Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Short Communication

Food & meal decision making in lockdown: How and who has Covid-19 affected?

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ABSTRACT

The Covid-19 lockdown resulted in all but essential shops closing in many countries, with inevitable and immediate impact on food availability and choice. Reasons for specific food choices influence diet and mealtimes and can affect psychological and physical well-being. The current study aimed first to investigate whether individuals and families in the UK have changed their food choice motivations over lockdown and second to identify sub-groups in particular need of support in the event of future lockdowns. Two hundred and forty adult participants from the UK completed an online survey, consisting of a series of demographic questions, the *Food Choice Questionnaire,* the *Family Mealtime Goals Questionnaire* and some short open-ended questions. They were asked to consider their goals and motivations around food and mealtimes at two timepoints: before lockdown and Summer 2020. Results indicated that the sample placed more importance on health, weight control and mood when choosing their food after lockdown than they had before, and less importance on familiarity. A number of sub-groups were identified who may be particularly vulnerable to food-related challenges in future lockdowns including younger adults, parents and carers of children, those self-isolating and individuals who do not live within close proximity to food shops. These results are preliminary and larger sub-group sample sizes will be necessary to draw firm conclusions. Future research should consider the nature and impact of these challenges in more detail across a more varied population.

1. Introduction

In December 2019, a novel Coronavirus was identified (2019-nCoV, also known as COVID-19). The virus spread at an alarming and unprecedented rate across the globe and was subsequently characterised as a pandemic by the World Health Organisation on 11th March 2020. By the end of that month, over 100 countries across the world had announced 'lockdown'. Defined as a situation where people are 'not allowed to enter or leave a building or area freely because of an emergency' (Lockdown, n.d.), lockdown came as a shock to most. In the UK, schools, businesses and workplaces closed, while only essential shops were permitted to remain open. Many countries experienced so-called panic buying in grocery stores and supermarkets as individuals struggled to comprehend what lockdown might look like (Arafat et al., 2020). In addition to broader lockdown measures, many individuals who were considered particularly vulnerable were advised to completely 'shield' at home. This involves taking even more rigorous precautions such as the whole household avoiding shops altogether.

These events naturally had impact on food accessibility immediately. Even before lockdown was announced, household items in supermarkets were subject to hoarding (Sim, Chua, Vieta, & Fernandez, 2020) and this continued after the announcement. In some cases, this also resulted in restrictions on the number of any given item that consumers could purchase. Access to shops became restricted both because of shielding and because of long queues imposed as a result of social distancing. Restaurants and pubs were ordered to close with immediate effect, preventing anyone from eating out. Aside from the practical implications that these restrictions clearly had, it is reasonable to consider that they may also have had an impact on individuals' motivations and priorities when planning their meals.

The far-reaching psychological impact of Covid-19 and of social distancing more specifically has been reported (Serafini et al., 2020). These studies found that, for many, mental health difficulties (including stress, anxiety, depression and frustration) emerged during the mass quarantine. Many countries, including the UK and much of Europe can continue to expect future national or local lockdowns in ongoing attempts to control the virus (Ferguson et al., 2020). It is therefore important that we consider the effect that the associated restrictions

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might have on individuals' psychological and physical well-being with future implications in mind.

Recent studies have considered changes in food purchasing behaviours during this time. For example, a study in Italy (Bracale & Vaccaro, 2020) used consumption trends to establish that individuals were more likely to purchase long-life grocery items such as pasta, frozen foods and long-life milk after lockdown than before. Purchases of fresh foods, on the other hand, decreased during the same period. These findings have been supported by research in New Zealand (Martin-Neuninger & Ruby, 2020) and Spain (Laguna, Fiszman, Puerta, Chaya, & Tarrega, 2020). The authors of the Spanish study also examined social media behaviours around food and cooking during the lockdown period and considered motivations for buying more or less of specific food items. Motivations to buy more of something centred around shelf life, mood regulation and health, while reasons for reducing purchases reflected opposing themes (i.e. short life, negative impact on mood or health). This finding indicates that changes in food purchasing in response to the pandemic may be fuelled by psychological and physical motives as well as pragmatic ones.

