



# Adolescents' dietary behaviour: The interplay between home and school food environments

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## ABSTRACT

In the UK, school food standards have looked to improve the nutritional profile of school food provision and the choices made; however, adolescents' choices tend to bias towards micronutrient poor and energy dense options. This study aimed to explore how adolescents make their school food choices, along with how they engage with their environments whilst selecting food. Seven focus group interviews took place with adolescents ( $n = 28$ ; 13–14 years) in a secondary school in Northern England. Discussions with participants were audio-recorded, transcribed verbatim and then analysed using an inductive thematic approach. Six themes emerged from the data: (1) parents' and adolescents' roles in the home food environment, (2) burgeoning food autonomy, (3) school food choice factors, (4) social aspects of school food, (5) home versus school, (6) food knowledge & beliefs. Adolescents identified two distinct environments during the focus group discussions: the home and school environments. Adolescents juxtaposed the two, in terms of food provision, food choices, rules and customs surrounding food choice. This juxtaposition emerged as an indirect but important influence on adolescents' school food choices. The school and home environments both (in)directly influence adolescents' school food choices, which involve an integration of multiple, often conflicting influences. Adolescents may adopt a number of unhelpful dietary rationalisations as they try to manage and reconcile these influences. Consultation, together with consideration of relevant food choice models, is required to identify opportunities to influence adolescents' food choices at school.

## 1. Introduction

Adolescent obesity is a substantial concern, with more than a third of adolescents in England (aged 11–15 years) classified as overweight or obese, up 5% since 1995 (NHS digital, 2019). The National Diet and Nutrition Survey highlights shortfalls in adolescents' diets (aged 11–18 years); including excessive intakes of saturated fat (12.4%) and free sugars (14.1%) (Public Health England, 2018) (compared to recommendations of maximum 10% and 5% of total energy, respectively (Scientific Advisory Committee on Nutrition, 2015, 2019). Substantial proportions of this population also have intakes that fall below lower reference nutrient intakes for iron (32%), calcium (16%), zinc (22%), magnesium (38%), potassium (28%), iodine (20%) and vitamin A (21%) (Public Health England, 2018). Adolescents on average consume 2.7 of the recommended (minimum) 5 daily portions of fruit and vegetables (Public Health England, 2018). Meanwhile, almost two-fifths of UK adolescents' energy intake has been reported to come from non-core

foods, including soft drinks, crisps and chocolate (Toumpakari et al., 2016). Moreover, unhealthy dietary behaviours and overweight/obesity established at this age hold physical and psychological health consequences both short-term during adolescence (Funtikova et al., 2015; Jacka et al., 2011; O'Neil et al., 2014; Ruiz et al., 2020) and longer-term into adulthood (Martinson & Vasunilashorn, 2016; Must & Strauss, 1999; Reilly et al., 2003; Sanderson et al., 2011; Sommer & Twig, 2018).

The challenge and urgency of addressing childhood obesity is evident in the Government's latest obesity strategy (Department of Health and Social Care, 2020). This sentiment was also shared by the earlier Childhood Obesity Action Plan (Department of Health and Social Care, 2016, chap. 1, 31, 2018) and crucially, the school environment has been highlighted as central to reducing childhood obesity prevalence. Adolescents spend 190 days per year in school (Department for Education, 2019a), where they can consume up to a third of their daily energy from food (Smithers et al., 2000). Evidence suggests that adolescents' school food choices are influenced by the options available in the school

*Abbreviations:* UK, United Kingdom; SEM, Socio-Ecological Model; FCPM, Food Choice Process Model; FG, Focus Group; IMD, Index of Multiple Deprivation.

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environment (Ball et al., 2006; Devi et al., 2010; Hermans et al., 2017; Kelly et al., 2019; Pineda et al., 2019, 2021) and UK school food policy has focused on the foods provided. Mandatory school food standards (Department for Education, 2019b; Instruments, 2007) and the School Food Plan (Dimbleby & Vincent, 2013, p. 149) looked to improve school food and bolster school lunch uptake. However, most secondary school students still choose to not have school food (uptake reported to be 41.1% (Taher et al., 2020)), and instead bring in packed lunches from home, or food from outside the school, in effect circumventing the school food standards. Students' purchasing of lunches from nearby outlets is associated with higher energy intake from non-core foods (Ziauddeen et al., 2018) and decreased diet quality (Taher et al., 2020), compared to school and/or packed lunches. Moreover, packed lunches have been shown to often contain less preferable micronutrient profiles than school lunches (Pearce et al., 2012; Stevens et al., 2013).

