DOI: 10.1111/chso.12623

ORIGINAL ARTICLE

Children & Society ncb WILEY

Food insecurity, poor dietary intake and a lack of free meal uptake amongst 16–17-year-old college students in the northeast of England, UK

Pamela Louise Graham[1] | **Crystal Haskell-Ramsay**[2] | **Melissa Fothergill**[3] | **Julie Young**[4]

[1]Department of Social Work, Education & Community Wellbeing, Faculty of Health and Life Sciences, Northumbria University, Newcastle upon Tyne, UK

[2]Department of Psychology, Northumbria University, Newcastle upon Tyne, UK

[3]School of Psychology, Faculty of Medical Sciences, Newcastle University, Newcastle upon Tyne, UK

[4]Department of Applied Sciences, Northumbria University, Newcastle upon Tyne, UK

Correspondence
Pamela Louise Graham, Department of Social Work, Education & Community Wellbeing, Faculty of Health and Life Sciences, Coach Lane Campus, Northumbria University, Newcastle upon Tyne, NE7 7XA, UK.
Email: p.l.graham@northumbria.ac.uk

Abstract

Food insecurity in the UK has been described as a public health emergency. Although programmes exist to alleviate food insecurity for children and families, there is a lack of focus on 16–17 year olds across research, policy and practice. The current study set out to address this gap by investigating the food insecurity status and food intake of 16-17-year-olds relative to current nutritional guidelines. An online, cross-sectional survey design was utilised to collect data on self-reported food security status, food intake and access to and uptake of free college meals. Eighty-three students aged 16–17 years from two sixth form colleges based in the North East of England, UK participated. Food intake data were compared to current dietary recommendations on fruit and vegetable intake and high fat/salt/sugar foods; food intake was compared between food secure and food insecure young people. A minority of young people consumed enough fruit and vegetables to meet or exceed current 5-a-day dietary recommendations, but the majority of young people consumed two or more high fat/salt/sugar items, consumption of which was higher in food insecure young people. Additionally, despite almost half the current sample identifying as food insecure, only four young people reported being entitled to free college

meals.The current study was the first to identify food insecurity and poor food intake specifically amongst 16–17 year olds in England. A lack of uptake of free college meals shows that current policy is not sufficient to address food insecurity amongst this group

KEYWORDS
adolescents, children's rights, food insecurity, school food

INTRODUCTION

According to the United Nations Convention on the Rights of the Child (UNCRC, 1989), childhood is a protected time lasting until the age of 18 years. The Convention sets out 54 articles outlining the rights of all children including rights to adequate nutrition, shelter and clothing. The UK signed up to this Convention in 1992, but with approximately 30% of children in the UK living in poverty (Royal College of Paediatrics and Child Health, 2020), it is likely that the basic rights of many children are going unfulfilled. Furthermore, the UK is currently impacted by the COVID-19 global pandemic, which is expected to lead to a substantial increase in poverty across the UK (Sumner et al., 2020).

Food insecurity

Poverty is a complex and pervasive experience typically characterised by a lack of resources needed to maintain a standard of living equivalent to the norms of the society in which a person lives (Gordon, 2006). When household finances are strained, food becomes a flexible resource with the quality and quantity available being dependent on what can be afforded once other, more pressing, financial commitments are met (Kennedy, 2014). When 'individuals and households do not have regular access to a supply of healthy and nutritious food to meet their dietary needs' (Long et al., 2020, p. 1) they are considered food insecure.

Globally, it is estimated that 2 billion people have insufficient access to safe, nutritious food (United Nations, n.d.). Yet global food security targets (e.g. Sustainable Development Goal 2) tend to focus on addressing the extremes of food insecurity by reducing malnutrition and eliminating hunger. Such issues are more pronounced in Asia and Africa where challenges of globalisation, conflict and drought make food insecurity difficult to address, especially for international organisations attempting to work across multiple countries (United Nations, n.d.; Schroeder & Smaldone, 2015). In contrast, more developed countries such as the US, UK, Australia and Canada are argued to possess more power to affect change to address food insecurity through the implementation of independent, country-specific policies (Schroeder & Smaldone, 2015). However, food insecurity has been called 'a serious public health concern in rich countries with developed economies' (Pollard & Booth, 2019, p. 1) and a 'public health emergency' in the UK due to UK food insecurity levels reported to be amongst the worst in Europe (Furey, 2019).

It was recently reported that 12% of children in the UK live in households experiencing food insecurity (The Food Foundation, 2022); an issue which has been greatly exacerbated by the COVID-19 pandemic (Loopstra, 2020; Power et al., 2020). This is concerning as inadequate nutrition throughout childhood can be detrimental to growth and development and can lead to poorer health outcomes into

adulthood (Perkins et al., 2017; Schwarzenberg & Geogieff, 2018). UK-based research has shown that under such circumstances, families adopt various strategies such as relying on cheaper, less nutritious foods and parental meal skipping to make available food go further and to try to reduce the possibility that children in the household will experience hunger (Defeyter et al., 2015). However, food insecurity exists on a scale with experiences of hunger associated with severe food insecurity (Food and Agriculture Organization of the United Nations, 2022). Whilst no universal definition of food security is applied consistently across research and policy, most capture its multifaceted nature that extends beyond the alleviation of hunger alone. It has been argued that an abundance of food is not enough to ensure food security, but food should also be safe, nutritious and accessible in a socially acceptable manner (Schroeder & Smaldone, 2015).

Importance of a Nutritious Diet

Current recommendations advise that from the age of 5 years, children should consume a diet consistent with the Eatwell Guide, including consumption of at least five portions of fruit and vegetables per day and minimal consumption of high fat, salt and sugar foods (Public Health England, 2016).

It is recommended that fruit and vegetables make up over a third of an individual's daily food consumption, and a mixture of fruit and vegetable items should be consumed to ensure intake of a variety of vitamins and minerals. This is important as fruit and vegetables have been associated with more favourable health outcomes and reduced risk of chronic diseases such as coronary heart disease and stroke (Angelino et al., 2019).

