

Title: Adults understanding of food sustainability, their openness to change to a more sustainable diet, and comparison of food sustainability to other food choice motives.

Author: Joseph Muldoon

Student Number: 2113201

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Name of Student (Capital Letters):

DECLARATION

I certify that the whole of this work is the result of my individual effort, and that all sources have been acknowledged.

Signed Joseph Muldoon..... (Student)

Date 18/04/24.....

DECLARATION

I am satisfied that this work is the result of the Student's effort.

Signed (Lecturer)

Date

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Abstract

Consumers can help reduce the trajectory of environmental decline through their food choices. Food choices have been shown to be influenced by factors of price, convenience, sensory, familiarity and health to name a few. However few studies have examined how sustainable food choices measure alongside other food choices. Sustainable food can cover many factors such as environmental, animal welfare and human welfare (e.g. Fair Trade). This study assessed 85 adults through an online questionnaire to determine their sustainable food behaviours by evaluating their understanding and knowledge of food sustainability; willingness to change; and how food sustainability measured alongside other food choice motives. To evaluate this information validated measures were used including the Sustainable Food Choice Questionnaire (SUS-FCQ) developed by Verain et al., (2021). The results indicated overall consumers rated sustainability and health the most important factors of food choice. Socio-demographic data indicated significant differences between genders and level of education with environmental concerns the lowest factor of food choice. Results showed a positive understanding of food sustainability, a somewhat openness to change towards sustainable food, although novel foods the least considered option.

1. Introduction

1.1. Why food sustainability is important.

The current food system and inversely modern diets are intensifying sustainability challenges globally (WHO, 2019). The environmental impacts of current diets affect air and water quality, water availability, soil health, biodiversity loss and disappearing landscapes variations (Rippin et al., 2021). The production of food is the largest cause of global environmental change, responsible for up to 30% of greenhouse gas emissions (GHGE) (Willett et al., 2019). In food production it has been estimated that up to 57% of GHGE are a result of animal-based foods and 29% from plant-based foods (Xu et al., 2021). It is not only the cultivating of food that impacts GHGE but the supply chain incorporating the transportation, storage and packaging requiring much of the energy use (Shukla et al., 2019).

There is increasing acknowledgement that rigorous international policy is required to curb the upward trajectory of global warming and reduce GHGE, which are a result of human activities (IPCC, 2023). The UN has stated that “the world must transform its energy, industry, transport, food, agriculture and forestry systems to ensure that we can limit global temperature rise to well below 2°C, maybe even 1.5°C” (UN, 2023).

Presented with these overwhelming and alarming statistics the interpretation of what a sustainable diet is, is additionally multifaceted and open to misunderstanding. Although studies suggest that populations are somewhat aware (56%) that food production impacts on climate change, less than 20% knew how to change their diet to be more sustainable (Department for Environment, 2011). A 2022 UK survey of over 6000 people responded that less than half (48%) believing they knew what a sustainable diet consisted of, but only 16% reported what “is or isn’t” sustainable however, 71% could identify at least one barrier to stop them from changing to a sustainable diet (FSA, 2022).

1.2. Food Choices

Moving towards a more healthy and sustainable diet will be a challenging obstacle for consumers to overcome. Consumers have been seen to show a lack of knowledge about food sustainability with an added combination of prioritising certain food choices such as price, taste and health over sustainability presenting some challenges to overcome (Leila Cheikh Ismail et al., 2023). Furthermore, studies have reported consumers may embrace elements of food sustainability, whilst others report a hesitancy of adopting sustainable food behaviours (Springmann et al., 2018; Barone et al., 2020).

Discounting energy requirements and hunger, understanding the food choice of individuals is difficult to define which can be influenced by socio-demographic (Schliemann et al., 2019); a range of psychological determinants (Koster, 2009); environmental and/or social norms (Nicklaus, 2023); and the availability, or appearance of food and how it is sold to us (Ensaff, 2021). Added to this complexity of defining a sustainable diet along with understanding

what is a sustainable diet is additionally challenging (MacDiarmid, 2013). Perspectives on food choice motives (FCM) can provide beneficial insights of food choices of individuals, as demonstrated by Steptoe et al., (1995); Sun Y, (2008); Heitor et al., (2015) to name but a few. Food choice can indicate consumers' motives or reasons for choosing or consuming food (Pollard, Steptoe and Wardle, 1998) whereas external factors (retail environment or product packaging) tease or pluck on consumers' willingness to purchase a product (Castro et al., 2018). Furthermore, understanding of consumers FCM has provided valuable perspectives of sustainable food consumption (Verain, Dagevos and Antonides, 2015).

1.3. Sustainable Food Choice

The seminal Food Choice Questionnaire (FCQ) by Steptoe et al., (1995) lacked the dimensions to explore sustainability motives, with 'ethical concern' not given the weighty impact of other dimensions. An added dimension, 'environmental concern' by (Lindeman and Väänänen, 2000) was incorporated to cover sustainability alongside 'animal welfare' as subscales of general sustainability. While these motives can confirm sustainable food choices, other motives could be viewed as a hurdle, such as availability or cost. Furthermore, why individuals decide to consume the food they do may conflict with sustainability motives. Izmirli and Phillips (2011) found that some vegans avoided meat for health reasons rather than environmental reasons. These differences highlight the importance of examining sustainability motives of individuals and the most recent Food Choice Questionnaire (SUS-FCQ), developed by Verain et al., (2021) will be utilised.

1.4. Aims and Objectives

Faced with the balance of consuming a healthy diet whilst respecting the environmental impacts presents consumers with an overwhelming conundrum. Understanding consumers knowledge of sustainability, along with a willingness to change and why we choose the foods we do, could improve guidance to consumers to achieve more sustainable healthy diets.

2. Review of Literature

Sustainable food consumption involves many facets e.g. animal welfare, food safety, food security, water usage, local and seasonal production, ethical working conditions to excessive waste (Hoek et al., 2021). The UN Food and Agriculture Organisation have expressed that “Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations” (FAO, 2010). Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy, while optimizing natural and human resources” (Willett et al., 2019). With this in mind it has been predicted that dietary changes towards a more sustainable healthier diet (SHD) could positively reduce GHGE by 29% (Springmann et al., 2018).

This transition to a more SHD has become en-vogue and much discussed in recent years with encouragement to increase consumption of more plant-based foods, whole-food grains and legumes, greater fibre intakes through fruit and vegetables contrasting with a reduction in animal-based foods (Brunin et al., 2022). Reducing animal-based food consumption will require overcoming strongly embedded beliefs around taste, traditions and social acceptance (Sanchez-Sabate and Sabaté, 2019). In-fact a study by Piazza et al., (2015) who compared meat eaters and vegetarians, found that the “necessity” (i.e. for survival) to eat meat was the greatest held belief, whilst vegetarians considered “naturalness” as their strongest towards their food choice. With estimates of 5% of populations practising a vegan or vegetarian diet there is a greater need to influence the meat eaters rather than “meat avoiders” (Segovia-Siapco, and Sabaté, 2019).

Opportunities to seek out consumers that are willing to change; the “meat reducers” or flexitarians; could add to the research and help direct behavioural change strategies (Dagevos and Voordouw, 2013). Verain, Dagevos and Antonides (2015) have framed this reduction or replacement of unsustainable foods as ‘curtailment’ which can be integral to aid the environmental impact of a person’s diet. It is known that moving diets to a more sustainable and healthier diet will require significant changes in peoples’ food choices (Shukla et al., 2019). Motivation plays a decisive role in behavioural change, however, there has been little research in establishing the interconnecting links of between FCM and sustainability in diets.

2.1. Sustainable Food Choices

Due to the complexity of a SHD all determinates should be considered and collectively valued to take account of their contributory positive or negative impacts, which can shape the order of importance on food consumption by consumers (Broom, 2019). Examining consumers food decisions or choices may elicit valuable insights on how consumers are willing to adopt a more SHD. A validated measure of FCM was devised by Steptoe et al., (1995), which analysed the order of importance of food choice by individuals.

To further along the research on consumers decisions to transition to a more SHD, the FCM has been updated to reflect this evolution (Lindeman & Väänänen, 2000; Dowd & Burke, 2013; Verain et al., 2021). Determinants such as Ethical concerns, Animal Welfare, Environmental Welfare, Local and Seasonal, Fair Trade and Organic encompass the upgraded FCM.