It is well established that food choices are associated with mental and physical health (Sarlio-Lahteenkorva, Lahelma, & Roos, 2004; Steptoe, Pollard, & Wardle, 1995). Some groups might find themselves more vulnerable around food and meal planning than usual during lockdown. For example, evidence indicates that anxiety associated with the pandemic may contribute to further weight gain in adults with obesity (Pellegrini et al., 2020). People self-isolating or shielding may also have new priorities and needs, for example support with shopping and/or feelings of loneliness. Individuals who have lost income as a result of the pandemic may feel the need to reduce their spending on food, to change their purchasing behaviour or to limit their intake. At its worst, these individuals may face food insecurity.

There are further concerns about rising food insecurity in families (Wolfson & Leung, 2020); it is widely reported that parents and carers living with children in lockdown, home-schooling and feeding them more frequently than usual, have been under a great deal of pressure (e.g. Cluver et al., 2020). Some families have faced further challenges, such as continuing to work (or look for work) without childcare. While evidence indicates that the majority of parents place a great deal of importance on avoiding stress at mealtimes (Hammons & Fiese, 2011; Snuggs, Houston-Price, & Harvey, 2019), Covid-related stressors are adding an additional burden (Brown, Doom, Lechuga-Pena, Watamura, & Koppels, 2020).

There is rationale to suggest that over lockdown individuals' priorities and motives in food and meal decision-making may have changed. This might leave some groups particularly vulnerable. This exploratory study aims first to establish whether individuals and families in the UK have changed their food choice motivations over lockdown, and secondly to identify sub-groups who may be in particular need of support in the event of future lockdowns or quarantine periods.

2. Material and methods

2.1. Design

The study had a mixed methods design. The quantitative element of the study had a repeated measures, within-subjects design. Participants were asked retrospectively about their food choices before lockdown and their food choices at the time of data collection as part of the same questionnaire. Participants were additionally asked for brief qualitative feedback as described in Section 2.3.1.

2.2. Participants

Participants were recruited through social media using a snowballing technique between 14th July 2020 and 3rd August 2020. Individuals who were over 18 and could read and understand English were eligible to take part. There were no further exclusion criteria. Participants who indicated that they lived with children were eligible to take part in an additional questionnaire examining parental feeding goals specifically. The study recruited 240 participants in total, see Table 1 for demographics.

Additional descriptive variables captured social distancing status and elements of food shopping. The majority of participants (n = 190, 79.2%) reported living in a suburban area, as opposed to a rural one and 213 (88.9%) stated that they lived in close proximity to a supermarket. Most participants said that they were currently social distancing (n = 213, 88.8%) but the majority were not self-isolating (n = 211, 87.9%). Most stated that they were responsible for food shopping in their household (n = 215, 89.6%), and many also shopped for somebody outside of their household (n = 75, 31.3%). Only 27 (11.3%) reported that someone else regularly did their food shop for them.

2.3. Procedure

Prior to data collection, participants were provided with a brief description about the purpose of the study and upon providing consent were directed to the online questionnaire, hosted by Google Forms. On completion of the questionnaire, they were also provided with a short debrief explaining the aim of the study, the purpose of the questionnaires, and advising them of the implications of their participation.

2.3.1. Measures

Participants were asked to provide demographic data as well as to complete the two measures described below. The demographic questions comprised: age; gender; living arrangements; food shop activity and social distancing/self-isolation status. All participants proceeded to complete the Food Choice Questionnaire and an open-ended question about their experiences of food in the pandemic. Those who had indicated that they lived with children under the age of 18 were also asked to complete the Family Mealtime Goals Questionnaire.

2.3.1.1. The Food Choice Questionnaire. The Food Choice Questionnaire (Steptoe et al., 1995) measures factors and priorities that influence individual dietary choices. It is well validated and widely used (Januszewska, Pieniak, & Verbeke, 2011). Factors measured are: *health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity* and *ethical concern.* Each factor can have a score ranging from 1 to 4 where a higher score represents greater importance attributed to that factor.

2.3.1.2. The Family Mealtime Goals Questionnaire. The Family Mealtime Goals Questionnaire (Snuggs et al., 2019) measures the goals that parents and carers have when considering family meals. Goals measured are: *stress/conflict avoidance, homemade food, shared family food, family*

Table 1
Sample demographics.