Despite the wide publication of the 5-a-day message through programmes such as Change for Life (n.d.), national survey data consistently shows that many of the UK population do not meet current recommendations for fruit and vegetable intake. The National Diet and Nutrition Survey (NDNS) showed over a period between 2014 and 2016 that only 8% of 11–18 year olds and 31% of adults met the recommendation for consuming 5 portions of fruit and vegetables per day. Indeed, in a 2020 update, dietary recalls indicated that fruit and vegetable intake continued to fall below current recommendations with mean consumption at 2.8 and 3.7 portions per day for these groups respectively (Ashford et al., 2021).

Analysis of NDNS data on fat, salt and sugar intake showed a similar trend, going against current recommendations. Whilst intake of free sugars amongst children had decreased over time, mean free sugar intake still exceeded current recommendations across all age groups. Similarly, mean intakes of saturated fat amongst all age groups and salt amongst adults also exceeded current recommendations (Bates et al., 2019, 2020). Such statistics are concerning as excess intakes of fat, salt and sugar are associated with detrimental health outcomes, including overweight and obesity, tooth decay and hypertension (Belc et al., 2019; Grimes et al., 2013; Jones, 2016).

Across England, 9.7% of children in reception (aged 4–5 years) and 20.2% of children in year 6 (aged 10–11 years) are reported to be obese (NHS, 2019) and the situation does not appear to improve with age as 63% of adults are also reported to be overweight or obese (Department of Health & Social Care, 2020). Against the current backdrop of the ongoing COVID-19 pandemic, this is problematic as obesity has been linked to a greater risk of severe complications and death amongst COVID-19 patients (Public Health England, 2020). This is in addition to a range of health issues that have previously been associated with obesity including type 2 diabetes, coronary heart disease and stroke (Al-Goblan et al., 2014; Lassale et al., 2018; Mitchell et al., 2015).

To add further to the complexity of this situation, determining levels of overweight and obesity in adolescents specifically is difficult as there are differences in the way adolescents are classified by age. The World Health Organisation, for example, define 'Adolescents' as individuals in the 10–19 years age group, whilst 'Young People' are in the age range 10–24 years (WHO, 2020). On the contrary, The Health Survey for England 2019 (NHS, 2020) categorises children over the age of 16 as adults. This contradicts the UNCRC (1989) definition of childhood, which lasts up to the age of 18 years, and brings into question whether children's health and well-being can be properly supported up to the age of 18 years with such inconsistencies in age categories.

Obesity and food insecurity

Whilst obesity has typically been associated with excess energy intake (Romieu et al., 2017), research has established a link between obesity and food insecurity (Brown et al., 2019; Alimoradi et al., 2016). This relationship is often described as paradoxical because food insecurity is generally associated with a lack of food rather than eating to excess (Nettle et al., 2017). However, it has been argued that perceived threats to food availability can lead individuals to overeat when food is available and to store more fat in response to the perceived threat; this is particularly the case for females (Dhurandhar, 2016; Nettle et al., 2017).

Furthermore, it has been reported that high-calorie, energy-dense foods of lower nutritional value are often perceived as more accessible than healthier options to caregivers in low-income households, which has negative implications for health and the development of food preferences (Daniel, 2020). Yet, this is somewhat controversial as findings from studies investigating food insecurity and dietary quality are mixed. For example, in a recent UK-based study, no differences in energy intake were found between food secure and food insecure adults. However, food insecure individuals did have a less diverse intake of foods (Shinwell et al., 2021). On the contrary, some studies have reported lower dietary quality amongst food insecure groups, particularly in terms of fruit and vegetable intake, though it is argued that poorer dietary quality might be less prominent amongst food insecure children due to strategies adopted by their caregivers to ensure their dietary intake is less impacted (Hanson & Connor, 2014).

School and community food provision

In an effort to support children and young people in England to access nutritious food, all primary and secondary schools must provide pupils with a nutritious lunch each day during school term time. For children and young people of families on a low income, lunches can be accessed free of charge (Department for Education, 2019). For young people aged 16–19 years enrolled on further education courses, free meals can also be obtained through their educational establishment. However, as well as being means tested, student eligibility for free meals at post-16 establishments is also based on time spent on site, so if a student attends their educational setting for only part of the day (e.g. 9 AM–10 AM), the setting does not have to provide a meal on that day. Additionally, there is more flexibility in where free food can be accessed with students able to use vouchers off-site in local food outlets (Education and Skills Funding Agency, 2020).

Recognising the importance of children and young people having sufficient access to nutritious food, current Government policy stipulates that schools, colleges and further education settings should actively support children and young people to make healthy food choices (Department for

Education, 2019; Education & Skills Funding Agency, 2020). Whilst evidence on the effectiveness of school lunches in improving access to and intake of healthier foods is mixed (Lucas et al., 2017; Micha et al., 2018), free school meals have been described as 'a key public health policy in reducing food insecurity and dietary inequalities in children in the UK' (Parnham et al., 2020, p. 2). Furthermore, the school dining experience can provide additional benefits to children and young people such as opportunities to practice social skills and learn cultural rules, which are important experiences for positive social development and well-being (Earl & Lalli, 2020). These experiences could be particularly beneficial for children and young people from food insecure households as research has shown that food insecurity can be associated with social isolation and less mealtime structure (McKenzie & Watts, 2020; Schuler et al., 2020). Building on free lunch provision in educational settings, many schools and community organisations also provide food to children and their families through other means, including breakfast clubs and holiday clubs (Lambie-Mumford & Sims, 2018). Such schemes have been implemented in response to concerns that many families are experiencing food insecurity (Holley & Mason, 2019; Mann et al., 2018). However, a large proportion of these schemes are targeted towards and accessed by families with children of primary school age (Mann et al., 2020). As children and young people progress through the education system, the availability and uptake of formal, policy-driven food provision appear to diminish. For example, Beattie and Gilmore (2016) reported that with increasing age, children are less likely to take up the offer of school lunch. Similarly, a recent report on the National School Breakfast Programme (NSBP, 2019), which supports the provision of free breakfast in schools 'in the most disadvantaged areas of England' (p. 5), showed that the scheme was available in 1384 primary schools compared with only 332 secondary schools.

