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THE INFLUENCES OF NEWS AND SOCIAL MEDIA ON FOOD INSECURITY AND HOARDING BEHAVIOUR DURING THE COVID-19 PANDEMIC

Lucy Charilaou, MSc, Northumbria University, Psychology Department, 2 Sandyford Rd,
Newcastle upon Tyne, NE1 8QH, charilaoulucy@gmail.com

Dr Santosh Vijaykumar, PhD, Senior Lecturer, Northumbria University, Psychology
Department, Santosh.vijaykumar@northumbria.ac.uk

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Abstract:

Objective: To examine how sociodemographic variables and frequency of media consumption affect hoarding behaviour and food insecurity concerns during the COVID-19 pandemic.

Method: A quantitative, non-experimental, correlational online survey was administered using a convenience sample of 203 participants from the United Kingdom with no medical issues that affected buying behaviour during the pandemic to examine perceptions related to food insecurity, and self-reported food hoarding behaviour

Results: Younger adults and lower income groups reported higher food insecurity perceptions and hoarding behaviours. Consuming COVID-19 information from websites was significantly associated with food insecurity perceptions, while information from social media was significantly associated with more food hoarding behaviours.

Conclusions: Younger adults and lower income groups are vulnerable populations from the perspective of food insecurity and hoarding behaviour in times of health disasters like pandemics. While social media can play a positively catalytic role during crises, excessive online information and misinformation can contribute negatively to public panic and feelings of insecurity. Implications for disaster preparedness and future research are discussed.

The findings suggest that age is the main predictor of food insecurity and hoarding behaviour, with younger adults more likely to be affected. They also suggest that people are turning to NHS websites, which were deemed more trustworthy than social media, to avoid 'news fatigue' and avoiding speculation. Suggestions for future research were made, specifically to examine people's social support during the pandemic to understand its' potential link to stockpiling behaviour or food insecurity concerns.

INTRODUCTION

The COVID-19 outbreak was declared in China on 31st December 2019 ¹ and spread rapidly across the world before being declared a global pandemic on 11th March 2020 ². The pandemic attracted widespread media coverage and its announcement coincided with a wave of stockpiling behaviour in supermarkets across the globe ³. In the UK, estimates suggest that consumers spent an extra £1.9bn in the period February 24th to March 21st, compared to the same period last year and made over 80m extra shopping trips ⁴. This surge in supermarket sales provoked extended media coverage of the empty shelves and stockpiling behaviour seen in shoppers ⁵, which arguably in itself could be a catalyst for the increase in stockpiling behaviour.

One explanation for stockpiling behaviour and food insecurity is the emotional contagion theory, specifically fear contagion. It argues that emotional contagion takes place in 3 stages: mimicry, feedback, and contagion ⁶, whereby people mimic behaviour which affects how they process their emotions and leads them to internalise this behaviour. This ‘contagion of fear’ can be exacerbated by media coverage as seen in the US throughout the Ebola outbreak in 2014 and previous researchers concluded that mass media can be responsible for inducing panic in the population even in cases where the actual risk to the public is low ⁷. This demonstrates the fact that face-to-face proximity is not needed for emotional contagion and images and videos are also an effective way for emotions to spread. This perspective is especially relevant in the context of the COVID-19 pandemic when face-to-face contact has been drastically reduced because of repeated lockdowns, with people relying heavily on social media and online interaction ⁸.

Previous studies have shown how emotion, many times fuelled with mass media, can spread easily on social networks, specifically on Twitter ⁹ and Facebook ¹⁰ through people replicating the emotions of others as seen on social media. During the Ebola pandemic, for instance, a news video triggered tens of thousands of tweets and Internet searches related to Ebola, a pattern attributed to the panic-inducing characteristics of the original video ⁷. Other studies attest to a linear relationship between the emotional valence of the stimuli that Internet users are exposed to and their emotional responses ¹¹. Public health emergencies like COVID-19 might motivate people to post emotional online content, thereby creating an emotion-induced climate of values in the society that prioritizes securing oneself and

avoiding threats¹². These studies attest to the power of social media to fuel emotion contagion during COVID-19 even though the extent to which it is associated with self-preservation behaviours and threat-related beliefs like hoarding and food insecurity respectively remains to be understood.