In terms of choices made within schools, many students favour quick, grab-and-go items (McSweeney et al., 2019), often selecting energy-dense and micronutrient-poor options (Ensaiff et al., 2013, 2016; Taher et al., 2020). Previous research has highlighted factors influencing students' school food choices, including price, length of queues, food availability (Kamar et al., 2019; Shepherd et al., 2006) and the presence of competitive nearby food outlets (Browne et al., 2019; Taher et al., 2020; Ziauddeen et al., 2018). Studies have also revealed factors uniquely associated with adolescence, including increasing food choice autonomy (Bassett et al., 2008), peer influence (Stok et al., 2016), food as identity expression (Stead et al., 2011; Stevenson et al., 2007) and the role of parents and parenting style (Carbert et al., 2019; Stevenson et al., 2007; Zahra et al., 2014).

The socio-ecological model (SEM) (Bronfenbrenner, 1977, 1979; Mcleroy et al., 1988) and the food choice process model (FCPM) (Furst et al., 1996) are pertinent to adolescents' school food choices; they acknowledge the complexity of food choice and consider the role that environment plays in guiding food choice. The SEM (Bronfenbrenner, 1977, 1979; Mcleroy et al., 1988) proposes behaviour can be influenced at five levels: (1) Policy, (2) Community, (3) Institutional, (4) Interpersonal and (5) Individual, and acknowledges interactions across these levels. This lends itself well to adolescents in a school food environment with multiple levels of influence, such as individual food attitudes, peer influence, school food provision and school food policy. The FCPM (Furst et al., 1996) posits the individual as an active decision-maker with food choices constructed and informed by the integration of life-course events and experiences, influences and an individual's personal food system. The FCPM also highlights how food choices involve the management of various influences (e.g. ideals, resources) and negotiation of personal values (e.g. tradition, familiarity, ethics).

Numerous interventions, adopting educational, environmental and norms-based approaches, have aimed to improve adolescents' dietary behaviours, including in school food environments (Micha et al., 2018; Stok et al., 2016; Van Cauwenberghe et al., 2010). Evidence for the long-term effectiveness of school-based interventions to promote a healthy diet has been reported as inconsistent, both in terms of influencing dietary behaviours and decreasing overweight/obesity (Van Cauwenberghe et al., 2010). Further, an umbrella review concluded the need to consolidate evidence on school-based nutrition interventions, including their effectiveness (O'Brien et al., 2021).

The perspectives and perceptions of adolescents within their school food environment is crucial. Interestingly, previous research has highlighted a lack of consultation with adolescents regarding what schools should provide and what could stimulate school food uptake (Addis & Murphy, 2019; Hermans et al., 2017). Moreover, some studies have reported a discord between students' views on school food provision and those of policymakers and educators (Addis & Murphy, 2019; Browne et al., 2019).

Further research is warranted, to deepen our understanding of adolescents' food choices within the school food environment. This is critical to informing intervention development and policy related to school

food. This study aimed to gain a better understanding, from adolescents' perspectives, of how they make their food choices throughout the school day and how they engage with their environments during the food choice process.

## 2. Methods

### 2.1. Study design and recruitment

Given the study's emphasis on the perspectives of adolescents on their food choices within a school food environment, a qualitative methodology was selected. This was also relevant to the potential of findings to inform intervention design, given that qualitative approaches hold particular utility in providing valuable insights and evidence in this respect (O'Cathain et al., 2013).

Semi-structured focus group interviews were selected as they offer a naturalistic environment in which participants can speak candidly. An inductive approach was chosen to support emergent findings from the data (Braun & Clarke, 2006). Adolescents (13–14 years) were chosen as they represent a transitional period between early and mid-adolescence; this was also a convenient year group (Year 9, the third year of secondary school) from the school's perspective as it avoided examination year groups. Adolescents were recruited from a secondary school in Northern England. The school was an average size secondary school with circa 900 students (11–18 years) on roll and an above average free school meal profile; 20.1% of students were eligible to receive free school meals compared to the national average of 14.1% (Department for Education, 2019c). The percentage of students whose first language was not English (3.8%) was below the national average of 16.9% (Department for Education, 2019c). The school was initially contacted by telephone and later by follow-up email to arrange a school visit to meet with school management and discuss the study. Once recruited, the school distributed participant information sheets (provided by the researchers) to all year 9 students and their parents. Participants were selected directly by school staff from those students with parental consent to participate; in conjunction, informed assent was obtained from adolescents. Each focus group was designed to include a mix of genders, ethnicities and academic achievement. Mixed groups were chosen in an effort to better capture the views of the wider student population.