At the current time, there are no widely available statistics on the provision and uptake of food for young people in post-16 educational settings. This is surprising given that uptake of free lunches in primary and secondary schools is reported annually through the School Census (for a recent example, see National Statistics, 2021). Additionally, some data exist on breakfast and holiday club provision for children and young people (Mann et al., 2018; NSBP, 2019), though such data are not as routinely reported as they are for school lunch.

Moreover, the UNCRC, which outlines children's rights up to the age of 18 years, stipulates that children and young people have a right to adequate nutrition. However, no published studies have considered the food intake and food security status of young people aged 16–17 years in post-16 educational settings to identify whether there is a need for closer scrutiny of available food provision at this age. According to Zace et al. (2020), there is a need for further research to identify and address food insecurity across different age groups to investigate how and why different groups are affected.

Current study

Given the need for more research on food insecurity across different age groups (Zace et al., 2020) and a lack of focus on 16–17 year olds in food research, policy and practice, the current study set out to address this gap. The aim of the study was to investigate for the first time: (a) the prevalence of food insecurity amongst a sample of 16–17 year old sixth form college students; (b) food intake of 16–17 year old college students relative to current nutritional guidelines; (c) whether there are differences between food secure and food insecure sixth form college students in terms of their food intake.

METHOD

Participants

An opportunity sample of 90 students from two sixth-form colleges based in the North East of England participated in the current study. However, data from seven students were not included in the final analyses because the students were aged above 18 years and were therefore above the age bracket for which the study materials were designed. The final study sample consisted of 66 females and 17 males aged 16–17 years (M = 17 years 1 month; SD = 4 m). Most participants (88%) identified as White British and the remainder of participants identified as either British Asian (n = 3); White European (n = 2); Filipino (n = 1); White Arab (n = 1); White Other (n = 1). One participant did not disclose their ethnicity.

Materials

Data were collected through an anonymous online questionnaire, which was delivered via the Qualtrics platform (www.qualtrics.com). Participants were not required to include any identifying information but were asked to provide a memorable word, which could be used to withdraw data if requested by the participant at a later date.

Food intake was measured using a food frequency questionnaire, which was developed in consultation with youth group staff who commented on the suitability of the food lists for the target age group. The measure required participants to tick a box next to foods and drinks consumed on the previous day from the given lists. Foods and drinks were listed under the categories: fruits; vegetables; potatoes; cereals; breads; pasta, rice and noodles; meat and fish; eggs; ready meals; puddings and desserts; crisps and confectionery; drinks. A total of 91 food and drink items were presented and participants were also given the option to add any foods or drinks consumed that were not listed.

Food security status was measured using the United States Department for Agriculture (USDA) Food Security Survey Module for Youth Ages 12 and Over (2006). The survey consisted of nine questions, which asked young people about food availability, quality and access within their household during the previous month. For each question, participants were asked to select a response of either 'A Lot,' 'Sometimes' or 'Never'. Responses of 'Sometimes' and 'A Lot' were summed for each participant and then, based on their score, participants were classified as experiencing either: (1) High Food Security (no affirmative responses); (2) Marginal Food Security (1 affirmative response); (3) Low Food Security (2–5 affirmative responses); (4) Very Low Food Security (6–9 affirmative responses).

Additionally, participants were asked to provide demographic information (i.e. gender, age and ethnicity), and were asked whether they were entitled to and access free college meals.

Procedure

Following ethical approval, details of the study were sent out to colleges based in the North East of England. Two college head teachers subsequently provided consent for their students to participate in the study. Students were then provided with written information about the study and were asked to take information home for their parent/carer (where applicable) to inform them that they would like to take part in the study. Students, parents/carers and college staff were given opportunities to seek

clarification about the study if necessary before students were provided with a link to access the online questionnaire.

After clicking the link, students were presented with information reminding them about the aims of the study and what their participation would involve. They were asked to provide consent and a memorable word ensuring their ability to withdraw from the study following their participation whilst maintaining anonymity. Additionally, students were advised that they could withdraw before or during participation by closing their web browser. Students completed the food frequency measure followed by the food security measure and demographic questions. On completion of the questionnaires, students were provided with written debrief information. Students from College 1 completed the questionnaires in April/May 2019 and from College 2 in December 2019. The questionnaire completion dates were decided in accordance with the requirements of the college timetables to avoid busy periods such as exams.

RESULTS

Food intake

For each student, the number of reported fruits and vegetables were compared against UK dietary recommendations, which advise the consumption of a combination of at least five fruit and vegetables per day (Public Health England, 2016).

Of the 83 students included in the final sample, only 28% ($n = 23$) met or exceeded the recommended daily intake of fruits and vegetables. Twenty-nine per cent of students ($n = 24$) ate a combination of some fruit and vegetables, but not enough to meet dietary recommendations. Seventeen per cent ($n = 14$) consumed fruit but no vegetables and 11% ($n = 9$) consumed vegetables but no fruit, suggesting that the majority of students are managing to incorporate some fruits and vegetables into their diets, but the quantity and variety are not sufficient to meet current dietary recommendations. However, this was not the case for a minority of students as 16% ($n = 13$) reported consuming no fruits or vegetables at all on the reference day.

The numbers of reported fast foods, crisps and confectionery, puddings and desserts were also collated to form a high fat/salt/sugar category. Current UK dietary recommendations suggest that these foods should be consumed in moderation as they offer little, if any, nutritional benefit (Public Health England, 2016). Eighty-seven per cent ($n = 72$) of students in the current study reported consumption of at least one high fat/salt/sugar food but the majority of students consumed two or more (see Table 1).

Food security

All participating students ($n = 83$) completed all nine items of the Food Security Survey Module for Youth Ages 12 and Over (USDA, 2006). Based on their responses, students were categorised into one of four food security categories in line with USDA (2019) definitions: (1) high food security; (2) marginal food security; (3) low food security; (4) very low food security.