Gender	n	%
Female	208	13.3
Male	32	86.7
Age	n	%
18–28	42	17.5
29–39	58	24.2
40–50	58	24.2
51–61	38	15.8
62–70	31	12.9
Over 70	13	5.4
Ethnicity		
White English / Welsh / Scottish / Northern Irish / British	225	93.8
Other	15	6.2
Living with children	86	35.8
Single adult household with children	18	7.5/20.9

involvement at mealtimes, price, occasional treats, ease of preparation and *high/low fat regulation.* Each goal can have a score ranging 1 to 5 where a higher score represents greater importance attributed to that goal.

Participants were asked to indicate scores for both measures at two time points. First, they were asked to think back to before lockdown and answer with reference to how they felt at that time. Second, they were asked to provide answers referring to how they currently felt.

2.3.1.3. Open-ended responses. Finally, participants were asked, 'is there anything else you would like to add regarding your food choices?' and for those indicating that they lived with children, 'is there anything else you would like to add regarding your family meal times?'. Given that this was an exploratory study, we were keen to ensure that participants had the opportunity to draw our attention to specific concerns raised by the pandemic in relation to food and mealtimes.

2.4. Data analysis

Repeated measures ANOVAs were conducted for all quantitative outcome measures with an independent variable of time (pre-lockdown/during lockdown). The qualitative data was not substantial enough to warrant formal analysis; tables of themes are presented in the Results and considered in the Discussion.

This study was granted ethical approval to proceed by London Metropolitan University Ethics Committee.

3. Results

3.1. Repeated measures ANOVAs

3.1.1. Food Choice Questionnaire (FCQ)

Repeated measures ANOVAs were conducted for each of the factors on the Food Choice Questionnaire (Table 2). These yielded several within-subject significant differences; participants placed more importance on *health, mood* and *weight control* after lockdown, and less importance on *familiarity*. Some additional variables had *p* values just over the 0.05 threshold, indicating that participants might place more importance on *price* and *natural content* after lockdown and less importance on *convenience.*

3.1.2. Food Choice Questionnaire: sub-group analyses

Several demographic and descriptive categories were examined for differences on the FCQ.

3.1.2.1. Gender. A main effect of gender was found for *mood, convenience, weight control,* and *familiarity*. In all cases, females placed more importance on these factors than males (Table 3). There was a significant interaction such that female increase in mood score over time was higher than male increase ($F(1,238) = 4.01$, $p = 0.046$).

3.1.2.2. Age. When comparing the 18–28 age group to the rest of the sample, there were main effects of *health, mood, convenience, natural content, price, weight control* and *familiarity* (Table 4). There were also a number of significant interactions such that this group were more likely to increase the amount of importance they placed on *health, natural content, price* and *weight control* and decrease importance on *convenience* and *familiarity* (Table 4, Fig. 1).

Table 2
Food Choice Questionnaire Repeated Measures ANOVA results.

	Before lockdown		July/Aug 2020			
	Mean	S.D.	Mean	S.D.	F	*p*
Health*	3.54	0.84	3.61	0.85	5.80	0.02
Mood*	3.03	0.84	3.18	0.88	38.03	<0.001
Convenience	3.47	0.87	3.41	0.84	3.02	0.08
Sensory Appeal	3.69	0.80	3.69	0.78	0.07	0.79
Natural Content	2.97	0.98	3.02	0.98	3.49	0.06
Price	3.38	0.89	3.43	0.94	3.36	0.07
Weight Control*	3.15	0.97	3.25	0.97	4.24	0.04
Familiarity*	3.02	0.81	2.91	0.82	19.13	<0.001
Ethical Concern	3.00	1.05	3.03	1.06	1.07	0.30

3.1.2.3. Lockdown-related variables. There was no significant main effect of suburban/rural location on any of the food choices or any time by location interactions. There was a main effect of proximity to shops on *health, mood* and *ethics* (Table 5). There were two significant interactions with this variable: participants living closer to supermarkets decreased their *familiarity* score over time while those further away showed a slight increase ($F(1,238) = 5.23$, $p = 0.023$) and people living further away from supermarkets were also more likely to increase their *ethical concern* score ($F(1,238) = 4.92$, $p = 0.028$).

3.1.2.4. Living arrangements. Participants who lived with children reported placing more importance on five factors (see Table 6). There was one interaction, whereby those living with children increased their *ethical concern* score by significantly more than those who did not ($F(1,238) = 4.31$, $p = 0.046$).