### 2.2. Development of the focus group schedule

Development of the focus group (FG) schedule centred on the primary aim of the study, to better understand students' school food choices, from their perspectives. Whilst being informed by relevant literature, the schedule was not framed with respect to any theoretical model. Instead, researchers adopted an inductive approach and strived to collect data relevant to the focus of the study.

The FG schedule was developed to encourage free discussion and provide flexibility for participants to explore issues most salient to them. The schedule included a series of questions, prompts and tasks, all relating to school food choices and how students engage with the school food environment. Question topics included school food provision, food choices made by students and the role of friends and family in said choices. Questions were open-ended, to avoid asking leading questions and to discourage yes/no responses. The researcher acted as a facilitator, with discussions intended to be led by the adolescents themselves. Efforts to mitigate against social desirability biases, whereby participants volunteer responses that they think are more socially acceptable, rather than ones which reflect their reality (Bergen & Labonté, 2020), were made. These included assuring students that any direct quotations would be anonymised, outlining that there were no right or wrong answers, and asking indirect questions (e.g. what does the "average" student choose?).

Two tasks were developed to serve as ice breakers, get students thinking about school food and promote discussion. These were to write

down (1) as many available school food and drink items as they could remember and (2) what they had consumed for lunch the previous day, along with three words to describe it. The schedule was reviewed by an expert panel of external researchers and practitioners in public health nutrition and school food provision, and six parents of secondary school students. A pilot FG was conducted with four older adolescents (18–19 years old and with recent experience of food in secondary schools). This provided the opportunity to receive feedback on the process, to identify and address potential issues, and for researchers to reflect on the process in preparation for the fieldwork. Following the pilot, refinements were made to the question order and wording to aid comprehension and flow.

### 2.3. Procedure

In-person FG interviews were conducted with adolescents (Year 9, 13–14 years,  $n = 28$ ) in groups of two to six participants. FGs took place in a plain, quiet room in the school and during the school day, in lesson time, in June 2019. Each FG started with a brief outline of the study and what the discussion would generally relate to (i.e., what students eat at school). During the FG, the researcher sat with the students in a square formation and offered questions. At the end, participants were asked to complete a short questionnaire, which included questions on age, gender and participants' perception of their own diet. All FGs were audio-recorded, transcribed verbatim and anonymised prior to analysis; unique identifiers (e.g. student 1, student 2) were introduced during anonymisation instead of the names of participants, and care was also taken to replace any identifying details relating to other individuals or places. Seven FGs were conducted in total, each lasting approximately 45 min. This was sufficient to reach data saturation (Saunders et al., 2018), whereby responses and discussions were similar and no new insights emerged.

### 2.4. Data analysis

Data were analysed using an inductive thematic approach (Braun & Clarke, 2006). The transcripts were read and re-read, and common responses or sentiments were grouped and coded into nodes. Through each iteration of the analysis, nodes were created, altered and grouped into themes. Themes were reviewed, reconstructed and refined until a small number of unique, data rich themes remained. During this process, the research team met to discuss the emerging themes, how the themes represented the data and related to one another. In recognition of the role of researchers in this process, and in order to mitigate against researcher bias, reflexivity was practised throughout; the researcher took reflection notes during and after each FG, wrote memos and notes during the analysis and brought these to each research group meeting. Four iterations were conducted in total, after which the research team was satisfied that the themes were (1) representative of the data, (2) distinct from each other, with minimal sharing of nodes between themes and (3) rich in data. NVivo12 software (QSR, Melbourne, Australia) was used to facilitate data management and analysis.

### Ethical approval

Ethical approval for the study was granted by the Faculty Research Ethics Committee at the University of Leeds (MEEC FREC 18–012).

### 3. Results

Participants were almost equally split by gender (13 boys, 15 girls), while most were White British (26 White British; 2 Mixed/Multiple ethnic groups - White and Black African). A majority of participants were from 2 children households ( $n = 17$ ), while a large portion ( $n = 12$ ) were from single-parent households. Index of multiple deprivation (IMD) data was generated using participants' postcodes volunteered in the questionnaire. About a third of participants providing postcodes ( $n =$

7) came from areas in the 1st or 2nd decile (representing the most deprived neighbourhoods), whilst almost half ( $n = 10$ ) lived in areas in either the 7th or 8th decile. Demographic characteristics are provided in Table 1.

