Factors influencing the perception and decision-making process of consumers on the choice of healthier foods in the United Kingdom: A systematic review using narrative synthesis

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Abstract

The perception that foods are eaten primarily to meet physiological and nutritional needs is nowadays understood as an outdated concept. Substantial empirical literatures have proven that diverse factors influence consumers' decisions in choosing healthy foods and diets, but the process of food choice remains complex.

In this review, the consumers' perceptions on food choices are explored and the key factors that influence food choices among the United Kingdom consumers are identified. The findings of this review were reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The identified food choice factors were categorised into product, person and environmental (social, economic, and informational) related factors. Interventions that would improve awareness of healthier food choices and negative impacts of factors influencing food choices are recommended. Studies on consumer behaviours around perceptions and choices of foods are scanty in the UK, and the limitations identified in this systematic review are to be addressed in future research.

Keywords*:* Food choices, consumer behaviours, healthy eating, nutrition

1. Introduction

The process of food choice is complex, and it varies for individuals (Kaya, 2016). Apart from hunger and satiety, people consume foods for many reasons and a plethora of factors that influence an individual's choice of foods have been identified in many previous studies (European Food Information Council, EUFIC, 2005; Sommer *et al.*, 2012; Stevano, Johnston and Codjoe, 2020).

The identified factors that have impact on perceptions and decision making in food choices include availability, cultural influences, education and knowledge, healthiness, hunger, labelling, likeability, palatability, personal preferences, price, psychological factors, religion and beliefs, social influences, sustainability and taste (Dye and Blundell, 1997; World Health Organisation, WHO, 2004; Balcombe, Fraser and Falco, 2010; Baglione, Tucci and Stanton, 2012; Leng *et al.*, 2017; Mantzari *et al.*, 2020). These factors have indirect effects on the health and wellbeing of an individual (Musonda et al., 2015). Factors that influence food choices have been categorised by various researchers (Contento, 2008; Lockie et al., 2004; Makatouni, 2002), in this review, the factors that are associated with informed food choices are categorised according to Contento, (2008), with some modifications.

In the UK, the growth of diet-related illnesses have over the years, identified a need for a shift in consumers' diets (Jeruszka-Bielak et al., 2018; Leng et al., 2017). For example, Gao et al. (2021), Sami *et al.* (2017), Aalaa *et al.* (2012), Forman, Stampfer and Curhan (2009) and Morris *et al.* (2005) reported a change in eating behaviours and lifestyles of people living with diabetes, hypertension, and other non-communicable diseases.

More recently, researchers were presented with the opportunity of exploring and accumulating evidence on consumers' behaviours during the outbreak of a respiratory

47 syndrome coronavirus SAR-Cov-2 (Covid-19). Alterations in the eating behaviours of
48 consumers such as the shift towards healthy eating and consumption of food supplements
49 during the pandemic, have been identified and discussed in some recent studies (Ogundijo,
50 Tas and Onarinde, 2021a; Di Renzo *et al.*, 2020; Ben Hassen, El Bilali and Allahyari, 2020).

51 In this systematic review (SR) the behaviours of the UK consumers on healthy food choices
52 were critically examined. The review aimed to critically review, appraise, and evaluate the
53 quality of existing information on the factors that influence food choice among the UK
54 residents, identify gaps in knowledge on consumers' perception and decision making on food
55 choices and recommend interventions on consumer food choice behaviours in the UK.

56 Particular outcomes from the systematic review were envisaged, and the following two
57 hypotheses were proposed during the development of the research protocol:

58 Hypothesis 1. Sociodemographic characteristics of consumers such as age, gender, level of
59 education, ethnicity and employment status are expected to be the factors most influencing
60 food choice because of the high level of diversity of these characteristics in the UK.

61 Hypothesis 2. Due to the increasing awareness on nutrition via nutrition labels and available
62 information in the UK media on the prevention and control of the risk factors of non-
63 communicable diseases (such as diabetes, obesity and overweight), most participants in the
64 studies included were expected to choose their diets based on their health status.

65

66 ## 2. Methodology

67 In order to arrive at reproducible findings, the guidelines of Cochrane reviews were used to
68 identify, screen, include, assess and analyse relevant studies on the factors that influence

food choices (Moher et al., 2016; Starr et al., 2009). An evidence-based tool, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[1] was used to test for the credibility of the included studies, (Moher *et al.,* 2009).