3.1.3. Family Mealtime Goals Questionnaire

Within the sample of parents and carers, two mealtime goals changed over time. These were *ease of preparation* which became less important to parents ($F(1,84) = 6.38$, $p = 0.013$) and *family involvement* which became more important to them ($F(1,84) = 11.13$, $p = 0.001$). There were no differences between parents and carers who had different numbers of children, although those in larger families tended towards stating that they were placing less importance on their children's health after lockdown than before ($F(1,81) = 2.35$, $p = 0.078$).

There were no differences between parents or carers who lived with other adults and those who lived with no other adults.

Parents who lived within close proximity to a supermarket placed more importance on the *stress/conflict avoidance* goal than those who did not at both time points and there was a significant interaction indicating that this goal became more important for those who did not live near a supermarket after lockdown ($F(1,83) = 5.24$, $p = 0.025$).

3.2. Open-ended responses

Forty-one participants responded to the open-ended question that was given to all participants. Answers were brief and did not allow for formal qualitative analysis, but several themes were identified, outlined in Table 7. Twenty-one participants living with children responded to the family specific open-ended question. Themes are identified in Table 8.

4. Discussion

This study is the first to consider how individual and family food goals and motivations have changed in response to the Covid-19 lockdown; although recent studies have considered purchasing behaviour, it is important also to consider how goals and decision making might have changed and how these changes might impact eating behaviours and well-being. Our sample reported placing more importance on *health, mood* and *weight control* during lockdown. While the *health* goal is typically associated with positive healthy eating behaviours, weight concern and preoccupation with dieting can in fact lead to weight gain in some groups (Lowe, Doshi, Katterman, & Feig, 2013) and the role of mood in this context is unclear. It is possible that the concern with health in this sample is associated with or caused by concern about weight gain rather than healthy eating behaviours per se. In the case of *mood*, women reported a significantly higher increase in this factor than men across

Table 3
ANOVA repeated measures results by gender.

	Before lockdown				July/Aug 2020					
	Male		Female		Male		Female			
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	F	*p*
Mood	2.87	0.85	3.06	0.84	2.90	0.87	3.22	0.88	7.56	0.01
Convenience	3.15	0.89	3.52	0.86	2.99	0.80	3.48	0.83	4.02	0.05
Weight Control	2.85	0.84	3.20	0.99	3.13	1.02	3.27	0.97	5.73	0.02
Familiarity	2.95	0.85	3.03	0.81	3.02	0.81	2.77	0.84	14.24	<0.001

Table 4
ANOVA repeated measures results by age group.

	Before lockdown				July/Aug 2020							
	18–28 year olds		Over 28		18–28 year olds		Over 28				Time*age	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	F	*p*	F	*p*
Health	3.24	0.84	3.60	0.83	3.50	0.93	3.63	0.83	14.23	<0.001	8.66	0.004
Mood	3.22	0.75	2.99	0.86	3.39	0.80	3.13	0.90	24.72	<0.001	0.20	0.65
Convenience	3.75	0.72	3.41	0.89	3.43	0.74	3.41	0.86	13.33	<0.001	12.50	<0.001
Sensory appeal	3.78	0.70	3.67	0.82	3.76	0.71	3.68	0.80	0.12	0.73	0.71	0.40
Natural content	2.48	1.02	3.08	0.94	2.71	1.12	3.09	0.94	11.85	<0.001	9.45	0.002
Price	3.70	0.76	3.31	0.90	3.93	0.80	3.33	0.93	10.37	<0.001	7.74	0.006
Weight control	2.96	1.06	3.19	0.95	3.44	1.05	3.21	0.96	15.52	<0.001	12.91	<0.001
Familiarity	3.15	0.73	2.99	0.83	2.87	0.78	2.92	0.84	31.20	<0.001	11.35	0.001
Ethical concern	2.73	1.18	3.05	1.02	2.85	1.29	3.06	1.01	3.03	0.08	2.16	0.14