2.1.1 Ethical Concern

Whilst 'Ethical Concern' was in the original FCM by Steptoe et al., (1995), it was formed from three questions: - country of origin, labelling and packaging. This limitation resulted in its failure to translate the broader aspects of sustainability which may have corresponded to the low interest of participants from successive studies (Januszewska, Pieniak and Verbeke, 2011; Eertmans et al., 2005). Moreover FAO (2013) stated that there is no simple way to articulate what is Ethical, addressing food security alongside environmental perspectives must be tackled to oppose growing stresses that collectively influence economies, trade and nutrition (Fanzo, 2015).

Typically, environmental impacts of food production are conducted by measuring Life-cycle analysis (LCA) techniques, which tend to overlook social and economic impacts (Martinelli and Cavalli, 2019) and focus on cultivation, packaging and processing (Del Borghi et al., 2014).

2.1.2. Animal Welfare

Consideration for Animal Welfare could include poor treatment or cruelty of animals during rearing, transporting and slaughter (Kumar et al., 2017). Although many communities globally exist because of a particular animal production process thus should be considered part of the sustainable framework. It is recognised that unacceptable production practices due to the increasing consumer demand, alongside increasing production impacts and vastly differing legislation on best practices are resulting in animal welfare concerns (Broom, 2010). Furthermore, efficiencies of global communication through media awareness has raised the public interest and attention which has prompted much debate on animal production practices (Ethics Council Germany, 2020).

2.1.3. Environmental Welfare

To put food choices into context that relate to Environmental impacts, decisions on how it's prepared, how it's produced and packaged are considerations. It is acknowledged that agriculture is the greatest driver of GHGE in our food choice, however it is estimated that up to 20% is contributed from processing and transportation (Mackie and Wemhoff, 2020). Packaging of food adds to the concern of environmental impacts, from the raw materials used that exhaust natural resources and emit further GHGE in their manufacture (Kan and Miller, 2022). The packaging requires much water and energy throughout its production to

its conclusion of use resulting in additional waste and pollution (Deshwai et al., 2019). Furthermore, because packaging is generally single use it lessens recyclability and contributes to greater environmental problems due to this ending life waste (Geueke, Groh and Muncke, 2018). Like many factors that involve food sustainability they co-habit each other's space and production / preparation. Estimates that food production alone contributes up to 26% of global GHGE where Ritchie and Roser (2023) have supposed four dimensions: Supply Chain 18% (retail, pack, transport processing); Livestock & Fisheries 31%; Crop Production 27%; and Land Use 24%. Additionally, not all food is equal in its contribution to environmental troubles of climate, loss of biodiversity, pollution and depletion of natural resources (Garnett, 2013). This disparity often presents a puzzling dilemma for consumers to overcome when deciding what foods to choose (Antonides, 2017).

2.1.4. Local & Seasonal

The progression of globalisation has provided food availability all-year round despite seasonal differences to meet the rising consumer demand; however, this has increased the traveling distance of food (Meyerding, Traier, and Lehberger, 2019). This has prompted attention from consumers who perceive eating more seasonal and local food is healthier, fresher, tastier and of higher quality (Wallnoefer, Riefer and Meixner, 2021). Some studies have shown that consumers purchase local food to support their local economy and/or farming communities (Brunori et al., 2016). According to Vargas et al., (2021) there is no agreed definition of what 'local' means. Geographic boundaries tend to be the greatest interruption by consumers (Birch, Memery and Kanakaratne, 2018), but similarly the perception can vary vastly amongst consumers (Vargas et al., 2021). Furthermore 'Seasonality' has proven to be as complex to define where a Department of Environment, Food and Rural Affairs (DEFRA) study in 2012 presented three concepts: "In Season" (Availability), "Produced in Season" (production & availability) and "Local Seasonal" (production & consumption) (Brooks et al., 2012).

There is also contradictory evidence that conflicts with the local / seasonal positive impact towards sustainability. Both iCanals et al., (2008) and Hospido et al., (2009) have demonstrated that local / seasonal fruit and vegetable consumption is not necessarily as environmentally friendly. They report that the energy required in growing stages (e.g. heated glass houses) can outweigh carbon footprint of travel miles. In terms of meat consumption Fletcher (2020) reported a 43% reduction in environmental impact through the production stage alone (excluding transportation) by choosing UK produce over Brazilian.

2.1.5. Fair Trade

The three grounding principles of Fair Trade (FT) are social responsibility, economic development and environmental protection (Fairtrade International, 2018). From a consumer perspective, trust and confidence in ensuring the produce they purchase lives up to those principles is vital (Konuk, 2019). The FT logo is widely recognisable, although there is not universal regulation, which has resulted in independent organisations portraying the values with differing standards (Berry and Romero, 2021). FT initially focused on fruit and coffee but has expanded to include cocoa, sugar, maple syrup and honey (Ribeiro-Duthie, Gale and Murphy-Gregory, 2021). FT products are generally more costly than comparable products, which protect the guiding principles, but it has been shown to be a barrier to consumers to purchase and in some cases seen as a premium product to be consumed occasionally (O'Connor, Sims and White, 2017). When studying consumers' decisions, it was found that consumers with "salient beliefs" to ethical values had the greater intention to purchase FT products (Dowd and Burke, 2013). The UK, Germany and US are the largest consumers of FT products, who buy into the promise that FT products are sustainable and are benefiting communities in developing countries (Andersson, 2019). There is cause for concern though, FT production can have unintended consequences in these communities. Due to increasing demands of FT staple foods (e.g. Quinoa) which are lost to meet global supply, resulting in indigenous populations lacking dietary requirements (Andersson, 2019). Furthermore, Fairtrade Movement (2024) have raised concerns that FT companies may not be as rigorous with due diligence, which would highlight vulnerable communities as a result of climate change.

2.1.6. Organic

Organic consumption has been seen as a lesser motivator to reduce climate impacts (de Boer and Aiking, 2022) and there have been close associations with health concerns by Siegrist and Hartmann., (2019). In terms of food production organic systems may be perceived as environmentally friendly, but there is an accompanying higher land use and resulting eutrophication potential that can result in greater GHGE versus more intensive agricultural production (Clark and Tilman, 2017; McMichael et al., 2007). Despite this, consumers may choose organically produced foods believing that the "naturalness" (i.e. free from pesticides and hormones) is influencing their decisions (Dowd and Burke, 2013). In terms of Sustainability, Miller et al., (2021) reported approximately 40% of consumers identified sustainable food as Organic foods. Although the interest in Organic foods is positively perceived, consumer positivity does not translate to purchasing action (Dangi, Gupta and Narula, 2020). Research in this field is burgeoning where Chen, Lobo and Rajendran (2014) profiled organic consumers; (Asif et al., 2018) looked at consumers intentions to purchase organic; Hasselback and Roosen (2015) reported on consumers' motivation and willingness to pay for organic foods; and Kushwah, Dhir and Sager (2019) looked at consumers resistance to choose organic foods.

2.2. Conclusion

The recently updated food choice questionnaire by (Verain et al., 2021) will be utilised to understand sustainability motives along with other established FCM of a group of adults. Since its recent development this questionnaire has had a meagre number of studies in which to compare. Andreani et al., (2023) incorporated SUS-FCQ to assess university students' intentions to purchase healthy and sustainable food. The SUS-FCQ was a small part of a wider study, however they found 'sensory appeal', 'health' and 'sustainability' were equally important motives for science students.

A study of sustainable food consumption on adolescent students aged 16-22 in Sweden incorporated a reduced version of the SUS-FCQ (Zorell, 2022). From the 24 questions asked, they found that 'sustainability' factor was the 2nd least important motive, whereby 'sensory appeal' (i.e. taste) was the most important factor to these students. Finally, Onwezen, Verain and Dagevos (2022) incorporated the SUS-FCQ to seek consumers intentions to consume alternative protein sources. This study condensed the SUS-FCQ to 33 questions with results compared to other domains such as person norms, self-reported consumption and food neophobia to name a few. In conclusion the current study has limited academic research to evaluate against, so should add to the literature of assessing the relationships of sustainable FCM using the updated framework of food choice.

3. Method

3.1. Participants

Data collection took place through an online survey between November and December 2023. It was hoped to recruit a minimum of 50 responses, seeking to capture a diverse range of adults in terms of age, gender, where they lived, to what level they were educated to and other socio-demographic determinants.