Overall, 59% of students ($n = 49$) reported experiencing high food security. These students gave no affirmative questionnaire responses, suggesting that they perceived no issues with their ability to maintain access to a sufficient source of nutritious food.

TABLE 1 Number of students consuming high fat/salt/sugar foods (HFSS)

Number of HFSS foods reported	Number of students reporting consumption (%)
0	11 (13)
1	19 (23)
2	24 (29)
3	16 (19)
4	7 (8)
5	5 (6)
6	1 (1)

A further 8% of students ($n = 7$) identified as marginally food secure as they gave affirmative responses to one questionnaire item. This classification suggested that although they did not experience consistent changes in their food intake, these students did have some anxiety over the adequacy of food available within their households.

Twenty-eight per cent of students reported low food security, which is characterised by a reduction in quality or variety of food within the household. A further 5% of students ($n = 4$) experienced very low food security, which is consistent with reduced food quality and intake.

Consistent with these categories, responses to individual survey items (see Table 2) revealed that for most students, experiences of food insecurity tended to be characterised by worries around food availability and reductions in food quality (i.e. less ability to access a balanced meal). However, a small proportion of students gave affirmative responses to questions on reduced portion sizes and meal skipping, which demonstrates that some students are experiencing food insecurity with hunger.

Finally, data on free college meal entitlement showed that only 5% of students ($n = 4$) reported that they were entitled to access free college meals and only 4% ($n = 3$) reported that they take up these meals. These students were all categorised as food insecure. Eighty-seven per cent of students ($n = 72$) reported that they were not entitled to free college meals and 43% ($n = 31$) of these students were categorised as food insecure. Eight per cent of students ($n = 7$) did not provide an answer on whether they are entitled to free college meals and no students answered 'Do not know' in response to this question.

TABLE 2 Number of affirmative responses to food security survey items

Questions	Number of affirmative responses (%)
Did you worry that the food at home would run out before your family got money to buy more?	23 (28)
Did the food that your family bought run out, and you did not have money to get more?	10 (12)
Did your meals only include a few kinds of cheap foods because your family was running out of money to buy food?	20 (24)
How often were you not able to eat a balanced meal because your family did not have enough money?	17 (20)
Did you have to eat less because your family did not have enough money to buy food?	13 (16)
Has the size of your meals been cut because your family did not have enough money for food?	8 (10)
Did you have to skip a meal because your family did not have enough money for food?	6 (7)
Were you hungry but did not eat because your family did not have enough food?	8 (10)
Did you not eat for a whole day because your family did not have enough money for food?	2 (2)

Food security status and food intake

Students were grouped as either food secure (i.e. high food security) or food insecure (i.e. low or very low food security) based on their responses to the Food Security Survey Module. Comparisons were made between groups on the number of reported fruits and vegetables and number of reported HFSS items consumed using Mann–Whitney *U* tests.

Analysis showed no significant difference between groups in the number of fruit and vegetable items consumed ($U = 625$, $p = .401$). However, there was a significant difference between groups in the number of HFSS items reported ($U = 476$, $p = .014$) with the food insecure group (mean rank = 45.63) reporting consumption of more HFSS items than the food secure group (mean rank = 33.32).

DISCUSSION

The current study set out to investigate the food intake and food security status of young people aged 16–17 years. To our knowledge, no previous studies have explored the food intake and food security status of 16–17 year olds independently of other age groups. However, this distinction is important as it has been recognised that children's food habits, food security experiences and uptake of food interventions such as free school meals vary across different stages of childhood, therefore, it has been suggested that specific age groups should be identified within research studies that seek to understand food habits and food security (Beattie & Gilmore, 2016; Zace et al., 2020). Furthermore, until the age of 18 years, young people are afforded specific rights and protections under the UNCRC (1989), including the right to adequate nutrition. However, as they move on from school to college at the age of 16, young people gain a greater level of independence (Harris, 2019), so consideration of food habits and food security at this age is critical to identifying whether more support is needed during this transitional period.

In terms of food intake, the results of the current study showed that only a small percentage of young people (28%) consumed enough fruit and vegetables on the reference day to meet or exceed current dietary recommendations. On the contrary, the majority of young people (64%) consumed two or more high fat/salt/sugar items, but consumption was higher amongst young people experiencing food insecurity compared to their food secure peers.

These findings lend support to existing data on nutritional intake across the UK, which show that adherence to recommended daily intakes of fruit, vegetables and high fat, salt and sugar foods remains a cause for concern (Bates et al., 2019, 2020). It is widely accepted that fruit and vegetables are an essential part of a nutritious diet whilst consumption of HFSS foods should be kept to a minimum since overconsumption of these foods not only leads to overweight and obesity but can result in cognitive deficits when consumed during adolescence (Reichelt, 2016). Moreover, a variety of health risks including overweight and obesity become apparent during adolescence and carry increased health risks into adulthood (Saydah et al., 2013). Also, poor preconception micro and macronutrient deficiencies can result in serious long-term foetal and infant development issues leading to early childhood mortality and stunting (Mason et al., 2014).

Undeniably, food insecurity was also a pertinent issue identified amongst young people aged 16–17 years, with almost half the current sample categorised as experiencing either moderate, low or very low food security. Moreover, only four students identified as having an entitlement to free college meals, and only three students reported that they accessed these meals, bringing into question the suitability of this support for young people of this age.

Although current Government policy stipulates that schools, colleges and further education settings should support children and young people to access healthy foods (Department for Education, 2019; Education & Skills Agency, 2020), it has been argued that current food systems do not successfully facilitate healthy dietary intake amongst children and young people (Hawkes et al., 2020). Barriers to healthy foods, such as cost and availability, were recently identified through the Children's Future Food Inquiry (2018), which sought to draw attention to children's views and experiences of food and food insecurity. The inquiry also highlighted broader issues of stigma, which deterred children from accessing free food.