News media play a crucial part in reducing public concern during an outbreak, especially as a tool to avoid the health system being overwhelmed¹³. When utilised correctly, the media can minimise the public's perception of risk, however, the growing access to a 24/7 news cycle leaves people prone to media-related anxiety which is incongruent with actual public risk¹⁴. Media richness theory argues that the effectiveness of the message will depend on the media form, with images and video considered the most effective¹⁵. Research has shown that exposure to graphic images still triggers anxiety after a traumatic event¹⁶, and priming theory suggests that higher exposure to images and videos can evoke related thoughts in the minds of consumers¹⁷. This is of particular importance during this pandemic, as recent research suggests people are spending more time on social media¹⁸ meaning they have had the opportunity to be exposed to more media forms that may have had an impact on their buying behaviour. Placing these perspectives in the context of fear contagion theory leads us to postulate that posting and sharing images and videos of panic buying at supermarkets on social media might spread fears around the lack of availability of food, thereby fuelling insecurities and hoarding tendencies aimed as self-preservation.

Previous research indicates that people have a set of societal norms which they look to for guidance on how to behave, particularly during times of uncertainty when it is easier to be influenced by these norms^{19 20}. Studies have examined the relationship between conformity and social influence when there is a threat to mortality²¹ and highlight the idea that following social norms generally increases the likelihood of avoiding death. This is not to say that the media coverage of the stockpiling in UK supermarkets may have increased people's mortality salience, however general news coverage of the virus may have increased people's awareness of their mortality and increased their desire for survival. In this way, it could be argued that people see stockpiling as a rational behaviour during times when survival is threatened and people want to prepare for the worst-case scenario, as seen in previous studies^{22 23}.

These problems are also affected by sociodemographic variables such as age and gender, and social determinants of health like income and education. For instance, previous research has

suggested that females and younger adults from lower income groups and older adults – one of the main vulnerable groups for COVID-19 – are more likely to be affected by food insecurity^{24 25 26 27 28}. Furthermore, those from lower income groups are less likely to resort to hoarding behaviours given their access to lesser disposable income; in contrast higher income and education might be associated with a greater propensity to hoard possibly given greater threat perceptions among this group which too has shown to influence^{29 30 31 32}.

Throughout the pandemic, there has been a growing need to be aware of future problems caused by the pandemic, and research suggests that the changes to the food chain may limit people's access to healthy food^{33 34}. Therefore, it is important to understand what drives hoarding and panic buying during a pandemic in order to be able to predict how people may behave so that everyone has equal access to food and other resources. In addition, a pandemic places enormous strain on the healthcare system, and some researchers have made nutrition recommendations for the pandemic to ensure people maintain a healthy diet and avoid placing stress on the food supply chain and healthcare system³⁵. In this context, the extent of the twin problems of food insecurity and hoarding behaviour and the influences of news and social media on these behaviours have thus far been understudied in the UK – a country with the highest COVID-19 mortality in Europe. In the context of this study, media consumption serves as an information source and takes into account various forms of media such as social media, traditional media, and websites. This is the gap in research our study seeks to address. Evidence from above literature review allows us to formulate the following research questions:

RQ1: To what extent do media consumption, food insecurity perceptions and food hoarding behaviours vary among different age groups in the UK?

RQ2: How do COVID-19 related food insecurity perceptions and food hoarding behaviours vary among different income groups in the UK?

RQ3: To what extent does exposure to online information on COVID-19 affect food insecurity perceptions and food hoarding behaviours?

2. METHODOLOGY

We employed a quantitative, non-experimental, cross-sectional design in order to age and income-based differences in food insecurity perceptions and hoarding behaviours, and identify factors related to media consumption that might affect these outcomes.

PARTICIPANTS

Using a convenience sampling approach, we recruited 203 participants between May 22nd and July 16th 2020 through advertisements on Facebook, Twitter, Reddit, online food forums and Survey Circle. By way of inclusion criteria, participants were required to be at least 18 years of age, residing in the UK since the start of the pandemic, and to have no medical issues that affected their buying behaviour during the pandemic (e.g. needing to be shielded which may have impacted how participants shopped during the pandemic and may have needed to stock up on certain items). Participants were informed that their participation was voluntary and anonymous and gave their informed consent before participating.