3.2. Procedure

The questionnaire was created and operated through an online survey platform Microsoft Forms (2023). Ethical approval was obtained from University of Wales Trinity Saint David Ethics Committee via Institute of Management and Health September 2023. Recruitment of participants was sought through social media platforms, X (formally Twitter) and Instagram, combined with assistance from UWTSO support services to email students and employees of the organization and poster displays on campus. The questionnaire was anonymised and was open to persons over the age of 18 years old. Informed consent was asked of all participants before proceeding with the questionnaire. The survey remained open for approximately 8 weeks until sufficient responses were received (>50).

3.3. Measures

The questionnaire consisted of four sections. The first section sought participants socio-demographic details; gender, age range, level of education, employment status, household income, residence (village, town, city), family status, and anthropometric measures of height and weight in which to calculate BMI. The second section sought to gauge participants understanding of food sustainability - **Objective knowledge**, the third section sought to understand participants behaviour towards food sustainability that had two subsections - **Sustainable food intake** and **Hierarchy of Food**, and the final section sought to understand the motives that participants consider in choosing the foods they consume – **Sustainable FCM**. This study was based on the European Horizon project (2020) that researched consumers knowledge about the factors of a sustainable diet (Bouwman, Verain and Snoek, 2016). This was a comprehensive questionnaire with over 500 questions from over 5000 participants from 4 European countries. This current study had a questionnaire that consisted of 108 questions which resulted in an average completion time of 16 minutes across all responses.

3.3.1. Objective Knowledge

Product knowledge is a decisive factor in the decision-making process for consumers choosing the products they do (Pieniak, Aertsens and Verbeke, 2010). It has been theorised that three aspects diverge to stimulate consumer decisions: Subjective knowledge (i.e. what they think they know), Objective knowledge (i.e. what they know already) and Experience (Flynn and Goldsmith, 1999; Peschel et al., 2016). To capture what participants know about food sustainability the objective knowledge scale developed by (Bouwman, Verain and Snoek, 2016) was used. This scale has 16 statements that had to be answered 'true' or 'false'. Example statements for sustainability were 'In terms of environmental impact there is no difference between eating chicken or eating beef. and 'Battery cages for chicken are forbidden in UK'. However, it was felt that some of the questions were mis-leading or too ambiguous, so additional answers were added 'maybe' or 'unsure'.

For example, Question 1: - 'In terms of environmental impact there is no difference between eating chicken or eating beef.' However, this depends on how we term environmental impact. Beef produces more GHGE than chicken, however chicken produces more environmental waste i.e. rivers, than beef. Also, the feed grown for chickens (wheat or corn) could be used for human consumption, whereas dairy beef eat grass.

3.3.2. Sustainable Food Intake

Participants were asked to indicate from 21 sustainable food choices they would consider and over how many days a week they would consume at their main meal. This is a validated scale created by Verain, Dagevos, and Antonides (2015) that measured the consumption of sustainable food products and considered curtailment of un-sustainable food. This assesses participants current acceptance of food sustainability in what they eat.

3.3.3. Hierarchy of Food

Participants were asked "If you were to eat less meat during dinner in the future, to what extent would you consider the following alternatives?" A range of meat-replacing options were available to choose from. Participants had to rate their openness to their choice on a Likert scale of 7 options from 'not at all' to 'a lot'. This scale was adapted with an additional two questions from the original scale created by Bouwman, Verain and Snoek (2016). It was considered that 'In-vitro meats' statement did not give enough consideration for additional novel foods such as 'modified meats' and 'analogues' that have been in the consumer domain for a number of decades.

3.3.4. Sustainable Food Choice Motives

Verain et al., (2021) compiled a reconstructed questionnaire that fused the original FCQ along with considered sustainability motives which cascaded into 13 FCM (motives). The original FCQ (Steptoe et al., 1995) has proven to be a very reliable method (Pula, Parks, & Ross, 2014; Birkenhead and Slater, 2015; Pearcey and Zhan, 2018; Cunha et al., 2018) to gather information on the motives of food choice. The advantages being that the questions are set, easy to understand, relatively quick to complete, comparable to similar studies, rigorous and easy to replicate (Slattery et al., 2011; Jones et al., 2008). The SUS-FCQ contains 43 items representing healthy and non-healthy food descriptions to animal welfare and environmental welfare that motivate people to make general food choices.

Participants are charged to rate the importance of each motive item for their food choices “on a typical day” on a Likert 7-point scale (1 = ‘not at all important’, 2 = ‘little important’, 3 = ‘moderately important’, and 7 = ‘very important’). The SUS-FCQ involves 13 motivational factors, each containing three to five items: 1. ‘health’, 2. ‘mood’, 3. ‘convenience’, 4. ‘sensory appeal’, 5. ‘natural content’, 6. ‘price’, 7. ‘weight control’, 8. ‘familiarity’, 9. ‘ethical concern’, 10. ‘animal welfare’, 11. ‘environmental welfare’, 12. ‘local & seasonal’, 13. ‘miscellaneous’. Data analysis and results from the SUS-FCQ will take prime reporting in this dissertation. As there was a vast heterogeneity in the cohort 64% >45 years old, 59% with an income >£40k, and 76% educated to degree or higher it was more efficient to cluster groups in the data analysis (e.g. age <45) to produce more succinct results.

3.4. Data Analysis

All data was collected using the structured online questionnaire ‘Microsoft Forms’, (see appendices) thereafter the data was formatted and organised on ‘Microsoft Excel’. Data from ‘Objective Knowledge’, ‘Sustainable Food Intake’ and ‘Hierarchy of Foods’ was analysed to seek percentage variables such as gender, mean food intake (days) and likelihood to choose a type of food respectively. Statistical analysis of SUS-FCQ was presented as means and standard deviation across the 13 motives. This process replicated the method by Verain et al., (2021) who divided the sum responses by the number of items in the subscale, then multiplying each response by a factor loading figure (see table 1) from that study. Through a scale reduction process, they found it was appropriate to reduce the FCM from 13 to 8, where the motives ‘sustainability’ encompassed (ethical concern, animal welfare, environmental welfare, local & seasonal) and removing motives for both ‘health’ and ‘miscellaneous’. The current study incorporated loading factors from both the original FCQ (Steptoe et al., 1995) and Verain et al., (2021) to include all 13 FCM (table 1). Further statistical analysis was completed with SPSS statistical software (version 29.01) on the mean scores of all FCMs, including independent samples t-test and one-way ANOVA to compare differences between motives (IBM, 2024). (see appendices)

Table 1 - Sustainable Food Choice Motive Questionnaire (SUS-FCQ) and loading factors.

MOTIVES	QUESTIONS	FACTOR LOADING
HEALTH	1 Contains a lot of vitamins and minerals.	0.77
	2 Keeps me healthy.	0.66
	3 Is high in fibre and roughage.	0.75
MOOD	4 Helps me cope with stress.	0.79
	5 Helps me relax.	0.78
	6 Cheers me up.	0.60
CONVENIENCE	7 Makes me feel good.	0.57
	8 Is easy to prepare.	0.82
	9 Can be cooked very simply.	0.81
SENSORY APPEAL	10 Takes no time to prepare.	0.76
	11 Smells nice.	0.80
	12 Looks nice.	0.72
NATURAL CONTENT	13 Has a pleasant texture.	0.70
	14 Tastes good.	0.53
	15 Contains no additives.	0.81
PRICE	16 Contains natural ingredients.	0.72
	17 Contains no artificial ingredients.	0.72
	18 Is not expensive.	0.87
WEIGHT CONTROL	19 Is cheap.	0.87
	20 Is low in calories.	0.87
	21 Helps me control my weight.	0.79
FAMILIARITY	22 Is low in fat.	0.74
	23 Is what I usually eat.	0.79
	24 Is familiar.	0.79
GENERAL SUSTAINABILITY	25 Is like the food I ate when I was a child.	0.66
	26 Is produced without exploitation.	0.89
	27 Is produced without child labour.	0.83
ANIMAL WELFARE	28 Is traded in a fair way.	0.69
	29 Is produced without animals being in pain.	0.96
	30 Is produced in an animal friendly way.	0.91
ENVIRONMENTAL WELFARE	31 Is produced with sufficient space for animals.	0.87
	32 Is a free-range product.	0.78
	33 Is produced with respect for animal rights.	0.88
ENVIRONMENTAL WELFARE	34 Is prepared in an environmentally friendly way.	0.74
	35 Is produced in an environmentally friendly way.	0.72
	36 Is produced with minimal CO2 emissions.	0.65
	37 Is packaged in an environmentally friendly way.	0.63

	38	Is produced without disturbing the balance of nature.	0.72
LOCAL AND SEASONAL	39	Is a local/regional product.	0.89
	40	Is a seasonal product.	0.88
	41	Comes from close by (little transport distance)	0.77
MISCELLANEOUS	42	Has a Fair-Trade Logo.	0.59
	43	Is produced organically.	0.55

4. Results

In total 87 responses (see table 2) were collected from participants over the age of 18 years old, two responses were excluded from analyses because of incomplete survey questions. The sample consisted of 57% females (n=49), 62% of participants (n=53) were 45 years of age or older with 4% under 24 years old (n=3). The majority of participants were university educated (75%, n=64), in full-time employment (83%, n= 71) and married (76%, n 65). Where people lived revealed an even split across the sample between village, town or city of 35%, 33% and 32% respectively. Under a third of respondents reported a household income <£40k (32%, n=27), with 58% (n=50) >£40k and 11% did not say (n=9). Finally body mass index (BMI) was calculated (weight (kg) x height squared (m²)) (Peterson et al., 2016). Results from the questionnaire reported that 56% of participants were overweight and obese (n=48), obese (26%, n=22), and 44% of participants had a normal BMI (n=37).