Taken together, the findings of current and previous research suggest that making free food available is not enough to fully ensure that those experiencing food insecurity are supported, and more should be done to ensure children and young people are consulted in the design and implementation of food interventions, to ensure their needs are met. This argument is in line with Hawkes et al. (2020) who proposed that food systems development requires a more child-centred approach that seeks to understand what children are eating and the contextual factors relating to dietary choices and behaviours. They argued that these factors should be incorporated through the food system to create food environments and systems that align with the contexts in which children live. In support of this, previous research has shown there is value in drawing on the perspectives of key stakeholders involved in food interventions as they understand the facilitators and barriers to access which are prevalent at a local level (e.g. Graham et al., 2016).

Paying particular attention to the age group involved in the current study, it is important that further research is conducted to explore the views and experiences of 16-17 year olds specifically. In a recent Parliamentary debate (UK Parliament, 2020), the issue of funding in post-16 education was raised with some attention drawn to the need for young people to be provided with the funds and facilities to access food whilst attending college. In support of this argument, the current findings showed that food insecurity is an issue that continues beyond formal school years at a time when young people are embarking on greater independence, suggesting that support is needed to ensure their experiences of food insecurity do not continue on into adulthood. Although some support is currently available through free college meals, the current findings showed that uptake of this scheme appears to be low so more work is needed to establish a system that addresses the needs of young people in post-16 education.

Future research should also consider the potential added benefits of free college meals that extend beyond nutritional intake. Studies of school dining occasions, including breakfast and lunch, have identified that eating alongside peers and school staff can be a valuable social experience (Earl & Lalli, 2020; Graham et al., 2015). However, students in post-16 education have more flexibility in terms of food access and can obtain vouchers to eat off-site in local food outlets (Education & Skills Agency, 2020). Whilst it could be argued this approach provides students with a more socially acceptable means of obtaining free food, there might be scope within colleges to enhance the social occasion around food in an effort to facilitate engagement with free meals. Given that peers are a crucial source of support for young people during adolescence (Wang et al., 2021), the social aspects of college meals are worthy of further exploration.

Despite the utility of the current findings, it is important to recognise the limitations of this study. Firstly, the study recruited a sample of participants from two colleges based in the North East of England. More research is needed to investigate whether similar findings are evident in other regions of England with equivalent food policies in place. Furthermore, the current study has provided evidence of food insecurity and poor dietary intake amongst 16–17 year olds, but it was not possible within

the scope of this study to ascertain the reasons behind these issues. Future qualitative investigation would be useful to determine whether young people's dietary intake is driven by choice or whether broader contextual factors such as cost and availability, which were highlighted in the Children's Future Food Inquiry are pervasive amongst 16-17-year-old college students. Moreover, the current findings provide a limited representation of food intake and food insecurity at one time point. The decision was made to ask participants to complete the questionnaire on just one occasion following discussions with college tutors who pointed out that their students are often dealing with multiple competing demands including college work, caring responsibilities and employment, which would limit the time available for research participation. Going forward, more collaborative work is needed with young people to identify suitable methods of data collection to maximise participation amongst this age group whilst minimising participant burden. Finally, the current study was conducted before the onset of the COVID-19 pandemic, which has resulted in more families experiencing food insecurity and changes in the way school food is accessed (Department for Education, 2021; Loopstra, 2020). It would therefore be useful to investigate how 16-17-year-olds have been impacted by the pandemic and changes to the school food system.

To conclude, the findings of the current study demonstrate that poor food intake and food insecurity are issues amongst young people aged 16–17 years attending sixth form colleges in the North East of England. Moreover, the uptake of free meals in these colleges is minimal. The findings show there is a need for further research to explore the views and experiences of 16-17-year-olds to identify the reasons for food insecurity and poor food intake at this age. Also, more collaborative work is needed across research, policy and practice to ensure that food interventions for older adolescents are developed and implemented in a way that meets the needs of those they aim to support. Finally, given that 16–17 year olds retain rights as children under UNCRC (1989), more attention should be paid to the way in which this age group is categorised across research and policy to ensure that they are not simply treated as adults and their rights are upheld. At the same time, it is important that the unique status of 16-17-year-olds is also recognised as they embark on a period of independence that sets them apart from younger, school-aged children.

FUNDING STATEMENT

This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

CONFLICT OF INTEREST

None.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

This study was approved through Northumbria University's Ethical Approval process. Informed consent was obtained from all participants.

ORCID

Pamela Louise Graham https://orcid.org/0000-0001-9492-9272

REFERENCES

Al-Goblan, A., Al-Alfi, M., & Khan, M. Z. (2014). Mechanism linking diabetes mellitus and obesity. *Diabetes, Metabolic Syndrome and Obesity*, *7*, 587–591. https://doi.org/10.2147/DMSO.S67400

Alimoradi, M., Ajami, M., Abdollahi, M., & Ahari, G. K. (2016). A review of the relationship between obesity and foodinsecurity. *International Journal of Medical Reviews*, *3*(1), 1–8.

Angelino, D., Godos, J., Ghelfi, F., Tieri, M., Titta, L., Lafranconi, A., Marventano, S., Alonzo, E., Gambera, A., Sciacca, S., Buscemi, S., Ray, S., Galvano, F., del Rio, D., & Grosso, G. (2019). Fruit and vegetable consumption and health outcomes: An umbrella review of observational studies. *International Journal od Food Sciences and Nutrition*, *70*(6), 652–667. https://doi.org/10.1080/09637486.2019.1571021

Ashford, R., Bates, B., Roberts, C. Collins, D. Rennie, K., Steer, T., Westgate, K., Page, P., Swan, G. & Nicholas, J. (2021). National Diet and nutrition survey: Diet, nutrition and physical activity in 2020—A follow-up study during COVID-19. Public Health England/Food Standards Agency. Retrieved January 2022, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1019663/Follow_up_stud_2020_main_report.pdf

Bates, B., Collins, D., Cox, L., Nicholson, S., Page, P., Roberts, C., Steer, T. & Swan, G. (2019). National Diet and Nutrition Survey. Years 1 to 9 of the rolling programme (2008/2009-2016/2017): Time trend and income analysis. Retrieved January 2021, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/772434/NDNS_UK_Y1-9_report.pdf.