Six themes emerged from the data: (1) parents' and adolescents' roles in the home food environment, (2) burgeoning food autonomy, (3) school food choice factors, (4) social aspects of school food (5) home versus school, (6) food knowledge & beliefs. During the discussions, the home and school environments emerged as two distinct environments, while adolescents juxtaposed the two, in terms of food provision, food choices, rules and customs surrounding food choice. This juxtaposition emerged as an indirect but important factor in adolescents' school food choices. Fig. 1 outlines adolescents' distinction between the school and home environments, along with how the themes are posited between the two environments.

#### 3.1. Parents' & adolescents' roles in the home food environment

Adolescents depicted the food choice process at home as structured and clearly defined. Their parents were responsible for purchasing and preparing foods and providing food options for them to choose from. In this way, parents reportedly assumed the role of nutritional gatekeepers.

*... you can decide [what to eat from] what's in the house. But when they're [parents] shopping, it's not your choice. But whatever's in the house, it's kind of your choice [what to eat]- Student 16*

Adolescents outlined how parents define the culture of the home food environment and adolescents' food choices there within. Parents reportedly establish this explicitly, by setting certain rules, routines and customs surrounding food at home, and implicitly, by modelling health behaviours to their children (for example, selecting certain foods and adopting certain food practices).

*Mum will always go out at the weekend and she'll pick loads of fresh ingredients from the shop and then she'll make either a curry or a Bolognese ... She'll always go to the shop and make a fresh meal every day and it'll be different every day ... Student 6*

**Table 1**  
Demographic characteristics of adolescents taking part in the focus group discussions.

	n	
<b>Gender</b>	Boys	13
	Girls	15
<b>Ethnicity</b>	White British	26
	Mixed/Multiple ethnic groups (White and Black African)	2
<b>Household</b>	1 adult, 1 child	1
	1 adult, 2 children	5
	1 adult, 3 children	3
	1 adult, 4 children	3
	2 adults, 2 children	6
	2 adults, 3 children	1
	3 adults, 1 child	1
	3 adults, 2 children	4
	3 adults, 5 children	2
	4 adults, 2 children	2
<b>IMD Decile<sup>a</sup></b>	1	3
	2	4
	3	2
	4	1
	5	0
	6	2
	7	4
	8	6

<sup>a</sup> Deciles based on the Index of Multiple Deprivation, decile 1 represents the most deprived and decile 10 the least deprived. Six participants not included due to non-response.

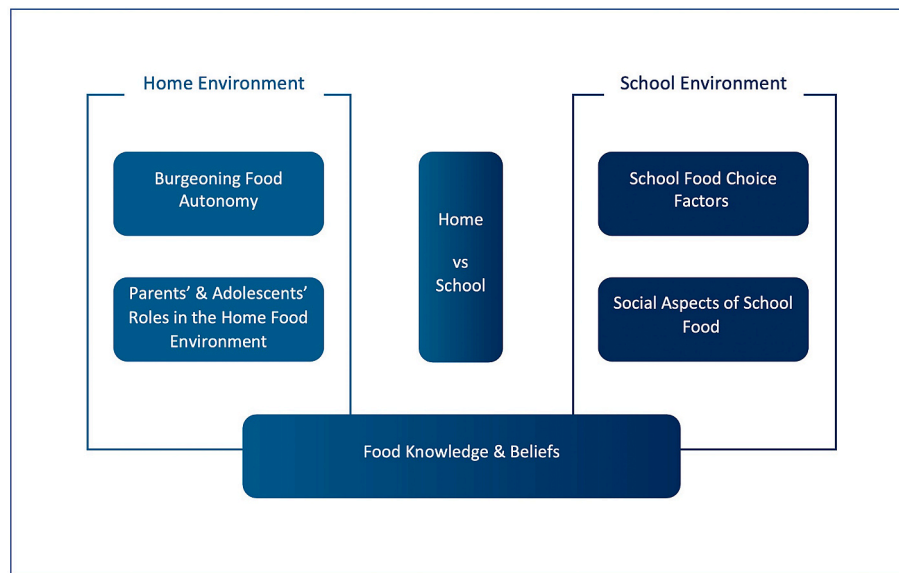


Fig. 1. Adolescents' food choice at school: the six emergent themes and how these relate to the school and home environments, as distinguished by adolescents.

... a rule my parents have for my sister, is that if she doesn't eat enough of her meal, she won't have anything after it ... you know, like a dessert. Student 23

Adolescents also acknowledged their own influence at home, recognising that whilst parents control food purchasing and provision, they still need to provide foods which their children will eat.

... they know what we want, don't they? So, if Student 8 really liked pasta, her mum would know to get some of it so Student 8 can have it one night. Student 7

... your parents know what you like, so they just make it for you. Student 22

Adolescents reported exerting pester power (i.e., repeatedly requesting or suggesting an item) to try to persuade parents to purchase desirable food items.