Table 2 - Socio-demographic details from Sustainable food questionnaire

<i>Socio-demographics</i>		(n=85)
<i>Genders</i>	Male (n=36)	42%
	Female (n=49)	58%
<i>Age Groups</i>	16 – 24	4%
	25 – 44	34%
	45 – 64	47%
	65+	15%
<i>Education</i>	Below Degree	24%
	Degree level & above	76%
<i>Employment</i>	Employed	84%
	Student / un-employed	2%
	Retired	14%
<i>Household income</i>	<£20k	9%
	£20-30k	4%
	£30-40k	19%
	£40-50k	14%
	£50-75k	22%
	>£75k	22%
	Did not say	10%
<i>Family Status</i>	Married with children	31%
	Married with children away from home	21%
	Married without children	26%
	Single with children	6%
	Single with children away from home	5%
	Single without children	10%
	Living with parents	1%

<i>Location</i>	Village	35%
	Town	33%
	City	32%
<i>BMI</i>	Normal <24.99kg/m ²	18%
	Overweight & Obese ≥25kg/m ²	56%
	Obese ≥30kg/m ²	26%

4.1. Objective Knowledge

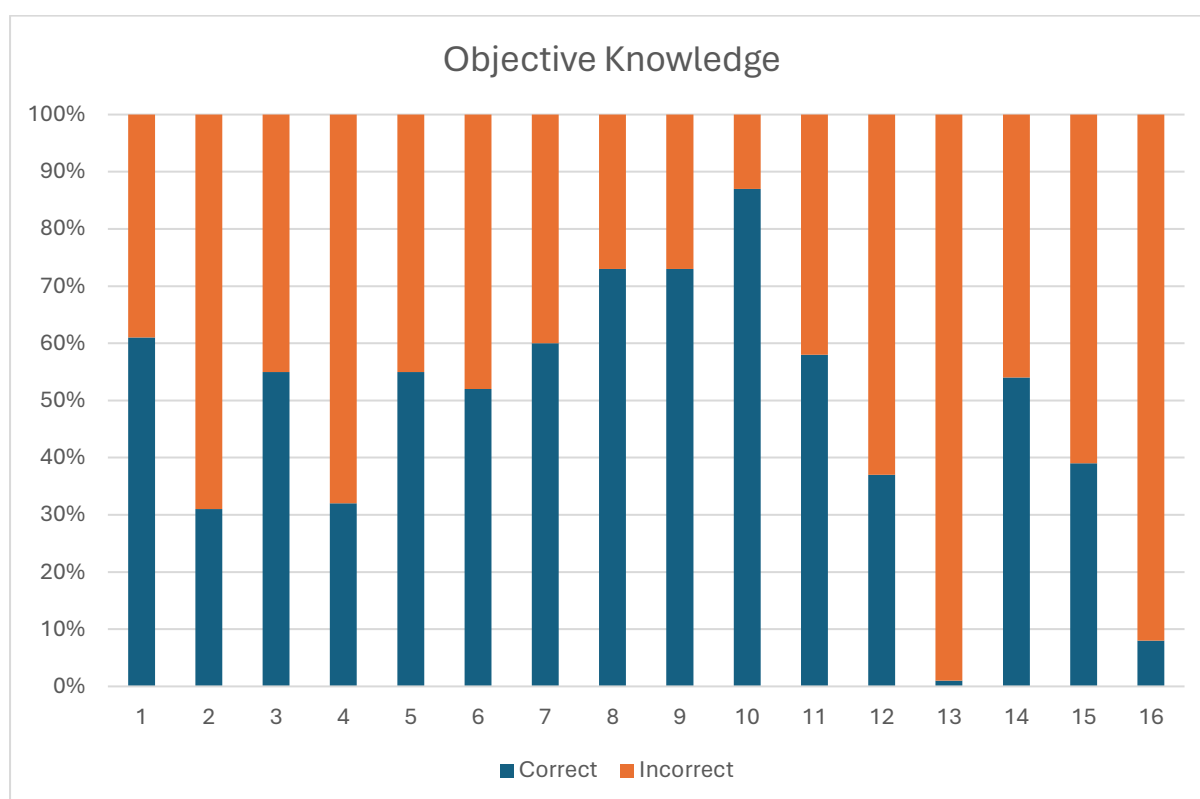


Figure 1 - Objective Knowledge of Food Sustainability.

Overall, 63% of participants choose the correct answer to the statements to assess objective knowledge on food sustainability (see figure 1). This score is similar to the study by Verain et al., (2021) which suggests that participants have a very good understanding of food sustainability. When analysing correct answers between male and female participants the results were 69% and 63% respectively.

4.2. Sustainable Food Intake

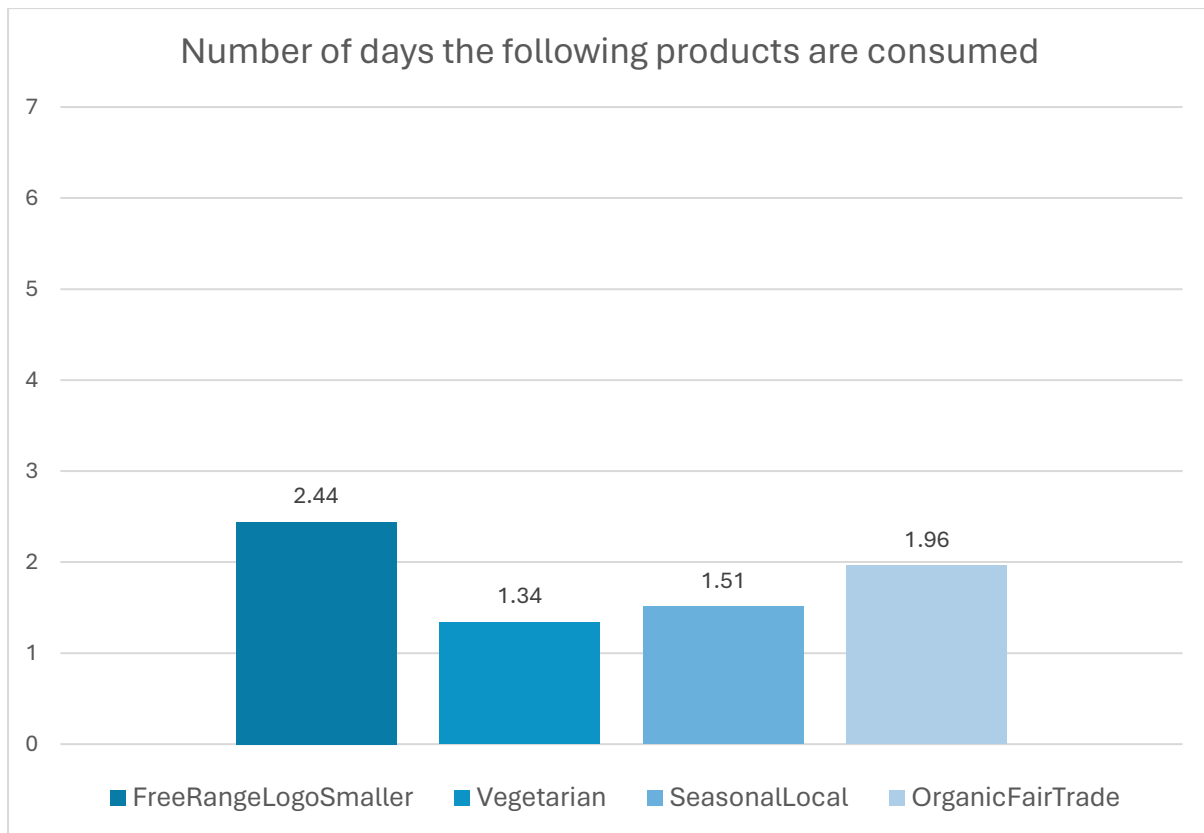


Figure 2 – Number of weekdays sustainable products are consumed.