Bates, B., Collins, D., Jones, K., Page, P., Roberts, C., Steer, T. & Swan, G. (2020). National Diet and Nutrition Survey. Rolling programme years 9 to 11 (2016/2017-2018/2019). Retrieved January 2021, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/943114/NDNS_UK_Y9-11_report.pdf.

Beattie, K. & Gilmore, G. (2016). *Uptake and factors impacting on demand for school meals*. Research Bulleting No. 6. Public Health Agency. Retrieved January 2021, from https://www.publichealth.hscni.net/sites/default/files/Bulletin%206%20Uptake%20and%20factors%20impacting%20on%20demand%20for%20school%20meals.pdf

Belc, N., Smeu, I., Macri, A., Vallauri, D., & Flynn, K. (2019). Reformulating foods to meet current scientific knowledge about salt, sugar and fats. *Trends in Food Science & Technology*, *84*, 25–28. https://doi.org/10.1016/j.tifs.2018.11.002

Brown, A. G. M., Esposito, L. E., Fisher, R. A., Nicasro, H. L., Tabor, D. C., & Walker, J. R. (2019). Food insecurity and obesity: Research gaps, opportunities, and challenges. *Translational Behavioral Medicine*, *9*(5), 980–987.

Change for Life. (n.d.). Easy ways to eat well and move more. Retrieved January 2021, from https://www.nhs.uk/change4life

Children's Future Food Inquiry. (2018). Retrieved January 2021, from https://foodfoundation.org.uk/wp-content/uploads/2020/11/Childrens-Future-Food-Inquiry-report.pdf

Daniel, C. (2020). Is healthy eating too expensive? How low-income parents evaluate the cost of food. *Social Science and Medicine*, *248*, 112823. https://doi.org/10.1016/j.socscimed.2020.112823

Defeyter, M. A., Graham, P. L., & Prince, K. (2015). A qualitative evaluation of holiday breakfast clubs in the UK: Views of adult attendees, children and staff. *Frontiers in Public Health*, *3*, 199. https://doi.org/10.3389/fpubh.2015.00199

Department for Education. (2019). School food in England. Advice for Governing Boards. Retrieved January 2021, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/788884/School-food-in-England-April2019-FINAL.pdf.

Department for Education. (2021). Providing school meals during the coronavirus (COVID-19) outbreak. Retrieved February 2021, from https://www.gov.uk/government/publications/covid-19-free-school-meals-guidance/covid-19-free-school-meals-guidance-for-schools

Department of Health & Social Care. (2020). New obesity strategy unveiled as country urged to lose weight to beat coronavirus (COVID-19) and protect the NHS. Retrieved January 2021, from https://www.gov.uk/government/news/new-obesity-strategy-unveiled-as-country-urged-to-lose-weight-to-beat-coronavirus-covid-19-and-protect-the-nhs

Dhurandhar, E. J. (2016). The food-insecurity obesity paradox: A resource scarcity hypothesis. *Physiology and Behavior*, *62*, 88–92. https://doi.org/10.1016/j.physbeh.2016.04.025

Earl, L., & Lalli, G. S. (2020). Healthy meals, better learners? Debating the focus of school food policy in England. *British Journal of Sociology of Education*, *41*(4), 476–489.

Education and Skills Funding Agency. (2020). Free meals in further education funded institutions: guide for the 2020 to 2021 academic year. Retrieved January 2021, from https://www.gov.uk/guidance/free-meals-in-further-education-funded-institutions-guide-for-the-2020-to-2021-academic-year

Food and Agriculture Organization of the United Nations. (2022). Hunger and food insecurity. Retrieved July 2022, from https://www.fao.org/hunger/en/.

Furey, S. (2019). UK food poverty now a public health emergency. Retrieved July 2022, from https://pure.ulster.ac.uk/en/publications/uk-food-poverty-now-a-public-health-emergency

Gordon, D. (2006). The concept and measurement of poverty. In D. Gordon, C. Pantazis, & R. Levitas (Eds.), *Poverty and social exclusion in Britain. The millennium survey* (pp. 29–70). The Policy Press.

Graham, P. L., Crilley, E., Stretesky, P. B., Long, M. A., Palmer, K. J., Steinbock, E., & Defeyter, M. A. (2016). School holiday food provision in the UK: A qualitative investigation of needs, benefits and potential for development. *Frontiers in Public Health*, *4*, 172. https://doi.org/10.3389/fpubh.2016.00172

Graham, P. L., Russo, R., & Defeyter, M. A. (2015). The advantages and disadvantages of breakfast clubs according to parents, children and school staff in the north east of England, UK. *Frontiers in Public Health*, *3*, 156. https://doi.org/10.3389/fpubh.2015.00156

Grimes, C. A., Riddell, L. J., Campbell, K. J., & Nowson, C. A. (2013). Dietary salt intake, sugar-sweetened beverage consumption, and obesity risk. *Pediatrics*, *131*(1), 14–21. https://doi.org/10.1542/peds.2012-1628

Hanson, K. L., & Connor, L. M. (2014). Food insecurity and dietary quality in US adults and children: A systematic review. *American Journal of Clinical Nutrition*, *100*(2), 684–692. https://doi.org/10.3945/ajcn.114.084525

Harris, A. (2019). Finding our own way. Centre for Mental Health Report. Retrieved February 2021, from https://www.centreformentalhealth.org.uk/sites/default/files/2019-01/CentreforMH_FindingOurOwnWay.pdf

Hawkes, C., Fox, E., Downs, S. M., Fanzo, J., & Neve, K. (2020). Child-centred food systems: Reorienting food systems towards healthy diets for children. *Global Food Security*, *27*, 100414. https://doi.org/10.1016/j.gfs.2020.100414

Holley, C. E., & Mason, C. (2019). A systematic review of the evaluation of interventions to tackle children's food insecurity. *Current Nutrition Report*, *8*(1), 11–27. https://doi.org/10.1007/s13668-019-0258-1

Jones, C. M. (2016). The UKsugar tax—A healthy start? *British Dental Journal*, *221*, 59–60.