... after a certain amount of time of me asking for the same thing, they usually just start buying it ... Student 9

### 3.2. Burgeoning food autonomy

Burgeoning food autonomy was predominantly described within the home environment, where adolescents described instances when they had enacted such autonomy. These included taking on specific cooking tasks, managing their diet at home, feeling more responsible and taking greater ownership of their food choices.

... we take on the role while my parents work, me and my big brother, we both do the cooking. I cook more of the difficult food, whereas he dishes it out, makes sure that it's healthy ... makes sure that we have a balanced tea. Student 13

I make my own lunch and I try to put stuff in it that'd be healthy. Student 11

I won't go downstairs and take everything that I want. If I want to have something, I'll limit myself to how much I can have. I won't just eat it all at once. Student 9

Some described diet management and the importance of healthy eating more generally, extending beyond the home environment.

I feel like a lot of people when they're our age, not necessarily year 7s and 8s but when they get to our age, they would love a salad bar [in school] because they try and be healthy and go on diets ... well, not diets, but like, just try and eat healthier. Student 23

### 3.3. School food choice factors

The food environment at school was depicted as much more complex than at home. Adolescents mentioned how various general (e.g. cost, taste) and school-specific factors (e.g. time available for lunch, food availability) influenced choices. For example, adolescents spoke about buying convenient, grab-and-go foods to have more time to spend with their friends. Queue length was highlighted as being particularly important, as the time dedicated to queuing can force students to compromise other aspects of their lunch (e.g. having less time to socialise). Some students mentioned opting for the food option with the shortest queue when deciding what to have for lunch, while others reported not purchasing any lunch due to the length of the queues.

There's always big queues and I can't deal with queues so it's a bit like, "Oh there's no queue there, I'll get something from there". Student 7

You might skip lunch cos you can't be bothered waiting in the queue. Student 16

Cos we only get half an hour for lunch and if the queue's massive, you're either not going to eat anything or go into the savage [long] queue. Student 23

Adolescents also mentioned cost as a pertinent factor, referring to "ridiculous prices", for example, "overpriced" cookies (a popular school food item) or opting for packed lunches as they were "cheaper". Interestingly, some students discussed how cost was a factor in their decision to not choose "the main meal" (typically a micronutrient dense option):

The main meal is like £2.16, but then a wrap is like 1 pound something. Student 28

A piece of pizza's a quid. And the brownies and stuff are [under a] quid. Student 26

... In comparison to the main meals, there's a massive difference. Student 26

Students also highlighted other factors, including sensory aspects

related to the foods on offer (e.g. taste, texture, appearance) and habits. Students mentioned choosing “filling food” and fruit needing to “look as appealing” as less healthy options, while for others, “it’s all about taste”. The variety and visibility of food items were also mentioned for example, having more fruit options available and more prominently displayed. Interestingly, some students recognised the habitual nature of their food choice.

*There’s not a day that goes by that I don’t eat a cookie at school, to be honest.* Student 9

*We know what it tastes like so we’re not going to hate it all the time. We’re not going to want to try something new when we’ve already got something that we like.* Student 13

### 3.4. Social aspects of school food

Social aspects of school food were clearly evident across the focus group discussions. Adolescents referenced these aspects of school food frequently during the discussions, and it was apparent that this was a pervasive, ever-present factor for adolescents in determining their food choices at school. For many, what they ate at lunchtime held intrinsic social implications, with social norms and adhering to social convention holding great importance. As such, students may forego their own preferences in order to toe the socially accepted line:

*... you might change your actual eating pattern because you want to fit in with others, instead of being on your lonesome. Unless you want to be outcasted or put with, sort of, the people who don’t contribute or fit into anything.* Student 13

*I see where my mates are queueing up. See, if I want a main meal but all my mates are getting a wrap or something, I’ll go get a wrap.* Student 21

Wider social aspects had an indirect influence on food choices. For example, one student illustrated how the avoidance of queueing on your own can have a knock-on effect on food choices.

*You kind of eat the same stuff because, girls specifically, they don’t like to stand in the queue by themselves. So, you wait until someone else wants to get food, and then you go in the queue together and normally get the same thing ... because you go to the same place and why not? We like the same stuff; same taste buds.* Student 7

Interestingly, some students went a step further, describing how the wider social milieu around food can take precedence over the food itself.