2.1 Research design

Firstly, a research area was identified from the gaps in the literature and the aims and objectives for the SR were clarified. Then a protocol showing the steps to be undertaken in the study was developed. The selection of articles was undertaken based on the inclusion criteria and appraised accordingly. Empirical studies have shown that the effectiveness of a SR depends on its quality, therefore, a high-quality appraisal was done to test the reliability of the included articles using the Critical Appraisal Skills Programme [CASP][2] checklist (CASP, 2018) and Cochrane qualitative assessment recommendations. A narrative synthesis approach was used to present the findings of the included studies, because the extracted data could not be analysed using meta-analysis.

Inclusion and exclusion criteria

The inclusion criteria were set from the development of the review protocol and comprised primary studies that focus on the factors that influence the perception and decision making of UK consumers around healthy food choice and limited to those between 2000 to 2021. The inclusion and exclusion criteria used in this study are presented in Table 1.

[1] http://www.prisma-statement.org/
[2] http://www.casp-uk.net/

Justification for exclusion

Primary studies were only used in this study because of their content benefits (Galvan, 2006). The in-depth descriptions of the overall study, presentation of methods and the discussion of findings made primary studies more important than secondary studies (Galvan, 2013; Persaud, 2010). Nonetheless, secondary studies were used to help provide interpretations and support theoretical and methodological decisions from which evidence was gathered (Gidley, 2012).

Studies where children and adolescents under 18 years of age make eating decisions were excluded, this is because there is a clear evidence that children and adolescents are a vulnerable population, whose decisions were reported to be easily influenced by factors such as parents/carers and peer groups (Campbell *et al.*, 2014; Harris, Bargh and Brownell, 2009).

The studies were limited to the UK and to a fixed duration. Although Lichtenstein, Yetley and Lau (2008) suggested that the search for articles to be included in a SR should cover many decades, Chalmers, Hedges and Cooper (2002) and Starr *et al.* (2009) have argued that limiting an articles search to a couple of decades will capture the most important and relevant articles in the field. It is therefore believed that limiting the articles search to between the years 2000 and 2021 will capture sufficient material for this SR. The search was limited to articles in English language only owing to resource and time constraints and the potential reliability of translations.

2.2 Search strategy

The search strategy tool used for identifying relevant studies is the Advanced search tool of the EBSCOhost's Academic-Search-complete[3] of the University of Lincoln. Academic Search Complete is a single search tool that comprises various incorporated databases such as Food Science Source, British Education Index, PubMed. Cochrane Library, CINAHL Complete, Gale Academic OneFile, PsycInfo, Science Citation Index, ScienceDirect, Scopus®, Food Science and Technology Abstracts, Social Sciences Citation Index, etc.

Keywords such as 'perceive OR perception' AND 'choice OR choose' OR 'choosing OR decision' AND 'food OR foods' AND 'consume OR consumers OR consuming' were identified from the title of the study and were searched in the electronic databases. The keywords or themes of this SR study were listed and made into search terms (free text). Firstly, all published research articles on the topic were comprehensively searched without any limitation to eligibility criteria and the retrieved articles were then screened based on the inclusion and exclusion criteria as presented in Table 1.

Further searches were carried out on relevant food and nutrition and consumers' websites (such as the Food Standard Agency (FSA), the Department of Health and Social Care (DHSC), Consumers reports, New Food, Westminster Food and Nutrition Forum and Department for Food and Rural Affairs, (DEFRA) and the reference lists of the searched articles were also used to retrieve articles relevant to the study. Two articles were obtained via the University of

[3] The EBSCOhost's Academic Search complete is a single search tool with multi-disciplinary full-text database that is widely recognised. It has more than 8,500 full-text periodicals and include above 7,300 peer-reviewed journals. This scholar database also provides titles, indexing, monographs, abstracts, reports, references and conference proceedings of various publications.

129 Lincoln inter-library loans system. All identified research articles were managed by using the
130 Mendeley Reference Manager (v2.44.1) software.

131

132 ***2.3 Screening strategy and selection process***

133 Critical evaluation of articles is crucial before appraising and synthesising. Inclusion and
134 exclusion criteria were therefore used to screen and sort the retrieved titles and abstracts of
135 the potentially relevant articles. All duplicates of articles and studies which did not met the
136 eligibility criteria were excluded. A full text review on the factors behind food choices and the
137 perceptions of consumers around decision making for healthier foods was then carried out to
138 remove further articles which could not be screened via the titles or abstracts.