MEASURES

The survey was composed of three different adapted scales to measure food insecurity, hoarding behaviour, and media consumption. The Food Insecurity Experience Scale Survey Module (FIES-SM)³⁶ was used to measure food insecurity as it is designed to measure access to food, and any changes in diet. This scale was originally designed as part of a Food and Agriculture Organization of United Nations project to measure food insecurity across the world and is designed to measure food insecurity at the individual and the household level. It has widely been used as a measure of countries' food insecurity^{37 38} as it is the "first experience-based food insecurity measurement system" which allows for comparison across countries³⁶. It was deemed a suitable measure for this study because it enables the measurement of people's access to food during the coronavirus pandemic, and how worried they have been about accessing food during the pandemic. Selected items from this scale were chosen to build our food insecurity scale. Building on the questions consisted of a 3-item (Since the global COVID-19 pandemic was announced (11th March 2020), has there been a time when, due to a lack of money or other resources: you have been unable to access healthy and nutritious food, your household ran out of food, you had to skip a meal), 5-point scale (Never, Rarely, Sometimes, Frequently, Very Often) (Cronbach's $\alpha = 0.76$, mean = 5.21)

The hoarding behaviour scale was adapted from the Saving Inventory-Revised (SI-R)^{39 40} which was designed to measure symptoms of compulsive hoarding and the levels of distress sometimes seen in hoarders. The items in the scale aim to measure general symptoms seen in those with hoarding tendencies, such as feeling the need to acquire items and any distress associated with hoarding behaviours. The hoarding scale was included in this survey in order to be able to examine stockpiling behaviour during the pandemic and the SI-R has again been widely used to measure hoarding behaviour^{41 42}. Building our hoarding scale consisted of selecting appropriate items from the SI-R, which again used a 5-point scale to measure hoarding behaviour (During the Covid-19 pandemic, how often have you acquired things you may not need immediately? Never, Rarely, Sometimes, Frequently, Almost Always). (Cronbach's $\alpha = 0.69$, mean = 8.39)

The final scale was adapted from the Ofcom News Consumption Survey⁴³ which aims to discover people's news consumption preferences in the UK. This survey is flexible and allows for many different types of news platforms to be examined. Including this survey in the study allows for a detailed examination of which types of media people are using the most for coronavirus related news and how often they are consuming it, in order to determine how much news they are being exposed to, and whether this affects their buying behaviour. This Ofcom survey is conducted every year, and the data from it is widely used in other studies to examine people's news consumption preferences^{44 45}.

Media consumption (used to measure people's source of information) was measured using the following media types: word of mouth, radio (analogue /online), newspapers (print/online), television (on TV and online), governmental health websites (e.g. NHS), medical websites (e.g. WebMD), social media, and other. These media channels were then condensed into three broad categories: traditional media (radio, television, newspapers), websites (governmental health websites, medical websites), and social media. It is important to distinguish between different sources of media, as not all forms of media will have the same effect on people's food insecurity and hoarding behaviours.

Two word association questions were included at the end of the survey in order to determine the priming effects of the media on people's perceptions of the words 'food shopping' and 'supermarket'. Participants were shown a list of words such as 'rationing' and 'empty shelves' and asked to select which words (if any) they associated with 'food shopping' and

'supermarket'. The aim of these questions was to create a word index based on how many words participants selected, with a higher score indicating that they had more negative perceptions of 'supermarket' and 'food shopping'. In order to determine the priming effects of the word association, a 'supermarket' ($M = 2.52$, $SD = 1.25$) and 'food shopping' ($M = 1.5$, $SD = 0.80$) index was calculated by adding together the number of words each participant selected, with higher scores indicating more negative associations with these words. The online survey platform Qualtrics was used to implement the survey. Ethical approval for the study was granted by the faculty ethics committee at a university in the United Kingdom.

ANALYSIS

We performed simple descriptive statistics to generate a profile of the participants. Age and income-based comparisons were performed using independent t-test and one-way ANOVA. Factors associated with food insecurity perceptions and hoarding behaviours were identified through linear regression modelling using the stepwise method to generate the most parsimonious model while controlling for age, gender, income and education. Statistical significance was set at $p < 0.05$ level for all tests. All data were then analysed using SPSS v.26.

