237 Whereas many food-allergic teenagers conceded that food allergy played a role in their food  
238 choices, some of them understated its importance, and engaged in risk taking behaviours  
239 involving infrequent label reading, consuming 'may contain' products, or not asking for  
240 ingredients in restaurants; all behaviours that have been described before <sup>7,9,14,15,17,18,32,36</sup>.

241 Adolescence is the period where parental control diminishes and teenagers exercise increased  
242 autonomy over their food choices <sup>37</sup>. While non-food-allergic teenagers generally looked  
243 forward to taking over the responsibility for their food choices one day, food-allergic  
244 teenagers appreciated the convenience of having their parents in control as it provided them  
245 security. This is in contrast to other studies where food-allergic teenagers or young adults  
246 were struggling with parental hypervigilance <sup>32,38</sup> or parents themselves expressed concern in  
247 regard to overprotection <sup>39</sup>. It seems that teenagers with food allergies seek more protection  
248 and control for food than their healthy peers, but in other aspects of life, as previously  
249 demonstrated <sup>32,38</sup>, they have similar parental expectations and demands.

250 Parental control seemed to be closely linked to the environment within which food choices  
251 are made. Non-allergic teenagers often mentioned that if they were outside the home they had  
252 the freedom to choose what they wanted. In line with previous investigations <sup>7,9,14,15,17,18,32,36</sup>,  
253 food-allergic teenagers tended to be more careful when consuming foods outside home,  
254 especially when travelling abroad. However, these teenagers also highlighted that they still  
255 enjoyed eating out.

256 Almost all teenagers liked to eat meals in the company of others should they feel comfortable  
257 with them. This was primarily true for food-allergic teenagers who did not want attention  
258 drawn to their allergy in front of other people. Similar experiences have been reported before

259 <sup>18</sup>. Most importantly, teenagers did not want to stand out from their peers so would often  
260 consume the same foods as their friends. As shown in other studies <sup>9,40</sup>, food-allergic  
261 teenagers struggle with the feeling of being different, and in situations like this they are  
262 reminded of it. However, there were a range of other factors influencing adolescent food  
263 choices that were similar between the groups including routine, traditions, environment and  
264 factors related to understanding of foods. Since these are non-modifiable influences on food  
265 choice it appears natural that they have an equal influence on food-allergic and non-food-  
266 allergic teenagers. The groups showed slight differences in terms of general food-related  
267 knowledge or interest such as ethical issues or information on healthy eating conveyed by the  
268 mass media. Teenagers without food allergies appeared to be more susceptible to  
269 environmental cues about food and eating than those without. However, other issues such as  
270 costs or TV advertising were again considered as an influence affecting both groups.

271 This study highlights similarities and differences in food choice behaviour among food-  
272 allergic and non-food-allergic teenagers. Strengths of this study include its comparative  
273 nature. By comparing non-food-allergic with food-allergic teenagers, similarities and  
274 differences in their food choices could be described. The teenagers were recruited through  
275 various routes including local schools, a national support charity (The Anaphylaxis  
276 Campaign), and an earlier population-based cohort study on the Isle of Wight (FAIR study) <sup>5</sup>  
277 and, therefore, their characteristics showed a rich variation (Table 2). Teenagers with food  
278 allergies were on average slightly younger than those without food allergies, but since  
279 qualitative research aims to collect a broad range of views and opinions, it was more  
280 important that different age ranges were presented. Although parents of non-food-allergic  
281 teenagers were on average higher educated than those of food-allergic teenagers, differences  
282 only appeared with respect to degree and postgraduate degree level and presumably did not  
283 have had a great influence on the results. Another strength of this study is that it presents

284 factors associated with food choice behaviour from the teenager's viewpoint, which has not  
285 been studied before. Further, most of the current literature on dietary management of food  
286 allergies in children and teenagers is derived from anecdotal evidence <sup>7,36</sup>. This study is the  
287 first publication to address the full complexity of food choice behaviour within this  
288 population on a research level. The qualitative research design enabled the researchers to  
289 collect information that supports and adds to findings from previous research studies <sup>9,17,18</sup>.  
290 Although findings from qualitative research cannot be extrapolated to the whole population  
291 due to the small sample sizes, their strength lies in revealing areas that can be further looked  
292 into in future investigations.

293 However, limitations are also recognised. The sample sizes between the two groups were  
294 uneven due to the fact that one FGD was conducted among non-food-allergic teenagers  
295 (n=11) in addition to the interviews. This imbalance was accounted for during the analysis by  
296 giving the FGD the same weight as one interview. Leaving out collected data would have  
297 been unethical towards study participants. Although the sample size was large enough to  
298 answer the research question of this study which was to identify themes influences food  
299 choice decisions of teenagers with food allergies, it did not allow to specify the food choice  
300 behaviour of sub-sets of participants such as those defined by age, gender, ethnicity, type and  
301 severity of allergy, and time of diagnosis. Also, this study used advertisements to recruit non-  
302 food-allergic teenagers which could have introduced a bias towards health-conscious  
303 teenagers. However, a potential selection bias is not corroborated in the findings of the study  
304 showing that both food-allergic and non-food-allergic teenagers have limited interest in  
305 healthy eating. Finally, the need to integrate a gender dimension into food allergy research  
306 has been highlighted as an important area for future study <sup>41</sup>.

307

## 308 CONCLUSIONS

309 This research has identified key aspects of food choice behaviour among teenagers with food  
310 allergies relevant to their dietary management and with immediate implications for clinical  
311 practice (Table 5). It emphasises the importance to involve an allergy-specialist dietician  
312 from the early beginning to ensure appropriate counselling and care for teenagers with food  
313 allergies. Further research is needed to investigate food choice behaviour in teenagers with  
314 food allergies with respect to age, gender, ethnicity, individual food allergies, severity of  
315 allergies, and time of diagnosis.

316

317

318

319

320

321

322

323

324