139 Four thousand, three hundred and forty-four (n=4,344) studies were initially retrieved and
140 seventeen (n=17) more were captured during the selection process. Only one hundred and
141 ninety-seven (n=197) studies were obtained after excluding those that do not fully meet the
142 inclusion criteria. The screening further excluded (n=164) papers which were secondary
143 studies (such as reviews, reports, comments and replies), studies that were not solely done
144 in the UK, studies that did not measure the perceptions and factors behind consumer decision
145 making, and studies where choices on foods were not made. Twenty-two (n=22) studies were
146 eligible for full text reading. Eight studies (n=8) were excluded during the full reading, (n=3)
147 because they were not consumer and food related, (n=1) focused on hospital patients who
148 did not make decision themselves and (n=4) were critiques of another's work. In total, 15
149 articles were included in the study, of which eight of them were qualitative (53%), four of
150 them quantitative (27%) and three were mixed method (20%) studies. The PRISMA diagram
151 that shows the how the studies were selected is presented in Figure 1.

2.4 Ethical considerations

Ethics in systematic reviews are rarely discussed in detail by authors of existing reviews (Suri, 2020; Bettany-Saltikov and McSherry, 2016). This is not because ethics approval is not necessary, but because systematic reviews are not primary researches which involve human participants (Adeoye-Agboola *et al.*, 2016; Harlen and Deakin Crick, 2004). Therefore, ethics approval was not sought for this systematic review, but attention was given to the process of ethics approval in the included primary studies.

2.5 Quality assessment and critical appraisal of the included studies

To avoid content bias, quality assessments were carried on the data extracted. Appraising included articles in a review helps in identifying their strengths and limitations (Porritt et al., 2014). The quality assessment was done by one of the reviewers and it was discussed with the other two reviewers. The studies that used mixed method approach were appraised qualitatively and quantitatively.

The qualitative studies were assessed by the use of CASP checklist (CASP, 2018). This checklist measured both the internal and external validity of the studies. All qualitative studies (n=8) included (Ford *et al.*, 2020; Mantzari *et al.*, 2020; Prescott *et al.*, 2020; Zandstra, Willems and Lion, 2018; Larkin and Martin, 2016; Sommer *et al.*, 2012; Carrigan, Szmigin and Leek, 2006; Makatouni, 2002) met 80% of the criteria.

The quality assessment of the quantitative studies was done by using Cochrane's recommendations of 'High quality', 'Medium quality' and 'Low quality' (Smith *et al.,* 2011).

The overarching aim of critically appraising quantitative studies is to assess if the studies adequately address the research questions through their processes, contexts, and outcomes (Hannes, 2011). The eligible articles were subjected to quality assessment by categorising them into high, medium and low quality according to Cochrane recommendations, which were used by Smith *et al.* (2011), Higginbottom *et al.* (2014) and Alderdice *et al.* (2013).

The quantitative articles were assessed based on the following weighting criteria:

'High quality'—Articles must have evidence of search strategy, selection and inclusion criteria, address publication bias and signpost heterogeneity in methods or results.

'Medium quality'—A study that did not address bias or heterogeneity but had evidence of the selection and inclusion criteria and search strategy.

'Low quality' —A study with only evidence of search strategy but no evidence of other quality assessment criteria.

As shown in Table 2, five of the seven eligible quantitative articles (including quantitative aspects of mixed method articles) fell into high quality, while two were of medium quality. None of the included studies were of low quality, possibly due to the rigorous screening that was done during the study selection.

2.6 Data synthesis

Analytical and descriptive data are the two main types of data that were extracted, and a summary of information collected is presented in Table 3. A narrative synthesis approach was used to synthesise all the included study data. Narrative synthesis (NS) has been found to be relevant in synthesising any type of data in systematic reviews (Bettany-Saltikov & McSherry,

196 2016). Although Pope, Mays and Popay (2006) and Dixon-Woods *et al.* (2005) pinpointed the
197 lack of transparency and clarity as the limitations to using NS as a method for presenting
198 findings in SR studies, a robust guidance on how narrative synthesis can be done in a more
199 transparent and systematic way has been provided by Popay *et al.* (2006) and Moher *et al.*
200 (2016). Statistical meta-analysis that measures inconsistency across all the studies could not
201 be done, this is because the quantitative data were insufficient and not homogenous. The
202 extracted information from the included articles was therefore categorised to meet the
203 objectives of this study and conclusions were drawn based on the quality of the findings.