3. RESULTS

Frequency statistics for the participants are shown in table 1. Frequency statistics were also carried out for news sources for COVID-19 with television, government health websites, and social media amongst the most popular. A food insecurity score was calculated by aggregating scores on all items related to the FIES-SM scale ($M = 1.70$, $SD = 0.75$), and a hoarding score was also calculated by aggregating scores on all items from the questions related to the SI-R scale ($M = 2.08$, $SD = 0.61$).

In response to RQ1, we found no age-based differences in usage of traditional media and medical and health websites (table 2). However, social media use among 18-39 year old participants was significantly higher than 40+ year old participants. We also found that food insecurity perceptions and hoarding behaviours among the younger age group were significantly higher than the older age group.

In response to RQ2, we found no significant income-based differences in the use of traditional media, websites and social media, or food hoarding behaviours (table 3). Food insecurity was the

only variable that demonstrated a significant difference between income groups at the $p < 0.05$ level. Tukey's post-hoc analyses revealed that the lowest income group of £0-20,000 significantly differed from the £20-50,000 group ($p = 0.03$) and the >£50,000 group ($p = 0.01$). No significant differences were found between the £20-50,000 and >£50,000 groups.

In response to RQ3, we ran a hierarchical stepwise linear regression to identify the most parsimonious model (table 4). None of the variables entered into the regression were highly correlated (Supplementary Table 1). Exploring factors explaining food insecurity perceptions, we found that younger participants, or those who earned less were associated with higher food insecurity perceptions. Also, usage of medical and health websites and priming related to food shopping was positively associated with higher food insecurity perceptions.

Exploring factors explaining food hoarding behaviours, we found that younger participants were more likely to display hoarding behaviour and those with higher education were associated with higher food hoarding behaviours. Additionally, we also found that social media use and priming related to supermarkets were associated with higher food hoarding behaviours.

4. DISCUSSION

Market research agencies have documented stockpiling behaviours among UK consumers in 2020 by pointing to 79 million extra shopping trips and an additional spending of £1.9 billion on groceries over the past year⁴. The aim of the present study was to investigate the influences of sociodemographic factors, with a particular emphasis on age and income, and media consumption on food insecurity perceptions and such hoarding behaviours using priming theory and emotional contagion theory. Our analyses revealed three important findings of relevance to the community of public health nutrition communication practitioners and researchers. Specifically, we found that younger adults reported not only significantly higher social media use, but also food insecurity perceptions and food hoarding behaviours. Further, lower income groups reported significantly higher food insecurity perceptions and substantially higher food hoarding behaviours. However, age became the main observed demographic variable due to its significant findings. Lastly, we found that online media – both by way of websites and social media – were associated with food insecurity perceptions and food hoarding behaviours respectively. These findings should be considered in the context of the sample which had an unequal gender balance towards females, however other demographic variables were more equally proportioned. Below, we

seek to unpack these key findings individually in the context of prior research and implications to the nutrition education community.

Our finding about greater food insecurity perceptions among younger adults is consistent with research in other high-income countries like Australia where the 18-25 age group accounted for nearly 36% of those were found to be food insecure⁴⁶. In the UK, where food insecurity quadrupled due to COVID-19, adults who were unemployed were found to be at risk of food insecurity⁴⁷, similar to income-based disparities observed in Australia as well as in our study where younger adults reported lower household incomes. Lower income increases susceptibility to food insecurity⁴⁸, an undesirable relationship that might have been strengthened with the impact of COVID-19 on increased unemployment in the UK⁴⁹.

The results of the parsimonious regression suggest that higher education is associated with hoarding behaviour and food insecurity. This finding supports previous research suggesting that consumers with a higher level of education are more likely to stockpile because they are more likely to show a greater risk perception of infection³¹. Further research would be useful in order to examine how education can lead to increased hoarding behaviour, and whether education would actually be a useful tool in combatting hoarding behaviours during a pandemic.