From the responses participants chose ‘fish, eggs or cheese’ as their most preferred option to replace meat, with the highest number of days that was acted on (30%), followed by ‘a vegetarian meal’ (29%), and ‘a small portion of meat instead of a regular or large portion’ (28%). Participants were least likely to choose ‘hybrid meat’ (88%), ‘a Vegetarian burger’ (79%), with nearly two thirds of participants unlikely to choose ‘organic meat’, ‘organic fruit’ and or dairy products. Amalgamating days two, three and four gave a cumulative view of the most days that sustainable foods were acted on. This showed that ‘fish, eggs or cheese’, followed by ‘seasonal vegetables, seasonal fruit, local/seasonal and free-range dairy’ were the highest considerations that participants consumed respectively.

Clustering sustainable foods into four categories demonstrated how often these foods were consumed, figure 2 presents the results. Free-range products/products with sustainability logo/smaller portions are consumed the most frequently, around 2 to 3 days; followed by organic/fair-trade products. In third place seasonal/local products are consumed under 2 days on average. Finally vegetarian products are consumed the least.

4.3. Hierarchy of Food

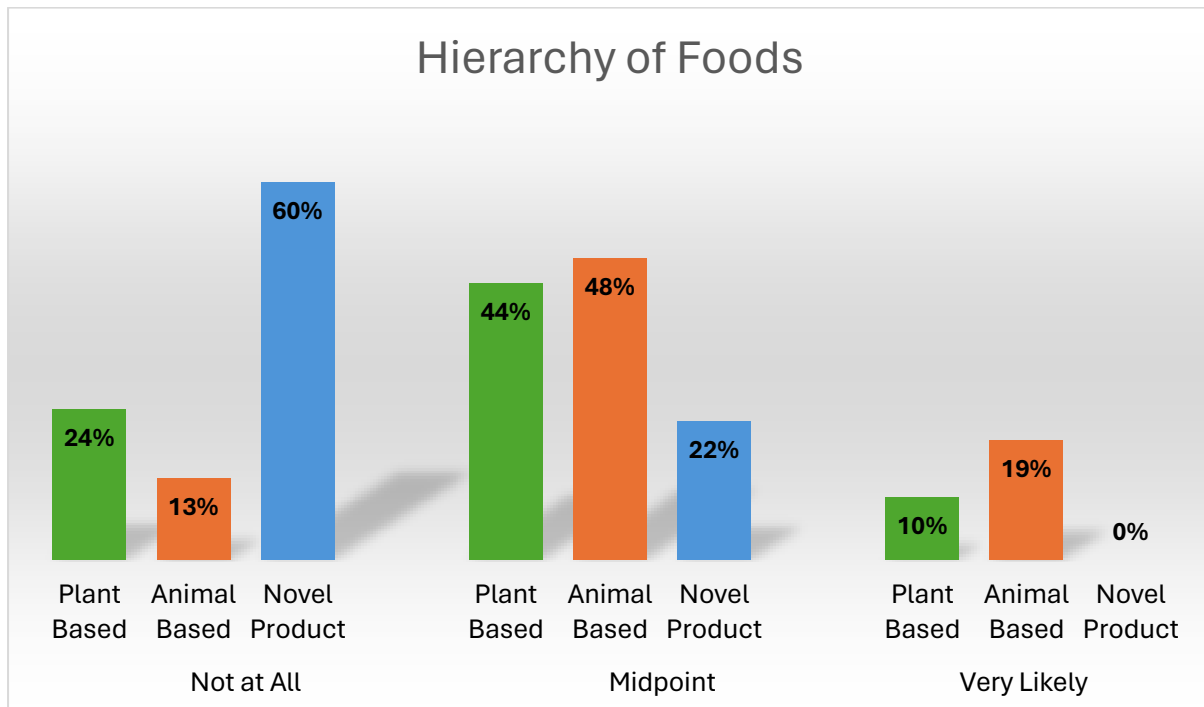


Figure 3 - Hierarchy of Foods: Openness to different products instead of meat.

Participants were least likely to choose 'novel products' (Insects 76%, In-Vitro 79%, GM 84%, Analogue 42%) to replace or eat less meat. Participants were very likely to choose animal-based products in particular (Fish or Fish products 36%) followed by Egg or Mushrooms based products (30%). Leaving out meat scored 29% which was a higher consideration amongst the respondents. Clustering answers into three segments Plant-based (PB), Animal-based (AB) and Novel Product (NP) offered a greater insight into openness to different types of products to replace meat (figure 3). The majority of responses fell into the 'midpoint' of the Likert scale, that was between 'not at all' and 'very likely'. Analysing this midpoint gave a more balanced picture with 22% open to NP, 44% for PB, and 48% for AB.

4.4. Sustainable FCM

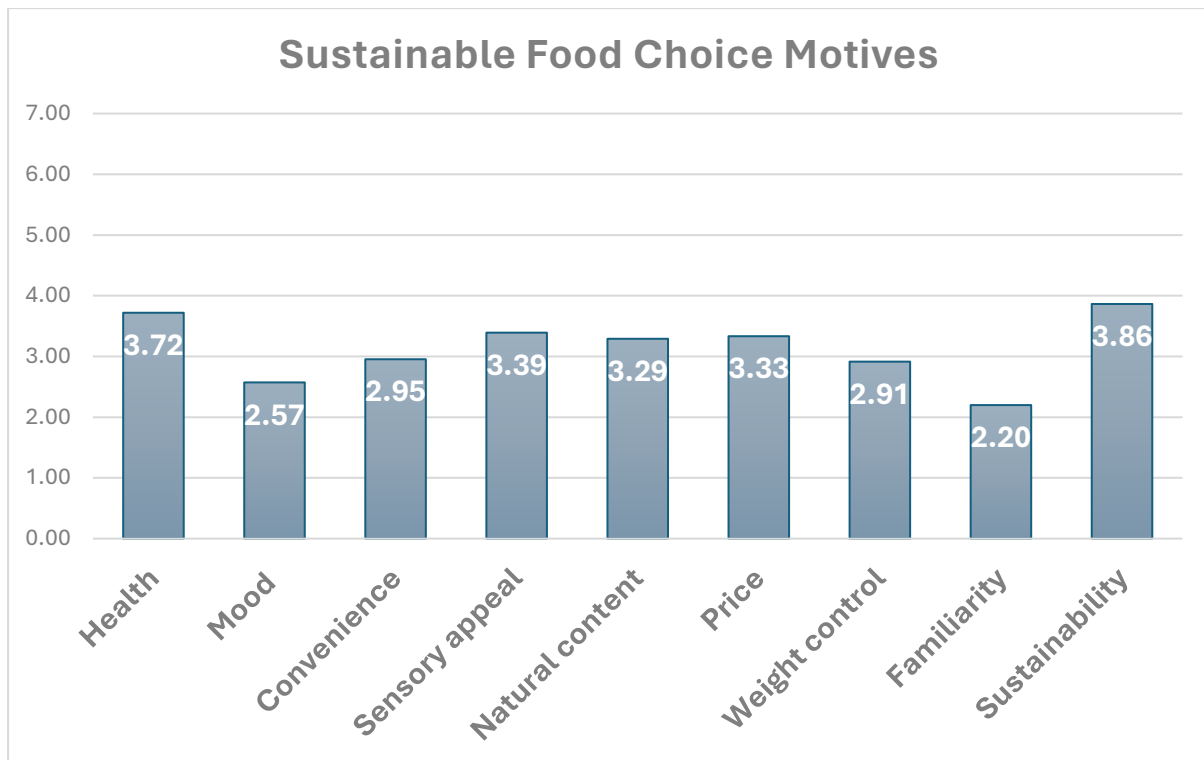


Figure 4 – Sustainable FCM on a 7-point scale.

Overall results from the SUS-FCQ demonstrated that participants rated sustainable foods (3.86 ± 1.13) the most important motive when consuming foods (see figure 4); followed by health (3.72 ± 1.13) and sensory (3.39 ± 0.98). Familiarity motive was the least important motive (2.20 ± 0.98), with mood, weight-control and convenience more important.