204

205 ## 3. Results and discussion

206 ### *3.1 General characteristics of the included studies*

207 Eight (n=8) of the included studies used qualitative research design, three (n=3) used
208 quantitative research design and four (n=4) used a mixed method approach, both qualitative
209 and quantitative methods. The qualitative design studies included used laddering interviews,
210 experimental factorial design, focus groups, semi-structured interview, and randomised
211 controlled laboratory experiment/intervention experiment to determine the factors that
212 influence the choice of healthier foods among the consumers in the UK. While choice
213 experiments and surveys were the quantitative research methods used in the included
214 studies, there were a combination of either interview or focus group or observations
215 (qualitative) and surveys (quantitative) applied in the mixed method studies.

216 As shown in Table 4, the studies vary in research focus, sample size, target audience, methods
217 of data collection and the identified factors for food choice. All measured the perceptions
218 and choices of the participants, but in terms of the research focus, 36% (n=5) of the included

articles centred on food and nutrition labelling, while functional genetically modified (GM) foods, food allergens, organic foods and routine diets were covered by other included studies. The criteria for choosing the participants were described in 87% of the included studies, and all the methods used for analysing both the qualitative and quantitative data across the studies were showcased. Only 26% of the studies carried out sample size/power calculations.

3.2 Consumers' definition of healthy food

In view of the fact that food choice and eating behaviours vary from consumer to consumer, it was expected that consumers' definition of health food would be shown to vary during this systematic review. For example, an obese consumer's definition of healthy foods based on caloric content differs from that of a consumer with normal weight (Larkin & Martin, 2016). It was hypothesised during the development of the protocol of this review that most of the participants would prefer to choose their diets based on their health because of increasing awareness of nutrition, diets, and health in the UK. The most influencing factor for food choices in some of the studies, such as Cole, Peek and Cowen (2019) and Balcombe, Fraser and Falco (2010) were said to be healthiness, but explanations on the choice of 'healthy' foods in studies that use quantitative methods were barely given.

Conventionally, healthy foods generally contain moderate amounts of energy, low fat, low salt and low sugar (Department of Health, 2011). In a choice experimental study where participants defined heathy food products as 'foods with far fewer calories', it was pinpointed that perception of healthiness of foods depend on the consumer's weight (Larkin & Martin, 2016). While exploring consumers' behaviours on the choice of organic foods, some participants who regularly purchase organic foods defined healthy foods as foods with

242 ‘natural raw materials, better taste, better texture, and those which are cooked from scratch’
243 (Makatouni, 2002, p5).

244 While trying to differentiate heathy and less healthy foods, the parents and carers of children
245 reportedly claim that they are faced with pressures when making healthy food choices, and
246 one of the participants described less healthy foods as being sugary or salty:

247 *“I'm aware that I'm feeding my son quite a lot of sugary, and occasionally, salty products”*
248 (Ford *et al.*, 2020, p4).

249 Some of the participants in the included studies found it difficult to differentiate between
250 healthy and unhealthy foods. According to one of the participants:

251 *“You get those shaker pouch things, and they are ideal for a school lunchbox, but it's got like*
252 *chocolate buttons and things in it. I just don't understand. Things like that confuse me because*
253 *I think right that probably is quite healthy, even though I know it's got chocolate buttons in it”*
254 (Ford *et al.*, 2020, p4).

255 While fresh fruits, vegetables, water, non-sugary drinks and fruit juices were said to be
256 healthy in the included studies, examples of food products that were considered unhealthy
257 included cakes, salted mixed nuts, sweets, yogurt coated blueberries, dried fruits, sugary fizzy
258 drinks, cereal bars and chocolates (Ford *et al.*, 2020; Larkin and Martin, 2016).

259

260 **3.3 Factors associated with informed food choices**

261 Factors that determine the choice of foods and food products by UK consumers were
262 addressed by all the studies. The factors that influence food choices of participants are
263 healthiness, past experience, price, socio-economic position, emotion, availability, and

promotion information or messages. The factors are categorised as product-related, environmental factors and person-related factors as shown in Figure 2.

3.3.1 Product-related factors

i. Diet's healthiness

Half of the studies reported that consumers made informed food choices based on the perceived healthiness of the food or health consciousness of the participants. This factor that determines food choices by consumers has been identified to be essential by Cole, Peek and Cowen (2019), Balcombe, Fraser and Falco (2010), Ford *et al.* (2020), Larkin and Martin (2016), Makatouni (2002), Sommer *et al.* (2012) and Grunert, Wills and Fernández-Celemín (2010).