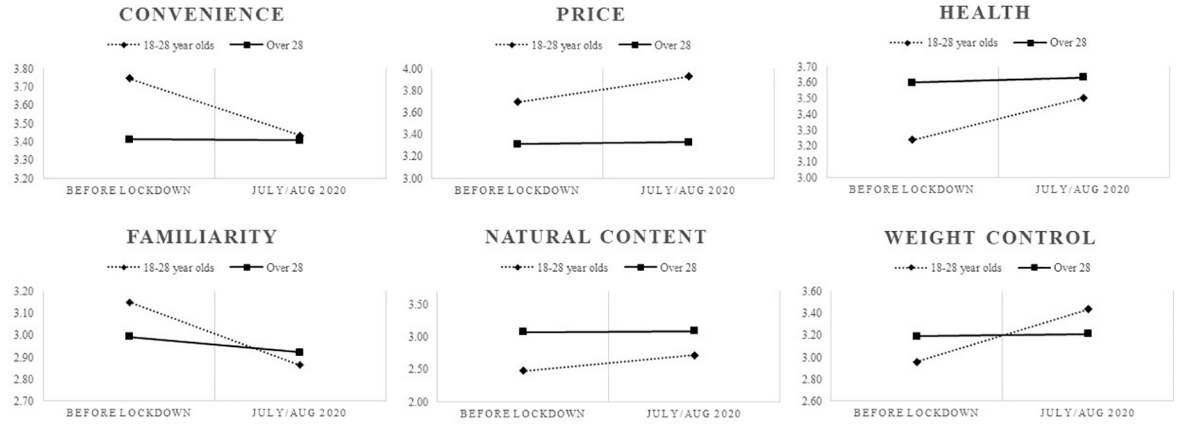

Fig. 1. Repeated measures Age*Time significant interactions.

Table 5
ANOVA repeated measures results by proximity to supermarkets.

	Before lockdown				July/Aug 2020					
	Close proximity		Not close proximity		Close proximity		Not close proximity			
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	F	*p*
Health	3.55	0.81	3.41	1.03	3.61	0.83	3.64	1.02	8.27	<0.001
Mood	3.09	0.80	2.57	1.01	3.22	0.85	2.81	1.07	24.15	0.001
Ethics	3.03	1.07	2.74	0.86	3.04	1.09	2.94	0.82	5.65	0.02

time which may have implications for female mental wellbeing. Age differences were also observed, with younger participants showing significantly more change than older participants over the lockdown period. Those between 18 and 28 years of age decreased the importance placed on *convenience* and *familiarity,* while increasing importance placed on *health, price, weight control* and *natural content.* Together, these findings might represent greater capacity to improve health behaviours (for example, using natural ingredients in cooking typically translates to nutritionally better meals while emphasis on convenience can reflect over-reliance on processed food, Mills, Brown, Wrieden, White, & Adams, 2017; Oellingrath, Hersleth, & Svendsen, 2013). On the other hand, they might reflect the more negative point that young people are more likely to have become unemployed or furloughed than older individuals leaving them with more time to consider their food choices, but also more pressure to keep costs down (Strauss & Pickard, 2020). Results also demonstrated more change amongst those who were self-isolating, and those who lived further away from supermarkets or grocery stores. These groups might be particularly vulnerable to challenges

Table 6
ANOVA repeated measures results by living arrangement.

	Before lockdown				July/Aug 2020					
	Living with children		Not living with children		Living with children		Not living with children			
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	F	*p*
Health*	3.70	0.81	3.45	0.84	3.77	0.78	3.52	0.88	5.25	0.02
Mood*	3.17	0.83	2.95	0.84	3.32	0.82	3.10	0.91	35.46	$p < 0.001$
Convenience	3.50	0.86	3.45	0.88	3.49	0.84	3.37	0.84	1.92	0.17
Sensory appeal	3.76	0.83	3.64	0.77	3.78	0.79	3.64	0.78	0.24	0.63
Natural content	3.11	1.00	2.89	0.96	3.13	0.99	2.97	0.98	2.29	0.13
Price*	3.49	0.97	3.32	0.83	3.56	0.96	3.36	0.92	3.48	0.06
Weight control*	3.23	0.93	3.11	1.00	3.34	0.92	3.20	1.00	4.07	0.04
Familiarity*	3.14	0.80	2.95	0.81	3.08	0.82	2.82	0.81	14.49	$p < 0.001$
Ethical concern	3.01	1.06	2.99	1.06	3.11	1.04	2.98	1.08	2.45	0.12

Table 7
Summary of open-ended responses about food choice in lockdown.