4.4.1. Differences between Genders

Gender differences in FCM along with a hierarchical ranking figure are displayed in Table 3 below. There were significant differences shown from four motives: Local Seasonal and Animal Welfare ($r = .009$, $p < .05$); Ethical Concern ($r = .045$, $p < .05$); Convenience ($r = .005$, $p < .05$). Females ranked Animal Welfare, Ethical Concern, Health highest in 1st, 2nd and 3rd respectively. Male participants ranked Ethical Concern, Animal Welfare and Health as their most important motives. Environmental Welfare was the least considered motive in terms of choosing sustainable food for both sexes males (2.84 ± 1.02) and for females (3.29 ± 1.07), which was slightly outside the p ratio tolerance ($r = .053$).

Table 3 - Mean scores on Food Choice Factors between Male and females (Figures in bold show rank priority of factor for each group in determining food choice)

<i>Factors</i>	<i>Male</i>			<i>Female</i>			<i>p value</i>
	Mean		SD	Mean		SD	
<i>Health</i>	3.53	3	1.13	3.85	3	1.14	.204
<i>Mood</i>	2.35	11	1.11	2.75	11	1.13	.111
<i>Convenience</i>	2.53	10	1.22	3.30	8	1.20	.005*
<i>Sensory Appeal</i>	3.24	4	0.91	3.48	5	1.01	.264
<i>Natural Content</i>	3.01	6	1.27	3.48	6	1.39	.113
<i>Price</i>	3.22	5	1.29	3.46	7	1.28	.397
<i>Weight Control</i>	2.70	9	0.93	3.07	10	1.14	.114
<i>Familiarity</i>	2.13	12	0.98	2.26	12	0.99	.529
<i>Ethical Concern</i>	4.05	1	1.42	4.62	2	1.17	.045*
<i>Animal Welfare</i>	4.01	2	1.55	4.86	1	1.34	.009*
<i>Environmental Welfare</i>	2.84	8	1.02	3.29	9	1.07	.053
<i>Local Seasonal</i>	2.97	7	1.18	3.73	4	1.37	.009*
<i>Miscellaneous</i>	1.74	13	0.78	1.99	13	0.98	.207

* $p < 0.05$

4.4.2. Differences between where people lived: Urban vs Rural.

Location differences in FCM along with a hierarchical ranking figure are displayed in table 4 below. There were no significant differences shown between if participants lived in a city or out of city location. There was a larger cohort living out of city of 67% (n= 57) compared with living in a city location (33%, n=28). There was a similar ranking of the importance of motive to genders with people living in a city reporting 'ethical concern' as the most important motive (4.52 ± 1.21) slightly ahead of 'animal welfare' (4.51 ± 1.37) and 'health' (3.80 ± 1.07). Participants living in towns and villages (rural) rated 'animal welfare' highest (4.50 ± 1.55), followed by 'ethical concern' (4.30 ± 1.34) and 'health' (3.67 ± 1.18) in third.

Table 4 - Mean scores on Food Choice Factors location (rural vs urban) (Figures in bold show rank priority of factor for each group in determining food choice)

<i>Factors</i>	<i>Rural (n=57)</i>			<i>Urban (city) (n=28)</i>			<i>p value</i>
	Mean		SD	Mean		SD	
<i>Health</i>	3.67	3	1.18	3.80	3	1.07	.630
<i>Mood</i>	2.54	11	1.14	2.66	11	1.13	.565
<i>Convenience</i>	3.01	9	1.24	2.91	9	1.34	.771
<i>Sensory Appeal</i>	3.31	6	0.98	3.49	6	0.96	.450
<i>Natural Content</i>	3.09	7	1.37	3.66	4	1.26	.072
<i>Price</i>	3.34	4	1.27	3.37	7	1.32	.923
<i>Weight Control</i>	2.94	10	1.01	2.84	10	1.17	.696
<i>Familiarity</i>	2.30	12	0.95	2.02	12	1.04	.226
<i>Ethical Concern</i>	4.30	2	1.34	4.52	1	1.21	.481
<i>Animal Welfare</i>	4.50	1	1.55	4.51	2	1.37	.966
<i>Environmental Welfare</i>	3.03	8	1.10	3.25	8	1.02	.358
<i>Local Seasonal</i>	3.33	5	1.34	3.56	5	1.35	.463
<i>Miscellaneous</i>	1.83	13	0.89	1.99	13	0.94	.456

* $p < 0.05$

4.4.3. Differences between higher educational level.

Clustering participants who achieved degree level education and above showed a significant difference between groups for both 'health' ($r = .028$, $p < .05$) and 'ethical concern' ($r = .042$, $p < .05$) motives. Table 5 displays means, standard deviation (SD) and ranking of motives. Both 'ethical concern' and 'animal welfare' were the highest motives for both groups. There are similar rankings for 'mood', 'convenience', 'natural content', 'weight control', 'familiarity' and 'environmental welfare'. The 'local seasonal' motive displays a difference, not significant, whereby those educated to degree level (3.45 ± 1.26) and above rated its importance much less than those educated below degree level (3.27 ± 1.27) although it was the third highest motive of importance for this group.

Table - 5 Mean scores on Food Choice Factors Education (up to degree vs > degree level)
(Figures in bold show rank priority of factor for each group in determining food choice)

<i>Factors</i>	<i>< Degree (n=21)</i>			<i>> Degree (n=64)</i>			
	Mean		SD	Mean		SD	<i>p value</i>
<i>Health</i>	3.24	4	0.94	3.87	3	0.94	.028*
<i>Mood</i>	2.41	11	1.13	2.64	11	1.13	.425
<i>Convenience</i>	2.80	9	1.22	3.03	9	1.22	.489
<i>Sensory Appeal</i>	3.06	5	0.95	3.48	4	0.95	.087
<i>Natural Content</i>	2.94	7	1.20	3.39	7	1.20	.196
<i>Price</i>	2.96	6	1.17	3.48	5	1.17	.108
<i>Weight Control</i>	2.67	10	1.06	2.99	10	1.06	.226
<i>Familiarity</i>	1.96	12	1.04	2.29	12	1.04	.196
<i>Ethical Concern</i>	3.88	2	1.20	4.54	2	1.20	.042*
<i>Animal Welfare</i>	4.18	1	1.39	4.60	1	1.39	.254
<i>Environmental Welfare</i>	2.82	8	0.99	3.19	8	0.99	.169
<i>Local Seasonal</i>	3.27	3	1.27	3.45	6	1.26	.584
<i>Miscellaneous</i>	1.64	13	0.90	1.96	13	0.90	.169

* $p < 0.05$

5. Discussion

5.1. Introduction

It is acknowledged that moving towards more sustainable diets will require reducing consumption of animal-based foods, increasing a variety of plant-based foods and avoiding foods high in fat, salt and sugar (Davies, Gibney and O'Sullivan, 2023). The solution to making this shift could be assessing the psychological traits that are associated with a sustainable diet. The aim of this study was to assess adults' understanding and knowledge of food sustainability; their willingness to change; and compare their food choices with the added factor of food sustainability.

5.2. Peoples understanding of food sustainability - 'objective knowledge'.

This study showed that nearly two thirds of participants had a good understanding or knowledge of food sustainability. Whilst this is encouraging the questionnaire was replicated from the original SUSFANS study to which the authors acknowledge may be biased towards a Dutch society (Bouwman, Verain and Sneek, 2016). Despite that, both Rivera-Medina et al., (2020) and Scalvedi et al., (2021) report that higher nutritional knowledge has been associated with more healthier food behaviours. The results from the SUS-FCQ demonstrated that health, sensory appeal and sustainability were highly considered motives, the least considered factor from the sustainability dimension was 'environmental welfare'. This suggests that from the questionnaire participants knowledge about the environmental impact of their food choice is not fully understood, this has been recognised by Siegrist and Harmann (2019) when researching consumers perceptions of food sustainability. Consideration for where people live may be a confounding influencer. Such as the country specific study by van Bussel et al., (2022), who found that greater environmental impacts may be more obvious to consumers through their day to day lives as seen in Brazil. Public messaging around food sustainability adds to the possibility of confusion amongst the people. It makes sense to have a global message to correct a global problem, i.e. the rise in global warming, that recruits global collaboration. However, foods vary in their environmental impacts thus the messaging to transition to more sustainable food should be nation specific to help stem the projected rise in GHGE from food production, that is inevitably rising due to a growing global population (Clark et al., 2020).