Cole, Peek and Cowen (2019) and Balcombe, Fraser and Falco (2010) for example, reported 83.5% and 94% respectively of participants used the traffic light system as nutritional guidance when making decisions on healthier food choices. The importance of consumers considering their health when choosing foods has also been emphasised by Makatouni (2002) and Sommer *et al.* (2012).

Balcombe, Fraser and Falco (2010) and Sommer *et al.* (2012) found that consumers were willing to choose healthy foods and willing to pay (WTP) more for them during food shopping. Grunert, Wills and Fernández-Celemín (2010) reported that 88% of the participants were able to clearly differentiate between food products that are healthy and unhealthy using only the nutrition labels.

ii. Past experience

During an organoleptic assessment of food products, Chong *et al.* (2019) reported that 70% of the participants consume striploin steak based on their past experience of the palatability

of the beef. The participants felt that the healthiness of the beef they consume is not as important as the palatability they have enjoyed over time, and they were willing to pay more for what they were used to. This pinpoints that the previous experience that consumers have had with a food is a factor for food choice.

3.3.2 Environmental factors

i. Cost of the food products / Price ***(economic environment)***

The price of foods and food products is also a factor that was identified for choosing foods in this review. Weatherell, Tregear and Allinson (2003), Carrigan, Szmigin and Leek (2006), Ison and Kontoleon (2014) and Cole, Peek and Cowen (2019) found that the participants in their studies were willing to pay more for the foods they choose. Carrigan, Szmigin and Leek (2006) found out that all the interviewees would pay extra for convenience foods because of their busy schedules. However, it was also reported that some consumers could not afford to buy some of the healthier food products because of the cost or price (Puddephatt et al., 2020)

ii. Socio-economic position or status ***(social environment)***

Even though this is not the influential factor with regards to food choices, the socioeconomic status of the participants was also seen as indicator for making informed decisions on food choices across the studies. Socio-economic status as a determinant for food choices in the studies comprises a combination of socioeconomic indicators of education, income, and employment. The participants' responses were grouped based on these criteria, and conclusions were drawn from their behaviours towards diet behaviours in Mantzari *et al.* (2020), Chong *et al.* (2019), Cole, Peek and Cowen (2019), Ison and Kontoleon (2014), Sommer

et al. (2012), Balcombe, Fraser and Falco (2010) and Carrigan, Szmigin and Leek (2006). Buckton, Lean and Combet (2015) reported that the socio-economic position of the participants was the factor most influencing food choice. Socio-economic status seemed to have beneficial implications for the behaviours of consumers as regards healthy food selection was seen by Balcombe, Fraser and Falco (2010), where 60% of the participants were in employment and about 50% have at least an A Level qualification. These attributes could have contributed to the higher number (n=448, 94%) of the participants who claimed to be health conscious during food shopping.

*iii. Promotion messages (**Informational environment)***

Contento, (2008) reiterated the impacts of informative environment such as advertisement and media promotion on how consumers make informed food choices. In this review, two of the included studies showed how promotion messages had impacts on the decision-making process of consumers on food choices. Zandstra, Willems and Lion (2018) found out that consumers make informed decisions during food shopping based on the nutrition, sensory and social promotion messages on the front of pack labels. Buckton, Lean and Combet (2015) also found that the language used for the health promotion messages greatly influenced how consumers choose their foods. For example, the use of diet and weight management and balance and moderation of macronutrients were used as health promotion messages.

3.3.3 Person-related factors

i. Income

Only one study critically examined the impacts of income on how consumers make informed food choices. Puddephatt *et al.* (2020) established that the income of consumers is the most influencing factor for eating behaviours. Some of the participants that relied on food banks claimed that they were left with *'*forced choice' of choosing from the available food products and attributed the 'no choice' to the low level of their income. One of them stated:

"… by the time they take off what they have to take off I only end up with £79 a fortnight. And then I have to pay bills out of that as well. It's like I got paid yesterday and I had £15 left so I have no money to get shopping …" (Puddephatt *et al.*, 2020, p4).

ii. Emotion

Perhaps unsurprisingly, when exploring the factors that influence food choices of food-allergic consumers in a qualitative focus group study, Sommer *et al.* (2012) found that the emotion of the diagnosed food-allergic (DFA) and self-reported food-allergic (SFA) or intolerant consumers strongly influenced their food choices. Unlike the non-food allergic (NFA) consumers, the DFA and SFA consumers were reported to have difficulties with choosing safe foods during food shopping, and *"did not have satisfaction and pleasure from foods"* (Sommer *et al.,* 2012*,* pg. 1).