Kennedy, L. (2014). Poor diet is the result of poverty not lack of education. The Conversation. Retrieved January 2021, from https://theconversation.com/poor-diet-is-the-result-of-poverty-not-lack-of-education-26246

Lambie-Mumford, H., & Sims, L. (2018). 'Feeding hungry children': The growth of charitable breakfast clubs and holiday hunger projects in the UK. *Children and Society*, *32*, 244–254. https://doi.org/10.1111/chso.12272

Lassale, C., Tzoulaki, I., Moons, K. G. M., Sweeting, M., Boer, J., Johnson, L., Huerta, J. M., Agnoli, C., Freisling, H., Weiderpass, E., Wennberg, P., van der A, D. L., Arriola, L., Benetou, V., Boeing, H., Bonnet, F., Colorado-Yohar, S. M., Engström, G., Eriksen, A. K., … Butterworth, A. S. (2018). Separate and combined associations of obesity and metabolic health with coronary heart disease: A pan-European cohort analysis. *European Heart Journal*, *39*(5), 397–406. https://doi.org/10.1093/eurheartj/ehx448

Long, M. A., Goncalves, L., Stretesky, P. B., & Defeyter, M. A. (2020). Food insecurity in advanced capitalist nations: A review. *Sustainability*, *12*(9), 3654. https://doi.org/10.3390/su12093654

Loopstra, R. (2020). Vulnerability to food insecurity since COVID-19 lockdown. Retrieved February 2021, https://foodfoundation.org.uk/wp-content/uploads/2020/04/Report_COVID19FoodInsecurity-final.pdf

Lucas, P. J., Patterson, E., Sacks, G., Billich, N., & Evans, C. E. L. (2017). Preschool and school meal policies: An overview of what we know about regulation, implementation, and impact on diet in the UK, Sweden and Australia. *Nutrients*, *9*(7), 736. https://doi.org/10.3390/nu9070736

Mann, E., Long, M. A., Stretesky, P. B., & Defeyter, M. A. (2018). A question of justice: Are holiday clubs serving the most deprived communities in England? *Local Environment*, *23*(10), 1008–1022. https://doi.org/10.1080/13549839.2018.1518415

Mann, E., Widdison, C., & Defeyter, M. A. (2020). Implementing holiday provision programmes: A qualitative investigation of the experiences of senior stakeholders. *Open Journal of Social Sciences*, *8*(7), 286–302. https://doi.org/10.4236/jss.2020.87023

Mason, E., McDougall, L., Lawn, J. E., Gupta, A., Claeson, M., Pillay, Y., Presern, C., Lukong, M. B., Mann, G., Wijnroks, M., Azad, K., Taylor, K., Beattie, A., Bhutta, Z. A., & Chopra, M. (2014). From evidence to action to deliver a healthy start for the next generation. *Lancet*, *384*, 455–467.

McKenzie, J.S. & Watts, D.C. (2020). Re-thinking the relationship between food insecurity, health and social isolation. *Proceedings of the Nutrition Society*, *79*, Issue OCE3: Nutrition Society Live 2020. E740. https://doi.org/10.1017/S0029665120007260

Micha, R., Karageorgou, D., Bakogianni, I., Trichia, E., Whitsel, L. P., Story, M., Peñalvo, J. L., & Mozaffarian, D. (2018). Effectiveness of school food environment policies on children's dietary behaviors: A systematic review and meta-analysis. *PLoS ONE*, *13*(3), e0194555. https://doi.org/10.1371/journal.pone.0194555

Mitchell, A. B., Cole, J. W., McArdle, P. F., Cheng, Y., Ryan, K. A., Sparks, M. J., Mitchell, B.D. & Kittner, S.J.. (2015). Obesity increases risk of ischemic stroke in young adults. *Stroke*, *46*(6), 1690–1692. https://doi.org/10.1161/STROKEAHA.115.008940

National School Breakfast Programme. (2019). Food for thought. Retrieved January 2021, from https://www.family-action.org.uk/content/uploads/2019/07/NSBP-Impact-report-v11-LOWRES.pdf

National Statistics. (2021). Schools, pupils and their characteristics. Retrieved February 2021, from https://explore-education-statistics.service.gov.uk/find-statistics/school-pupils-and-their-characteristics

Nettle, D., Andrews, C., & Bateson, M. (2017). Food insecurity as a driver of obesity in humans: The insurance hypothesis. *Behavioral and Brain Sciences*, *40*, e105. https://doi.org/10.1017/S0140525X16000947

NHS. (2019). National Child Measurement Programme, England 2018/19 School Year. Retrieved January 2021, from https://digital.nhs.uk/data-and-information/publications/statistical/national-child-measurement-programme/2018-19-school-year

NHS. (2020). Health Survey for England 2019. Retrieved January 2021, https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/2019.

Parnham, J. C., Laverty, A. A., Majeed, A., & Vamos, E. P. (2020). Half of children entitled to free school meals did not have access to the scheme during COVID-19 lockdown in the UK. *Public Health*, *187*, 161–164. https://doi.org/10.1016/j.puhe.2020.08.019

Perkins, J. M., Kim, R., Krishna, A., McGovern, M., Aguayo, V. M., & Subramanian, S. V. (2017). Understanding the association between stunting and child development in low- and middle-income countries: Next steps for research and intervention. *Social Science and Medicine*, *193*, 101–109. https://doi.org/10.1016/j.socscimed.2017.09.039

Pollard, C. M., & Booth, S. (2019). Food insecurity and hunger in rich countries – It is time for action against inequality. *International Journal of Environmental Research and Public Health*, *16*(10), 1804. https://doi.org/10.3390/ijerph16101804

Power, M., Doherty, B., Pybus, K., & Pickett, K. (2020). How COVID-19 has exposed inequalities in the UKfood system: The case of UKfood and poverty. *Emerald Open Research*, *2*, 11. https://doi.org/10.35241/emeraldopenres.13539.2

Public Health England. (2016). Government dietary recommendations. Government recommendations for energy and nutrients for males and females aged 1–18 years and 19+ years. PHE Publications. Retrieved January 2021, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/618167/government_dietary_recommendations.pdf.