*The food’s irrelevant. At the end of the day, it’s more about: where you sit; what you’re doing; how many of you is there.* Student 23

### 3.5. Home versus school

Adolescents differentiated between the home and school food environments, generally preferring food provision at home, perceiving it to be fresher, more flavourful and more diligently prepared. Students also noted a greater variety of foods at home, along with more time to have their meals. Ultimately, students acknowledged how they ate “differently at home” and ate “a lot of healthy stuff at home, more so than I do at school”. Many students claimed to “prefer the food at home” and described the food to be “healthier at home”. Further, some students reported adopting less “healthy” behaviours at school compared to at home.

*I do get stuff at school, that’s usually a pizza ... I’ll get a wrap occasionally. But at home, I’m always having healthy stuff like chicken and salad and stuff like that; but it’s different in school.* Student 6

One student attributed this difference in food choice behaviour to the

reduced level of supervision at school compared to at home.

*... cos in school you’re choosing what you want - whereas at home, you’re influenced more by your parents. So, at school, that’s why people normally just get brownies and stuff ... because their parents aren’t saying to them, “Right you’re having this”. You know you’re choosing, which is why people just get the bad food.* Student 25

### 3.6. Food knowledge & beliefs

Throughout the discussions, adolescents displayed a good level of food and nutrition knowledge, both in terms of what constitutes a healthy diet and food preparation and cooking. However, this knowledge was largely seen as important for later on in life, when health and independence would be more relevant.

*Well if I don’t change my diet, I’m going to end up with bad illnesses when I get older.* Student 15

*... when you move out [from home], you have to know what is healthy, what you should live on, what you should buy.* Student 13

Despite showcasing a good level of food knowledge, adolescents exhibited some unhelpful dietary rationalisations and beliefs. Students spoke about meeting their energy requirements and viewed energy drinks and high-sugar foods as useful, immediate sources of energy and an easy way to fuel themselves through the school day.

*... after three exhausting periods [lessons] you just want to get your energy back up so you have something at lunchtime.* Student 4

*... or an energy drink if you want energy ... so sugary drink maybe ...* Student 12

*... cos it’s got a lot of sugar in it, so it boosts you with energy.* Student 10

Interestingly, two concepts of “balance” emerged from adolescents’ discussions; the first related to a balanced diet as outlined in the Eatwell guide, i.e. “just going around all different sections of food” and ensuring your meal had “some meat, vegetables, some carbohydrates”. The second involved balancing a “healthy” food item with an “unhealthy” food item, which students considered to, in effect cancel each other out.

*I’ve got a nougat bar, which is unhealthy, and I sort of balance it out with a chicken and lettuce wrap. Then, I’ve got flavoured orange drink, which is kind of unhealthy cos it’s [got] sugar - so, I get a fruit shot to balance that out as well.* Student 14

Some students extended this beyond the school gate, reportedly offsetting poor food choices in school with perceived healthier choices at home.

*I’ll eat normal food at home. I’ll have healthier things. But at school I’m not really bothered.* Student 9

*I control what I eat and I’m sensible with what I eat, apart from school.* Student 9

## 4. Discussion

This study explored adolescents’ perspectives on their food choices at school, and how they engaged with the school food environment across the school day. This work looked to deepen our understanding of adolescents’ school food choices and contribute to evidence informing the development of future school-based interventions and policy. A number of salient factors influencing food choice were revealed, some were specific to the school environment, such as queue length, availability, cost and sensory properties of school food. Findings also highlighted broader adolescent-specific aspects and the intrinsic social

implications of lunchtime, with the associated social norms and conventions. Burgeoning food autonomy also emerged, and was clearly apparent in the home environment, with greater levels of responsibility and ownership of food choices by adolescents. Findings add to previous research relating to school food choice (Fitzgerald et al., 2010; Kelly et al., 2021; Shepherd et al., 2006), peer influences (Stok et al., 2016) and increasing food choice autonomy (Bassett et al., 2008) in this population.

The factors highlighted in this study can be considered with respect to the SEM. For example, long queues (institutional level) hold large dissuasive power as they force students to choose between having a school meal or spending time with friends (interpersonal level). As such, even health-conscious students (individual level) may feel forced to adopt the normative social behaviour (interpersonal level) and purchase less healthy grab-and-go items, get lunch elsewhere or skip lunch entirely. Likewise, adolescents' struggles to integrate conflicting influences mirrors the value negotiations described within the FCPM, for example, students' health or nutrition values may conflict with values of cost, inconvenience attached with queuing or managing relationships with friends, all of which appeared to take precedence in the present study. These challenges are pertinent in considering the development of dietary interventions and how potential barriers to preferable food choices can be lowered.

