INTRODUCTION

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

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

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

METHODS

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

Participants

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

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

Focus group discussion and interviews

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

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

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

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

Data analysis

The theory or conceptual model guiding the investigation and analysis was proposed by Story, Neumark-Sztainer, French [4] and conceptualises adolescent eating behaviour as a function of individual and environmental influences. The model rests on social cognitive theory (SCT) and ecological theory and consists of four levels of influence: individual influences, social environmental influences, physical environmental influences and societal influences.

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

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

RESULTS

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

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

Variety and Enjoyment of Food as Learning Process (Individual and social environmental influences)

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

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

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

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

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

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

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

'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 won't pick it all out with nuts first…' (Ryan, 14 years, food-allergic)

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

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

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

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

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

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

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

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

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

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

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

Eating as Social Experience (Social environmental influences)

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

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

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

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

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

Knowledge Shapes Understanding of Foods (Individual and societal influences)

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

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

DISCUSSION

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

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

One of the major findings to emerge from this study is that teenagers with food allergies found it more difficult to be adventurous with new foods than non-food-allergic teenagers. Even though there were also some 'fussy' eaters among non-allergic teenagers, it was notable that food allergy can be a major obstacle to learning to introduce variety into the diet. This finding corroborates those from a French study showing that food neophobia can be a consequence of food allergies [30].

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

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

Another interesting finding was that none of the food-allergic teenagers believed that finding safe foods at parties was particularly difficult. Previous studies have reported a negative impact of food allergies on the social activities of children and teenagers [17,32,33], although some of them presented the parent's perspective [12,31,34,35]. 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 [7,9,14,15,17,18,32,36].

241 Adolescence is the period where parental control diminishes and teenagers exercise increased
242 autonomy over their food choices [37]. 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 [32,38] or parents themselves expressed concern in
247 regard to overprotection [39]. 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 [32 38], 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 [7,9,14,15,17,18,32,36],
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

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

This study highlights similarities and differences in food choice behaviour among food-allergic and non-food-allergic teenagers. Strengths of this study include its comparative nature. By comparing non-food-allergic with food-allergic teenagers, similarities and differences in their food choices could be described. The teenagers were recruited through various routes including local schools, a national support charity (The Anaphylaxis Campaign), and an earlier population-based cohort study on the Isle of Wight (FAIR study) [5] and, therefore, their characteristics showed a rich variation (Table 2). Teenagers with food allergies were on average slightly younger than those without food allergies, but since qualitative research aims to collect abroad range of views and opinions, it was more important that different age ranges were presented. Although parents of non-food-allergic teenagers were on average higher educated than those of food-allergic teenagers, differences only appeared with respect to degree and postgraduate degree level and presumably did not 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 [7,36]. 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 [9,17,18].
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 [41].

307

CONCLUSIONS

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