Public Health England. (2020). *Excess weight and COVID-19*. Insights from new evidence. PHE Publications. Retrieved February 2021, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907966/PHE_insight_Excess_weight_and_COVID-19__FINAL.pdf

Reichelt, A. C. (2016). Adolescent maturational transition in the prefrontal cortex and dopamine Signalling as a risk factor for the development of obesity and high fat/high sugar diet induced cognitive deficits. *Frontiers in Behavioral Neuroscience*, *10*, 189.

Royal College of Paediatrics and Child Health. (2020). State of Child Health. Retrieved July 2020, from https://stateofchildhealth.rcpch.ac.uk/evidence/family-and-social-environment/child-poverty/

Romieu, I., Dossus, L., Barquera, S., Blottiere, H. M., Franks, P. W., Gunter, M., Hwalla, N., Hursting, S. D., Leitzmann, M., Margetts, B., Nishida, C., Potischman, N., Seidell, J., Stpien, M., Wang, Y., Westerterp, K., Winichagoon, P., Wiseman, M., Willett, W. C., & IARC working group on Energy Balance and Obesity. (2017). Energy balance and obesity: What are the main drivers? *Cancer Causes Control*, *28*(3), 247–258. https://doi.org/10.1007/s10552-017-0869-z.

Saydah, S., Bullard, K. M., Imperatore, G., Geiss, L., & Gregg, E. W. (2013). Cardiometabolic risk factors among US adolescents and young adults and risk of early mortality. *Pediatrics*, *131*, e679–e686.

Schroeder, K., & Smaldone, A. (2015). Food insecurity: A concept analysis. *Nursing Forum*, *50*(4), 274–284.

Schuler, B. R., Bauer, K. W., Lumeng, J. C., Rosenblum, K., Clark, M., & Miller, A. L. (2020). Poverty and food insecurity predict mealtime structure: Mediating pathways of parent disciplinary practices and depressive symptoms. *Journal of Child and Family Studies*, *29*(11), 3169–3183.

Schwarzenberg, S. J., & Geogieff, M. K. (2018). Advocacy for improving nutrition in the first 1000 days to support childhood development and adult health. *Pediatrics*, *141*(2), e20173716.

Shinwell, J., Bateson, M., Nettle, D., & Pepper, G. V. (2021). Food insecurity and patterns of dietary intake in a sample of UKadults. *British Journal of Nutrition*, *1-8*, 770–777. https://doi.org/10.1017/S0007114521003810

Sumner, A., Hoy, C. & Ortiz-Juarez, E. (2020). Estimates of the impact of COVID-19 on global poverty. WIDER Working Paper Series wp-2020-43. World Institute for Development Economic Research (UNU-WIDER).

The Food Foundation. (2022). New data shows food insecurity major challenge to levelling up agenda. Retrieved February 2022, from https://www.foodfoundation.org.uk/press-release/new-data-shows-food-insecurity-major-challenge-levelling-agenda

UK Parliament. (2020). Equality of funding: Post-16 education. Volume 672: debated on Tuesday 25 February 2020. Retrieved January 2020, from https://hansard.parliament.uk/Commons/2020-02-25/debates/FD9BBA82-48E7-4836-BCA8-EE8B4471C76D/EqualityOfFundingPost-16Education

United Nations. (n.d.). Sustainable development goals. Goal 2 zero hunger. Retrieved July 2022, from https://www.un.org/sustainabledevelopment/hunger/

United Nations Convention on the Rights of the Child. (1989). Retrieved February 2021, from https://www.unicef.org.uk/rights-respecting-schools/the-rrsa/introducing-the-crc/#:~:text=The%20CRC%20sets%20out%20the,human%20rights%20treaty%20in%20history

United States Department for Agriculture. (2006). Self-administered food security survey module for youth ages 12 and older. Retrieved January 2021, from https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools/#youth

United States Department for Agriculture. (2019). Definitions of food security. Retrieved January 2021, from https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security

Wang, L., Liang, L., Liu, Z., Yuan, K., Ju, J., & Bian, Y. (2021). The developmental process of peer support networks: The role of friendship. *Frontiers in Psychology*, *12*, 615148. https://doi.org/10.3389/fpsyg.2021.615148

World Health Organisation. (2020). Adolescent Health. Retrieved January 2021, from https://www.who.int/southeastasia/health-topics/adolescent-health#:~:text=WHO%20defines%20'Adolescents'%20as%20individuals,age%20range%2010%2D24%20years

Zace, D., Di Pietro, M. L., Caprini, F., de Waure, C., & Ricciardi, W. (2020). Prevalence and correlates of food insecurity among children in high income countries. A systematic review. *Annali dell'Istituto Superiore di Sanità*, *56*(1), 90–98. https://doi.org/10.4415/ANN_20_01_13

AUTHOR BIOGRAPHIES

Pamela Louise Graham is a Senior Lecturer in Community Well-being in the Department of Social Work, Education and Community Well-being. Her research interests are in poverty, food insecurity and inclusion.

Crystal Haskell-Ramsay is a Professor of Biological Psychology in the Department of Psychology at Northumbria University. Her research focuses on the impact of nutrition on cognition and well-being.

Melissa Fothergill is a Senior Lecturer in the School of Psychology at Newcastle University. Her research examines sport and physical activity on psychological well-being.

Julie Young is a Senior Lecturer in the Department of Applied Sciences at Northumbria University. Her research focuses on nutrition across the lifespan.

How to cite this article: Graham, P. L., Haskell-Ramsay, C., Fothergill, M. & Young, J. (2022). Food insecurity, poor dietary intake and a lack of free meal uptake amongst 16–17-year-old college students in the northeast of England, UK. *Children & Society*, *00*, 1–16. https://doi.org/10.1111/chso.12623