5.3. Sustainable Food Intake

The survey reported that foods which were 'free-range/with a sustainability logo/smaller portion' being the most frequent sustainable food behaviour, that was consumed under two and half days a week, followed by 'organic fair trade', 'seasonal/local' and 'vegetarian' the least frequent at under one and half days a week. Results from the SUSFANS study showed

that 'seasonal/local' was the most regularly practiced behaviour amongst Europeans (Bouwman, Verain and Sneek, 2016).

How these self-reported results translate into action is not clear; consumers have been shown to be unfamiliar with sustainability logos much in part to the vague interpretations (Dowd and Burke, 2013). Previous studies have reported that eating smaller portions (Verain, Dagevos and Antonides, 2015) along with free-range produce (de Boer, Hoogland and Boersema, 2007) are greater considerations for consumers. Additionally Free-range produce has been shown to be a much greater predictor to purchase against organic produce amongst consumers (Van Loo et al., 2014). Furthermore, a higher income has been seen to influence the decision-making of consumers towards free-range produce over other sustainable classifications (Van Loo et al., 2014). The current study reflects this outcome with a high proportion of participants declaring an income over £40k (>55%).

5.4. Openness to alternatives for meat 'Hierarchy of foods'

When participants were asked to consider consuming less meat, they were more likely to choose 'animal-based' foods such as fish, cheese and dairy. This is a common behaviour termed "curtailment" that consumers have demonstrated a preference towards (de Boer, Schösler and Aiking, 2014), that is additionally influenced by a higher socio-economic status (Verain, Dagevos and Antonides, 2015). Although, analysing the average responses suggests some un-certainty with less than half (48%) asserting towards animal-based and 44% leaning towards plant-based products, both indicating a moderately negative openness towards this behaviour.

Across all scales 'novel foods' such as insects or in-vitro meat were the least likely of products that participants would choose. This is a well reported phenomenon rooted in a low acceptance of different protein sources. A systematic review by Onwezen et al., (2021) reported that novel foods with insects were the least accepted meat alternative followed by cultured meat. Novel foods have been suggested to be an important consideration for populations to transition to a more healthy and sustainable diet (Shukla et al., 2019). This presents an opportunity for organisations and governing bodies to embrace a burgeoning economic and sustainable food offering. Evidence seen locally in Wales has shown that by educating younger people in the wider options of food sustainability such as introducing edible insects to their diet i.e. entomophagy, may alleviate future pressures on the environment (Jones, 2020).

5.5. SUS-FCQ

To the best of the authors knowledge this is the first study incorporating the SUS-FCQ (outside its creation) to investigate food choice and sustainability. From this study individuals appear to rate food sustainability highest amongst their considerations in comparison to other motives of food choice. Mean scores for Sustainability (3.86 ± 1.13) and Health

(3.72 ± 1.13) ranked uppermost in FCM, although only slightly over the mid-point, which suggests a moderate commitment overall.

To offer some context, the results from the SUSFANS study showed factors Sensory, Price and Convenience as the top three ranked motives, with Sustainability motive ranked second from last. When expanding the sustainability factor that was condensed to form this dimension, it showed that Animal welfare was the most important motive (4.52 ± 1.49), followed by Ethical concern (4.39 ± 1.30), Local/Seasonal (3.42 ± 1.34) lastly Environmental Welfare (3.12 ± 1.08).

It is not surprising that both health and sustainability are the most important motives from this study, in that it has been shown to have a shared space (Marty et al., 2022; Allès et al., 2017). Although these studies used different forms of FCQ they reported a strong correlation between both these dimensions. This was also demonstrated by Verain et al., (2021) when creating the SUS-FCQ who found diverging correlations between both dimensions, thus they took the decision to isolate the health dimension from the final results. From the initial FCQ through to successive studies, 'health' motive has been a consistent high consideration for consumers (Steptoe et al., 1995; Lindeman and Väänänen, 2000; Sautron et al., 2015). Furthermore, the decision by Verain et al., (2021) has been corroborated by others who have found that people who choose to eat healthier foods tend to place higher importance in organic foods (Baudry et al., 2017) or environmentally friendly foods (Sautron et al., 2015). The current study had over 60% of participants over the age of 45 which has been shown to be a determining factor in other studies which demonstrated a higher importance for 'Health' amongst older participants than younger people (Pollard et al., 1998; Sautron et al., 2015). Share and Stewart-Knox (2012) suggested younger people tend to be less concerned about longevity or health than maturer people. These results offer a positive acceptance towards the 2019 IPCC report, that moving towards a more sustainable diet is beneficial for health and planet (Shukla et al., 2019).

5.5.1. Genders

In order of hierarchy both genders reported similar considerations of FCM with higher orders of Ethical Concern, Animal Welfare and Health. Similar to the original FCQ by Steptoe and colleagues this study showed differences between male and females, more specifically Animal Welfare ($p=.009$), Ethical Concern ($p=.045$), and Local/Seasonal ($p=.009$) (Steptoe et al., 1995). Females (4.25 ± 0.74) reported higher consideration towards the sustainability dimension than males (3.47 ± 0.65); which was greater than the midpoint (>3.5) and was also demonstrated by Rejman et al., (2019). They state that women seem to be more "sensitive to the issues of food and health" that relates to the consumption of sustainable foods. Environmental Welfare was the least considered sustainability motive and ranked in the bottom half of motives for both sexes. This could be contributed in part to a lack of understanding of the impact of food towards the environment. Additionally, this was a

prominent expression by adults from a substantial online survey by the Foods standards Agency, that clearer information should be made available to overcome consumers difficulties in understanding environmental impacts of food choice (FSA, 2022).

This shows that there is a gap to be overcome in public health messaging, which must be addressed if populations are to respond to the ambitious goals of reducing the consumption of carbon-intensive foods that the Climate Change Committee (2020) recommends by 2050.

5.5.2. Location – urban vs rural dwellers

There were no significant differences from the results where people resided (rural or urban). The results did demonstrate similar hierarchical ranking of motives to gender and education which has been a relatable variable in preceding studies incorporating FCQ (Grunert et al., 2012). However, to the authors knowledge no study compared where people live although some have compared results between countries (Verain, Dagevos and Andonides, 2015; Torán-Pereg et al., 2023). In terms of sustainability, purchasing locally produced food has been reported as the main driver in some Irish rural communities principally to support the local economy and jobs (Bord Bia, 2023). The results from the current study aren't conclusive with a moderate support (3.33 ± 1.34) towards local/seasonal for residents from rural areas, and the mean urban responses slightly higher (3.56 ± 1.56). Although self-identifying as 'green living' has shown differences between rural and city dwellers in terms of pro-environmental behaviours by Whitmarsh and O'Neill (2010), results from this study are inconclusive.

5.5.3. Education

A higher education level was shown to have a significant difference for health ($p=.028$) and ethical concern motives ($p=.042$). In terms of assessing sustainability dimensions ethical concern and animal welfare were both much higher considerations for persons who achieved a degree and higher to those who did not. A higher education has been a significant socio-demographic variable that has influenced results throughout the history of food choice questionnaire studies (Steptoe et al., 1995; Andreani et al., 2023). Additionally, people achieving a master's level education had the greatest practice towards sustainable food consumption than those with a lower education (Niva et al., 2014). Although this study from Nordic countries did not find a significant difference across all four nations for education, speculating it has a "relatively weak role" alongside occupation as a characteristic for sustainable food consumption. A higher education when grouped with other socio-demographic variables such as income, smaller household sizes and age have been seen to align to a higher level of meat curtailment which corresponds to the results (de Boer et al., 2014).

5.6. Limitations

There were limitations in the current study which should be considered such as the cohort are not a homogeneous sample of UK population in terms of age, education, gender, income and family status. This study did not ask participants dietary preferences i.e. omnivore, vegetarian, veganism etc, which could present a bias to the results which was found by Kim, Oh and Cho (2022).

Furthermore, self-reported sustainable food intake may not correspond to actual behaviour e.g. recall and can be prone to social desirability resulting in bias (Vetschera and Kainz, 2013). Similarly, reported intentions may not result in purchase intentions (Dowd and Burke, 2013), thus these results should not be taken as validation.