We found hoarding behaviours decreasing with increasing income, however this association was not significant. While it would be reasonable to think that lower income impedes an individual's financial capacity to stockpile, previous research supports this seemingly counterintuitive finding by suggesting that those who earn less are in fact more likely to hoard^{50,51} with the studies suggesting further research is needed to determine whether hoarding is a consequence of financial insecurity, or if hoarding behaviour leads to financial insecurity. While our study does not possess the data to draw causal linkages about the effect of income, the consistent patterns from our study and other related research clearly paints a picture of the extent of the economic burden that COVID-19 has placed on young adults and the socio-structural inequities that might have exacerbated food insecurity perceptions among lower income groups. Taken in the context of fear contagion theory, this finding suggests that those on lower incomes feel more vulnerable and have a higher tendency to display self-preservation behaviours, such as food hoarding.

The significant effect of age however continued to persist as younger adults reported higher hoarding behaviours. One possible explanation from correlated research reporting similar findings is that hoarding behaviours are influenced by impulsivity which is pronounced among younger age groups⁵² and can be triggered by panic⁵³. Relatedly, findings about higher food insecurity hoarding behaviours among younger adults should not only be seen in the context of food shortages in supermarkets in the UK during the initial months of COVID-19, but also situated against the greater extent of social media use among this group as a possible explanation for panic. This perspective gains strength with one study finding 20 million mentions of ‘coronavirus’ across social media and news sites in a single day⁵⁴, and other large-scale analyses of Twitter data that describe how a combination of human and automated agents were responsible for spreading manipulated content or misinformation during the initial months of the pandemic⁵⁵.

The ‘infodemic’ that the World Health Organisation refers to constitutes not only a large-scale spread of misinformation but also an over-abundance of information in general which was diffusing at scale through social media, reaching people in various combinations of textual, visual and audible content. Among these strands of multimedia content were pictures of empty store shelves^{56 57 58} which, using emotional contagion theory, it could be argued to have caused panic and anxiety among consumers in the midst of an emergency characterised by high levels of uncertainty, leading them to stockpile food supplies. Recent research has argued that the media’s framing of the situation helped to drive stockpiling behaviour which then became “self-perpetuating”⁵⁹, for example, supermarkets introducing product restrictions could encourage people to buy extra quantities of other items and increase their perception of uncertainty. However, hoarding behaviour can be seen as rational during times of crisis when there is a fear of the unknown and a need to control the situation and feel prepared⁶⁰. Whilst social media is widely seen as an untrustworthy source of news⁶¹, it was still one of the most popular news sources for COVID-19 for those aged 18-39 years. Twitter reports of food shortages and queues in supermarkets were shared multiple times⁶², increasing people’s exposure to these events, especially if checked several times a day, as was the case in this study. Psychological distress associated with COVID-19 increases as exposure to COVID-19 related news increases⁶³, and the findings of the current study suggest that exposure to COVID-19 related news on social media can increase concerns over food insecurity and hoarding behaviour, potentially due to media priming and emotional contagion. Those on lower incomes may already be feeling vulnerable during the pandemic,

and may therefore be more susceptible to emotional contagion via social media, prompting them to hoard more and feel more food insecure.

The significant association of website use with food insecurity perceptions which might be explained by the fact that government health websites were among the most commonly used sources of media. This is supported by earlier research showing that visits to NHS sites hit a peak of 22.5 million visits in March 2020¹⁸. Our findings suggest that people might be seeking factual information about various aspects of COVID-19 such as symptoms, and guidelines related to social distancing and self-isolation, all of which can be sourced from the NHS website. The lack of opinionated or user-generated content on government websites makes it less likely for these informational sources to trigger and diffuse emotional responses. As such, the role of governmental websites such as the NHS is to provide information on a 'need-to-know' basis with the aim being to supply authentic information as opposed to eliciting emotional reactions or inducing panic. Therefore, usage of these fact based websites may prove an effective way to stop emotional and fear contagion through media consumption. This approach has been suggested as the best way to manage psychological distress from repeated media exposure to COVID-19 related news, as it allows people to access appropriate and critical information about the virus without overloading themselves⁶⁴. Television was the main news source used, and research suggests that many people rely on television as they perceive it to be more trustworthy than other news sources, such as social media⁶¹.