Given the complexity of food choice in school and the role of the wider environment, the SEM and FCPM were pertinent. Consideration of study findings with respect to both models advanced the discussion, including with respect to potential implications for policy and practice. In the case of adolescents' food choice at school, it is interesting to note that the models provided different and complementary benefit; the SEM provided valuable consideration of influences on the adolescents whilst the FCPM was suited to considering the individual themselves and how they managed food choice factors and influences. Consulting with both models during the discussion held advantage over using one alone.

An important finding from the study was adolescents' juxtaposition of the school and home environments, in terms of food provision, food choices, food choice rules and customs. Previous research has found that both the school and home environments are associated with healthier food choices compared to outside options (e.g. food at nearby outlets) (Palla et al., 2020; Taher et al., 2020; Ziauddeen et al., 2018). The present study reveals the adolescent perspective and the extent to which the school and home environments are distinct. Further, findings from this study point to an interplay between environments, where school food choices are influenced directly by their proximal environment (e.g. school food environment influencing food choices at school) and also indirectly by their distal environments (e.g. home food environment indirectly influencing food choices at school). This resembles other work on spillover effects on food choices (Devine et al., 2003, 2006), where attitudes and behaviours carry from one environment to another, and also echoes FCPM principles in illustrating how food choices are influenced by exposure to and interaction with environments.

Specific examples seen in this study include adolescents' reports of differing food choices at school compared to at home, and their balancing of 'healthy' and 'unhealthy' foods. A study conducted with American adolescents (aged 11–14 years) reported similar findings, attributing less favourable behaviours (e.g. skipping school lunch, consumption of energy-dense options) to a cultural mismatch between the school and home environments (Agaronov et al., 2019). Cultural mismatch was described as sensory-emotional (e.g. food taste, quality, freshness) and socio-political (rules, available choices), with students contrasting home and school environments across these domains. The present study develops on this, by describing how students grapple with various influences as they look to reconcile this mismatch. This finding also supports previous calls (Agaronov et al., 2019; Kelly et al., 2019) for researchers and policymakers to depart from environmental siloes and consider students' food choices across multiple environmental contexts.

Another key finding of the present study was adolescents' use of

dietary rationalisations. Students rationalised food choices in school by reportedly choosing healthier options at home, citing the availability of "healthy" and "fresh" foods at home as a primary reason for preferring home food over school food. This "healthier at home" perception is evident in previous research indicating healthier dietary behaviours at home compared to outside the home (Palla et al., 2020; Ziauddeen et al., 2018), and also aligns with previous research, where students viewed food choices outside the home (e.g. in school or at food outlets) as less healthy (Browne et al., 2019). This perception may prove unhelpful, particularly if adolescents view the school environment as an opportunity to choose less healthy options and offset this with perceived healthier choices at home.

Students' "balance" rationalisation relates to previous research, which found that Irish adolescents (Stevenson et al., 2007) and American adults (Oakes, 2005) classified foods as either "good" or "bad" when discussing (un)healthy eating and obesity. In this study, the concept of "balancing" foods extended across the two contrasting environments of school and home; further there was an element of a healthier food choice cancelling a poor food choice within the context of the whole day. A review of qualitative studies on adolescents' alcohol use and eating behaviours found that adolescents viewed unhealthy food consumption favourably, describing it as "fun", but also reported exercising dietary restraint and avoiding overeating (Scott et al., 2019). In the present study, students illustrated a good level of food knowledge; however, their binary conceptualisations of foods may hinder some students from learning to incorporate "bad" or "fun" foods into a balanced, healthy diet (Stevenson et al., 2007). The dietary rationalisations reported in this study thus contribute to an existing body of research indicating that food knowledge alone holds limited predictive power over students' food choices (Fitzgerald et al., 2010; Hermans et al., 2017; Kainulainen et al., 2012; Neumark-Sztainer et al., 1999; Stevenson et al., 2007) and signal a need for multi-component, innovative approaches to instil healthy dietary behaviours in adolescents.

#### 4.1. Implications

The findings of this study reveal challenges and opportunities to positively influence adolescents' school food choices. Further, consideration of findings with respect to the SEM points to potential levels of intervention. For example, queues emerged as an important factor, and efforts to reduce queue lengths may prove worthwhile, in supporting students' food choices as well as their time to socialise; such efforts could be considered at an institutional level. Likewise, whilst students displayed sound knowledge regarding food and nutrition, efforts are needed to support better interpretation of information (e.g. Eatwell guide) and application to their own dietary behaviours. These endeavours could also address students' binary definitions of food and help them to consider food choices as part of an overall diet rather than simply "good" or "bad", "healthy" or "unhealthy", "fun" or "not fun". Such efforts could be approached at a national level, for example within the national curriculum.