As presented in Figure 2, the attitudes, and behaviours of consumers towards preference, cost and nutrition has a correlation with food choice. This explains how the attitudes or behaviours of consumers take precedence over other factors influencing food choice (Contento, 2008; Petrovici and Paliwoda, 2008). Contento, (2008) presented how the factors of food choices are related to the product, the person, and/or the environment.

The past experience of consumers around their diets, and the emotions that are attached with eating are two major psychological factors that influence the attitudes of the consumers (Chong *et al.*, 2019; Sommer *et al.*, 2012). These two factors are directly linked with a habitual framework of attitudes and behaviours as shown in Figure 2. Similar to Chong *et al.* (2019) where consumers chose beef based on their experience of palatability, taste and succulence, Barnett *et al.* (2013) reported how past knowledge about food products make consumers have trust in their foods. In some instances, consumers claimed that they do not bother to read labels on their food products because of their past consumption experience. One consumer said: *"I could almost say yes without looking at the ingredients for these ones because I've eaten them lots of times before"* (Barnett *et al.*, 2013, p4).

In the reviewed articles, the emotions of consumers were also pinpointed as contributing choice factors towards food attitudes and behaviours, for example, where people with allergies use eating as a medium of combating stress and for expressing pleasure (Sommer et al., 2012). Although existing studies, (such as Barthomeuf, Rousset and Droit-Volet, 2009; Leigh Gibson, 2006) suggest that the relationship between emotions and eating remain unclear, in some instances, emotions have been found to regulate eating and vice versa (Macht, 2008; Bekker, Van De Meerendonk and Mollerus, 2004; Bellisle *et al.*, 1990). Sadness, anxiousness, sleepiness, stress, anger, happiness, pleasure, and other emotional states of mind have been identified to influence consumer eating behaviours (Macht, 2008; Leigh Gibson, 2006; Devine, 2005). For example, a loss of appetite has been observed in men that were scheduled for surgery, primarily due to their anxiety (Ayik and Özden, 2018; Bellisle *et al.*, 1990).

Contrary to the study of Livingstone and Helsper (2006), Young (2003) and Duffy (1999) which reported, perhaps surprisingly, that there is little or no evidence that advertising affects the eating and purchasing behaviours of some consumers in the UK, more recently, some of the included studies in this review stated that health and nutrition promotional messaging on the products' labels and those used in advertisement/media have a major impact on consumers' choices (Zandstra, Willems and Lion, 2018; Buckton, Lean and Combet, 2015).

Food labels play an important role in giving consumers informed choices in supermarkets while shopping (Barnett *et al.*, 2013; Livingstone and Helsper, 2006; Duffy, 1999). The use of front of pack (FoP) labelling by manufacturers and retailers is prevalent on food products in the UK retail market (Ogundijo, Tas and Onarinde, 2021b). Food manufacturers are now using various types of labelling formats above and beyond any legal requirements to convince consumers around healthier choices. The effective use of traffic light labels, warning labels, front of pack messages and languages as tools for food choices were demonstrated across the included studies.

Participants in three of the studies claimed that they mostly purchase foods with low prices, and price was identified as the factor most influencing their food choices. While 98.3% of the participants in the Ison and Kontoleon (2014) study were willing to buy functional genetically modified foods at a 13% discounted price, all the participants in Carrigan, Szmigin and Leek (2006) claimed that they choose to consume convenience foods because they are generally cheaper than homemade foods. Moreover, 95% of the participants in Weatherell, Tregear and Allinson (2003) said they would be motivated to purchase local foods from farm shops because of the low cost.

Ford *et al.* (2020) recorded several impulse buys by consumers at the checkouts in the UK food supermarkets. It was evident that consumers, especially children, are easily 'tempted' or they can pressurise parents to buy foods that are strategically placed and displayed at various locations in supermarkets.

3.4 Changes in consumers food preferences and choices

The evaluative attitudes of people towards foods vary from one individual to another, and these were measured across the studies. As the understanding and knowledge of consumers on foods, health and wellbeing continue to increase, consumers try as much as possible to change diets amidst complex food choices. Buckton, Lean and Combet (2015) recommended approaches that might cause a positive shift in the preferences, choice of healthy foods and eating habits of consumers.