Our arguments about websites and social media may be considered in view of the hyper-linked media systems where all forms of media seamlessly blend into each other. Such a complex informational ecosystem is cohabited by individual and institutional sources of amplification of risk⁶⁵, with each actor and channel contributing to emotional contagion of outbreak news in different ways as was seen during the Ebola crisis⁷. Given that social media use was highest amongst 18-39 year olds, and this group had higher levels of food insecurity, this contributes to the idea that emotional contagion through social media was at play here, leading to these higher levels of food insecurity and hoarding behaviour amongst this age group. It is important to note that not all forms of social media may lead to information overload, and some forms of social media have been used to provide support to others during the pandemic, such as Facebook. Hundreds of Facebook community support groups were set up in March⁶⁶ helping to build solidarity in local communities and provide support for

vulnerable people. This sense of community provides an important indicator of people's desire to stockpile, and those who score higher in Honesty-Humility on the HEXACO scale are less likely to stockpile because they care about the welfare of others and the negative impact of stockpiling on the wider community⁶⁷. Therefore, if people have engaged extensively in social media during the pandemic and participated in these community groups, they may be less likely to display hoarding behaviours.

CONCLUSION

The aim of this study was to contribute to a growing understanding of food insecurity and hoarding behaviours during pandemics by considering the role of sociodemographic differences and different forms of media. We found that both these tendencies were higher in higher in younger and poorer income groups and identified the role of online and social media in catalysing these behaviours. The implications of these findings are especially relevant to the nutrition education community who may target community interventions towards these vulnerable groups. Also, these findings, in concert with extant research, call for the nutrition education community to have a more concerted presence on online and social media platforms, so that communication campaigns can be geared towards alleviating panic and anxiety and providing accurate information. These efforts might be especially relevant in contexts such as the UK and the US which are characterised by high levels of diet-related chronic conditions such as diabetes and socioeconomic disparities acting as barriers to food and nutritional diets.

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Table 1: Sociodemographic profile of survey participants

Demographics	n	%
Gender:		
Male	25	12.3
Female	175	86.2
Other/Prefer not to say	1	0.5
Age:		
18-39	105	51.7
40 and over	91	44.8
Education:		
Undergraduate degree or below	103	50.7
Postgraduate degree or above	97	47.8
Household income:		
£0-20,000	52	25.6
£20-50,000	85	41.9
£50,000 and over	63	31.0

Table 2: Age-based comparison of media consumption, food insecurity and hoarding behaviours

Variable	18-30 years		31-40 years		<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Traditional Media	8.13	3.18	8.74	3.05	0.18
Websites	3.77	1.99	3.84	1.77	0.80
Social Media	3.67	1.59	2.96	1.65	0.004
Food Insecurity Perceptions	1.47	0.62	1.13	0.28	<0.001
Hoarding Behaviours	2.30	0.63	1.91	0.60	<0.001

Table 3: Differences in media consumption, food insecurity perceptions and hoarding behaviours between different income groups in the UK

Variables	£0-20,000 M(SD)	£20-50,000 M(SD)	>£50,000 M(SD)	Sum of Squ	Df	F	P value
Traditional Media	7.78(3.21)	8.63(3.09)	8.70(3.17)	28.80	2	1.45	0.24
Websites	4.11(1.97)	3.55(1.84)	3.89(1.82)	9.76	2	1.40	0.25
Social media	3.60(1.68)	3.44(1.68)	3.12(1.60)	6.29	2	1.15	0.32
Food Insecurity Perceptions	1.52(0.66)	1.27(0.45)	1.22(0.49)	2.59	2	4.77	0.01
Food Hoarding Beha	2.24(0.76)	2.14(0.58)	1.98(0.62)	1.83	2	2.20	0.11

Df indicates degrees of freedom.

Table 4. Sociodemographic, media consumption and priming factors predicting food insecurity perceptions and hoarding behaviours

Predictors	B	p	F	R ²
Food Insecurity Perceptions Model				
Age	-0.1	0.001**	11.38	0.28
Education	-0.008	0.13		
Income	-0.008	0.003**		
Gender	0.16	0.09		
Websites	0.08	0.001**		
Priming: Food shopping related	0.03	0.05		
Hoarding Behaviour Model				
Age	-0.30	0.001**	9.83	0.001**
Education	0.20	0.13		
Income	-0.01	0.83		
Gender	0.12	0.33		
Priming: Supermarket-related	0.14	0.001**		
Frequency social media	0.06	0.01**		