Price	Participants expressed that they were now either having to buy more expensive food, or that they had less money to spend on food. Others, however, identified that they had saved money during lockdown that they could now spend on food.
Restricted choice/ variety	Individuals found that their choices were limited, and this impacted their diets negatively
Weight	While some participants reported that they had lost substantial amounts of weight, others saw lockdown as an opportunity to eat healthily and lose weight
Support local businesses	A small number of participants attempted to buy their food from local suppliers to support small businesses
More junk/ unhealthy food	For some, lockdown represented unhealthy food choices and increase in 'junk' and takeaway food

Table 8
Summary of parents' open-ended response about family food choice in lockdown.

Eating together	Most commonly, parents reported that their families were eating together more often as a result of lockdown
Less choice	Children were offered less choice and variety
More expensive	Food prices had increased and this presented a challenge when presenting variety
Unhealthy choices	Some parents indicated that lockdown had led to more unhealthy choices and 'treats'

around food provision and healthy eating.

Parents and carers of children reported an increase in importance placed on *family involvement* in meal preparation and a decrease in importance on *ease of preparation.* On the surface, at least, both of these represent positive changes; family involvement has been associated with healthier family eating and feeding behaviours (Allirot, da Quinta, Chokupermal, & Urdaneta, 2016), while convenience-related goals have been associated with more negative parental feeding practices (Kiefner-Burmeister, Hoffmann, Meers, Koball, & Musher-Eizenman, 2014). A likely explanation for this is that parents and carers were spending more time with their children over lockdown in the UK, as the children were not permitted to attend school. However, these results likely do not capture the well-documented stress and pressure of parenting throughout lockdown which might feasibly impact family mealtimes. As with other studies (e.g. Snuggs et al., 2019), *stress/conflict avoidance* remained a high priority for the sample across time points. It is notable, however, that parents who did not live in close proximity to a supermarket reported a further increase in this goal over time. This supports the earlier finding that this group may be particularly susceptible to challenges around food during future lockdowns.

The brief qualitative data from this study offer perhaps the most valuable insight into the challenges that individuals faced in their food decision-making during lockdown and the impact this has had on their behaviour. For parents, a positive outcome was increased family meal frequency. Shared family meals have consistently been associated with positive health outcomes (Hammons & Fiese, 2011) and participants indicated that this was valuable family time. Other themes were less clear-cut, and it appeared that people had markedly different experiences. For example, some participants reported healthier eating in lockdown, whilst others reported that it had led them to consume more junk food. Similarly, some reported losing substantial amounts of weight whilst others gained weight. This supports other recent studies that have suggested the impact of lockdown has differed for individuals depending on various psychological and practical risk factors (e.g. Dawson & Golijani-Moghaddam, 2020). Limited choice and variety were also cited by individuals as a consequence of lockdown purchasing. Limited variety of food can restrict overall diet quality and is associated with unhealthier food preferences in children (Birch, 1999).

Collectively, the *Food Choice Questionnaire, Family Mealtime Goals Questionnaire* and open-ended results indicate that certain groups might be particularly vulnerable to psycho-social and health related challenges in any future lockdown.

This study had limitations and results should be treated as preliminary. The sample was relatively heterogenous; although there was a wide age range, and representation of a variety of living situations, the sample was predominantly white and female and some identified subgroups were small. Furthermore, we did not collect data on whether participants were working (either at home or out of the home), whether they had been 'furloughed' or whether they were facing financial difficulties as a result of the pandemic. This information might shed more light on which specific groups need more support around food and meals during lockdown. A further limitation is the fact that participants were asked to indicate their goals at the beginning of lockdown retrospectively. This might limit the validity of these responses. Nevertheless, strengths of the study include a large overall sample size, psychometrically strong measures and novel, qualitative anecdotes.

5. Conclusions

This study has provided valuable provisional insight into some of the food-related challenges that individuals have faced during the Covid-19 lockdown in the UK and how this has affected their decision making and priorities. While some participants appear to have thrived in this context, with healthier lifestyles and decision-making, others gained weight, lacked varied diets and struggled with food expense. Individuals living far away from amenities and those who are self-isolating may need higher levels of support. However, our study probably did not capture completely the characteristics of vulnerable sub-groups. Future research in this area should consider exploring financial challenges, securing a more representative sample, considering health inequalities more closely and collecting data in real time.

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CRediT authorship contribution statement

Sarah Snuggs: Conceptualization, Methodology, Project administration, Formal analysis, Writing - original draft, Supervision. **Sophie McGregor:** Conceptualization, Methodology, Project administration.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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