3.4.1 Nutritional reasons

Cole, Peek and Cowen (2019), Grunert, Wills and Fernández-Celemín (2010) and Balcombe, Fraser and Falco (2010) noted an increase in the level of awareness among UK consumers towards avoiding foods with high nutrients ('red') which are displayed on nutritional labels. Consumers are now generally being more cautious about their diets as the incidence of diet-related illness increases.

3.4.2 Financial reasons

The participants in Puddephatt *et al.* (2020), Chong *et al.* (2019) and Sommer *et al.* (2012) emphasised how the level of their income dictates their food purchasing behaviours. For

example, all the participants in Puddephatt *et al.* (2020) reported a constant struggle to afford food.

3.4.3 Food supermarkets/ stores

One study reported that it is difficult for consumers to resist foods at the checkouts in supermarkets even though they are aware of the foods' unhealthiness. One of the participants stated:

"It's at the checkout you always have that we kind of impulse buy at the end" (Ford *et al.*, 2020, p4).

The increasing concerns of UK consumers on the deliberate positioning of high-calorie food items at tills in supermarkets has forced retailers to be committed to removing less healthy foods from these locations (Ford et al., 2020).

Some consumers' food preferences may change if the foods in the supermarkets are limited or unavailable, and they need to travel a distance before they could find foods of their choice. For example, Sommer *et al.* (2012) reported some of the limitations that some of the participants who are allergic or intolerant are confronted with when selecting foods in store, they were reported to sticking to only the familiar foods because of risks of adverse reactions.

3.4.4 Environmental impacts

Only one study recorded how the environment has impacted consumer food choices. Makatouni (2002) emphasised the effects of the use of pesticides and the space for rearing on the environment. As there is a growing awareness on the environment, a shift in consumer preferences is inevitable, especially by the supporters of environmental campaigning. The recent body of scientific evidence on food choice models not only include psychological,

cultural and biological influencing predictors, but also environmental indicators (Wetter *et al.*, 2009; Booth *et al.*, 2001).

3.4.5 Health consciousness

Negative emotional arousal was seen in a choice experiment where a shift in the choice of sugar-sweetened beverages was observed in participants after exposure to an image showing the consequence of excessive sugar consumption (Mantzari et al., 2020). A fizzy drink sample with an image of rotten teeth caused by excessive sugar consumption demotivated 83% of the participants from choosing the sweetened drink they would have initially chosen. A similar study demonstrated how salt-reduced products could be made appealing to consumers using front of pack labelling to communicate the effects of excessive salt consumption over time (Zandstra et al., 2018). A shift from the consumption of sweetened food products is likely to be seen among the consumers if the food manufacturers continue to signpost images of health implications of the food contents (Mantzari *et al.*, 2020).

3.4.6 Time and energy saving (convenience) foods

Carrigan, Szmigin and Leek (2006) forecast a surge in the consumption of convenience foods over time. As the size of UK families becomes bigger[4], preference for the convenience foods is expected to increase compared to homemade foods. Jackson and Viehoff (2016) and Buckley *et al.* (2005) reported how the convenience food sector has grown over the last two decades, and more recently how factory-made ready meals and soups (dry and wet) account for about 6% of the overall global food markets (Statista Consumer Market Outlook, 2021).

[4] https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2020

457

458 **3.5 Implications of food choice among consumers**

459 All the factors that influence the choices of food products could have either positive or
460 negative impacts on the consumers. While the decisive factors that motivate consumers to
461 make healthy food choices are referred to as *'positive factors',* the negative impact as a result
462 of choices of foods are *'negative factors'* in this study. All the studies reported the implications
463 (benefits or effects) of the influencing factors on the consumers, and these are categorised as
464 either positive or negative factors influencing food choices.

465 *3.5.1 Positive factors influencing food choice*

466 The use of traffic light and warning labels on food products help consumers to make healthier
467 food choices more easily (Mantzari *et al.*, 2020; Cole, Peek and Cowen, 2019; Balcombe,
468 Fraser and Falco, 2010; Grunert, Wills and Fernández-Celemín, 2010). The traffic light system
469 is a front of pack labelling format that was introduced by the UK FSA for effective healthier
470 food choices in response to the increase in diet related diseases (FSA, 2016). This tool is used
471 by consumers to avoid foods that were least healthy (predominant in red coloured
472 constituents) and for assessing the nutrients in the food products during shopping (Mantzari,
473 2018; Balcombe, Fraser and Falco, 2010). Nutrition labels in various formats such as the UK
474 Traffic light system and Chilean warning labels have been identified to positively help
475 consumers to differentiate between healthy, moderately healthy and less healthy foods
476 (Ogundijo, Tas and Onarinde, 2021b; Tas *et al.*, 2020).