Social aspects were a pervasive, ever-present factor for adolescents in determining their food choices at school. This was a key distinction between the school and home environments and illustrates a greater complexity associated with school food choices. This is particularly relevant in the case of secondary schools, where there is more freedom of food choice (Ziauddeen et al., 2018), and social norms are much more at play compared to with younger children (Neufeld et al., 2022; Pedersen et al., 2015). Given the relevance of social norms in this study and for example, friends choosing to eat the same foods, a worthwhile endeavour would be to try and make the healthier food choice the popular or "cool" choice (Neumark-Sztainer et al., 1999). Suggestions include reformulation of popular grab-and-go foods (cookies, pizzas, muffins etc.) and the introduction of healthier alternatives (e.g. salad bowls, fruit slices, plant-based snacks). Similarly, nudges (Thaler & Sunstein, 2008) (i.e. adjustments to the framing of choices) may also

prove effective in this regard, with the food choice architecture designed specifically to promote the choice of certain food items (Ensaff, 2021). Such initiatives could include strategically repositioning healthier items and providing descriptive names and food labels (Ensaff et al., 2015; Marcano-Olivier et al., 2019; Quinn et al., 2018).

Policymakers should also consider students' "home as healthier" perception, and the reported qualities of freshness and flavour. Promotion of school foods with these qualities should be considered (e.g. a wider variety of fruit, salad bar). Corresponding with the substantial influence that social aspects held for adolescents and in aligning public health aims with adolescent social norms, the involvement of students as stakeholders is critical. This would contribute to appropriate and salient initiatives to alter the school food environment and should include adolescents as thought leaders and decision-makers in the design and implementation processes (Addis & Murphy, 2019; Browne et al., 2019; Hermans et al., 2017; McHugh et al., 2019). Alongside this should be dialogue with stakeholders at different levels (e.g. students, school catering managers, school leadership, catering providers, parents) so that priorities are feasible and actionable (e.g. ensuring changes to provision do not come at a prohibitive cost to schools and catering companies; ensuring school lunch prices are amenable to parents). Finally, the interplay between the home and school environments should also be considered further. As well as the role of parents as nutritional gatekeepers within the home food environment, there is a role for parents in understanding the influence of the home on their children's school food choices and how this is navigated.

#### 4.2. Limitations

Findings from this study, along with their implications, should be considered within their specific context. Participants were school-selected and as such, sample bias may indicate that this specific group may not reflect other students' perspectives. Further, the demographic characteristics of the participants is relevant; for example, all but two participants were white British, all lived in areas with an IMD decile of 1–8 (1 being the most deprived) with just over half living in areas with an IMD decile of six or above. Household composition also varied in the sample, with almost half of the group coming from single-parent households. Being in the same year group and school, the students likely knew each other, and this may have influenced the responses. Although efforts were made to mitigate against it, social desirability bias (Bergen & Labonté, 2020) also poses a limitation. Researcher bias (Cohen & Crabtree, 2008) may also have affected the data collection and analysis, however reflexivity was practised during this study. While the school was not atypical in terms of the number of students on roll, it had a higher percentage of students eligible for free school meals, compared to the national average. Finally, the school was located on the outskirts of a large urban area, thus students had less access to nearby food outlets compared to, for instance, students attending a city-centre school.

#### 5. Conclusion

Adolescents juxtapose the school and home environments, in terms of food provision, food choices, rules and customs surrounding food choice. School food choices involve the integration of multiple, often conflicting influences and adolescents may adopt a number of unhelpful dietary rationalisations as they try to manage and reconcile these influences. As adolescents' school food choices are influenced across multiple environmental contexts, the interplay between environments should be examined further. Policy and intervention development should involve consultation with adolescents, particularly given the importance of social aspects to school food choice, and in order to highlight key opportunities and challenges to influence food choice processes amongst this unique population.

#### Authors' contributions

DR, HE and MH designed the study. DR moderated the focus group discussions, transcribed and coded the raw data. DR, HE and MH analysed the data. DR drafted the manuscript. All authors contributed to the critical review of the manuscript and have approved the final version of the manuscript.

#### Ethical review

Ethical approval for the study was granted by the Faculty Research Ethics Committee at the University of Leeds (MEEC FREC 18–012). Informed parental consent was obtained for adolescents participating in the focus group discussions, and in conjunction informed assent was obtained from adolescents.

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#### Declaration of interest

None.

#### Declaration of competing interest

We have no conflicts of interest to report.

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