477 The use of health and nutrition promotional messages to make salt reduced foods appealing
478 to consumers was also found to have a positive influence on consumers' health. Consumers
479 are encouraged to lower their salt consumption and improve their knowledge about

messaging used on healthy foods (Zandstra, Willems and Lion, 2018; Buckton, Lean and Combet, 2015). Less healthy foods with higher saturated fats, sugar, sodium and energy contents have been discouraged by nutritionists and dieticians due to their contribution to diet-related illnesses such as diabetes, obesity and overweight (FSA, 2016; Potvin Kent, Dubois and Wanless, 2011).

3.5.2 Negative impacts of factors influencing food choice

Participants in Puddephatt *et al.* (2020) claimed that they either skip meals, eat small portions or prioritise feeding their children because of their low income level. The accessibility of food banks and charities is a positive intervention that was put in place by the UK government to alleviate food insecurity (Puddephatt et al., 2020). Policies that will encourage people from disadvantaged communities to use such social programmes should therefore be encouraged.

The strategic placement of foods at checkouts and the underestimation of the amount of calories of 'healthy' foods densities nudge consumers to choose less healthy products which has a negative impacts on their nutrition, health and diet (Ford *et al.*, 2020; Larkin and Martin, 2016).

The unavailability of the food products that meet the needs of the consumers in nearby stores also has a negative impact on food choices. Consumers are sometimes left with choosing alternative products or incur costs of travelling to other stores. Weatherell, Tregear and Allinson, (2003) reported how the regular availability of beef is a major priority when making choices on buying food products from the farm shops.

Existing studies have also provided evidence that showcased the impacts of commercials and advertisements on the eating habits of consumers across different age groups. For example, children from families who always watch food advertisements on the television were found to consume lower amounts of heathy foods than children from families who do not watch food advertisements (Robinson *et al.*, 2017; Fulkerson *et al.*, 2014).

3.6 The limitations and implications of study to practice

Although having nutrition knowledge does not guarantee a good eating habit, an improvement in consumers' income and educating consumers on healthy eating are still essential for protecting consumers against the negative impacts of factors influencing food choice. These will help in the reduction of the effects of the contemporary diet-related diseases such as overweight, obesity, diabetes, and many non-communicable diseases.

It can be seen from the findings of this study that consumers' food choice is a complex phenomenon influenced by individuals` subjectivity. The empirical evidence on the factors that influence the decision-making process and food choices of consumers in the UK were provided in the included articles, however, most of the instruments that were used for the primary data collections were neither totally reliable nor validated (Table 4). Only 27% of the included studies conducted sample size calculation and presented the response rate, therefore, the statistical significance across the data could not be evaluated. The findings of this review were not also meta-analysable, because the statistical heterogeneity of the majority of the articles could not be adequately measured due to the lack of sufficient quantitative data.

The findings of the studies that used qualitative methods were more robust and in-depth because the actual experience of people on food choices were known, this was unlike the included quantitative studies where inferences were obtained from statistical data.

It is evident that the consumers' interest is tending towards the implications of nutrition and diets on health; future research should therefore focus on food choice predictors that are important for policymaking. Interventions on awareness that will encourage consumers to make healthier food choices are recommended. This review provides the insights on the shortcomings in the assessment of risk of bias across the included studies, incorporating these in future studies would provide more credible and reliable outcomes.

5. Conclusion

Empirical studies on the UK consumer behaviours around perceptions and choices of foods are still scanty and need researchers' attention. This systematic review provided a framework that shows how product-related, environmental, and person-related factors play vital roles on consumers attitudes and behaviours to foods. The healthiness of foods and consciousness of the consumers was found to be the most influencing factor for making informed food choices in the UK.

As hypothesised, the increasing awareness of nutrition as a result of the prevalence of risk factors of non-communicable diseases in the UK (such as diabetes, obesity and overweight), is making the UK consumers to be more conscious about their health status. This consciousness is seen in the negative emotional arousal and the demotivation of most of the participants on the choice of sugar-sweetened beverages and foods with excessive salt in the

included studies. Nonetheless, more work on the awareness of diets on consumers' health is still needed from the public health policymakers in the UK.

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