5.7. Conclusion

The original FCQ by Steptoe et al., (1995) has been extensively used in academic research although a systematic review by Cunha et al., (2018) reported a strong lack of standardization across all the studies which can be seen in reliable studies. The current SUS-FCQ has yet to be established in academic literature with only the original study to compare against. This is a weakness that could be overcome from further studies. Furthermore, a limitation of the current study was that it relied on utilising factor analysis of each motive from both the original FCQ and the updated SUS-FCQ. This approach was neglected from the current study thus lacking a possible individuality by conducting its own exploratory factor analysis to determine the results that most of FCQ studies apply.

6. Conclusion

This study found that this group are very much engaged in food sustainability although as mentioned this cohort are highly educated, have higher incomes and there is a greater proportion over the age of 45 years old which is not a representative sample of the UK population. Nearly two-thirds of participants indicated a good understanding of food sustainability, with a higher ratio of men answering correctly to women. Responses indicated their most frequent sustainable food behaviour is eating Free range products/products with sustainability logo/smaller portions with vegetarian options the least frequent. Openness to alternatives for meat found that animal-based products were the most popular in terms of order with novel products the least likely. The results demonstrate a preference for seafood over novel foods which could be a characteristic of the mature demographic. Novel alternatives such as insects and analogue products showed that two-thirds of participants were unlikely to consume. Finally, the results indicate that participants base their food choices on sustainability and health and least on familiarity. Furthermore, highlighting that environmental welfare is very low consideration of food choice amongst the results, may be a symptom of defining the concept of food sustainability. This suggests tailoring public health initiatives to sub-population groups would be more effective than generic messaging to advance change to healthier sustainable diets to recommendations by EAT-Lancet Commission (Willett et al., 2019).

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8. Appendices

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SPSS

Gender Evaluation – Male or Female

Report														
Gender		Health	Mood	Convenience	SensoryAppeal	NaturalContent	Price	WeightControl	Familiarity	EthicalConcern	AnimalWelfare	Envmiromental Welfare	LocalSeasonal	Miscellaneous
Male	Mean	3.5294	2.3542	2.5261	3.2378	3.0083	3.2158	2.6978	2.1278	4.0478	4.0136	2.8394	2.9697	1.7394
	N	36	36	36	36	36	36	36	36	36	36	36	36	36
	Std. Deviation	1.12631	1.11491	1.21792	.91266	1.27090	1.28697	.92869	.98447	1.41588	1.55062	1.02401	1.18383	.77527
Female	Mean	3.8484	2.7514	3.3008	3.4769	3.4794	3.4553	3.0673	2.2649	4.6173	4.8600	3.2931	3.7296	1.9904
	N	49	49	49	49	49	49	49	49	49	49	49	49	49
	Std. Deviation	1.13961	1.13013	1.21919	1.00804	1.39019	1.27922	1.13641	.99105	1.16640	1.33727	1.07390	1.37065	.97939
Total	Mean	3.7133	2.5832	2.9727	3.3756	3.2799	3.3539	2.9108	2.2068	4.3761	4.5015	3.1009	3.4078	1.8841
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Std. Deviation	1.13834	1.13434	1.27111	.97049	1.35358	1.28038	1.06352	.98474	1.30110	1.48348	1.07087	1.34169	.90228

Independent Samples Test

		Levene's Test for Equality of Variances				t-test for Equality of Means				95% Confidence Interval of the Difference	
		F	Sig.	t	df	Significance One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Health	Equal variances assumed	.190	.664	-1.281	83	.102	.204	-.31892	.24893	-.81404	.17619
	Equal variances not assumed			-1.283	76.071	.102	.203	-.31892	.24848	-.81381	.17596
Mood	Equal variances assumed	.056	.813	-1.610	83	.056	.111	-.39726	.24667	-.88789	.09336
	Equal variances not assumed			-1.614	76.147	.055	.111	-.39726	.24616	-.88751	.09299
Convenience	Equal variances assumed	.316	.576	-2.896	83	.002	.005	-.77471	.26751	-1.30677	-.24264
	Equal variances not assumed			-2.896	75.620	.002	.005	-.77471	.26747	-1.30746	-.24195
SensoryAppeal	Equal variances assumed	1.033	.312	-1.124	83	.132	.264	-.23916	.21270	-.66221	.18389
	Equal variances not assumed			-1.142	79.367	.128	.257	-.23916	.20946	-.65606	.17774
NaturalContent	Equal variances assumed	1.354	.248	-1.600	83	.057	.113	-.47105	.29441	-1.05662	.11451
	Equal variances not assumed			-1.622	79.043	.054	.109	-.47105	.29036	-1.04899	.10688
Price	Equal variances assumed	.113	.737	-.851	83	.199	.397	-.23947	.28152	-.79941	.32047
	Equal variances not assumed			-.850	75.316	.199	.398	-.23947	.28179	-.80078	.32184
WeightControl	Equal variances assumed	3.385	.069	-1.598	83	.057	.114	-.36957	.23133	-.82967	.09053
	Equal variances not assumed			-1.648	82.002	.052	.103	-.36957	.22431	-.81579	.07665
Familiarity	Equal variances assumed	.265	.608	-.632	83	.265	.529	-.13712	.21694	-.56861	.29436
	Equal variances not assumed			-.633	75.858	.264	.529	-.13712	.21672	-.56876	.29452
EthicalConcern	Equal variances assumed	2.128	.148	-2.031	83	.023	.045	-.56957	.28044	-1.12735	-.01179
	Equal variances not assumed			-1.972	66.541	.026	.053	-.56957	.28888	-1.14625	.00711
AnimalWelfare	Equal variances assumed	.691	.408	-2.694	83	.004	.009	-.84639	.31415	-1.47122	-.22156
	Equal variances not assumed			-2.634	68.735	.005	.010	-.84639	.32138	-1.48757	-.20521
EnvironmentalWelfare	Equal variances assumed	.443	.507	-1.962	83	.027	.053	-.45362	.23118	-.91342	.00619
	Equal variances not assumed			-1.977	77.512	.026	.052	-.45362	.22949	-.91053	.00330
LocalSeasonal	Equal variances assumed	1.351	.248	-2.673	83	.005	.009	-.75987	.28430	-1.32534	-.19440
	Equal variances not assumed			-2.734	80.766	.004	.008	-.75987	.27797	-1.31297	-.20676
Miscellaneous	Equal variances assumed	4.067	.047	-1.272	83	.104	.207	-.25096	.19734	-.64346	.14153
	Equal variances not assumed			-1.318	82.496	.096	.191	-.25096	.19045	-.62979	.12787

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Health	Between Groups	2.111	1	2.111	1.641	.204
	Within Groups	106.738	83	1.286		
	Total	108.849	84			
Mood	Between Groups	3.275	1	3.275	2.594	.111
	Within Groups	104.811	83	1.263		
	Total	108.086	84			
Convenience	Between Groups	12.455	1	12.455	8.387	.005
	Within Groups	123.265	83	1.485		
	Total	135.720	84			
SensoryAppeal	Between Groups	1.187	1	1.187	1.264	.264
	Within Groups	77.928	83	.939		
	Total	79.115	84			
NaturalContent	Between Groups	4.605	1	4.605	2.560	.113
	Within Groups	149.298	83	1.799		
	Total	153.902	84			
Price	Between Groups	1.190	1	1.190	.724	.397
	Within Groups	136.517	83	1.645		
	Total	137.707	84			
WeightControl	Between Groups	2.834	1	2.834	2.552	.114
	Within Groups	92.175	83	1.111		
	Total	95.010	84			
Familiarity	Between Groups	.390	1	.390	.400	.529
	Within Groups	81.066	83	.977		
	Total	81.456	84			
EthicalConcern	Between Groups	6.732	1	6.732	4.125	.045
	Within Groups	135.468	83	1.632		
	Total	142.201	84			
AnimalWelfare	Between Groups	14.867	1	14.867	7.259	.009
	Within Groups	169.993	83	2.048		
	Total	184.860	84			
EnvirnomentaWelfare	Between Groups	4.270	1	4.270	3.850	.053
	Within Groups	92.057	83	1.109		
	Total	96.328	84			
LocalSeasonal	Between Groups	11.983	1	11.983	7.144	.009
	Within Groups	139.227	83	1.677		
	Total	151.210	84			
Miscellaneous	Between Groups	1.307	1	1.307	1.617	.207
	Within Groups	67.078	83	.808		
	Total	68.385	84			

Education – Below Degree Level or Degree Level and above

Report														
Education		Health	Mood	Convenience	SensoryAppeal	NaturalContent	Price	WeightControl	Familiarity	EthicalConcern	AnimalWelfare	Environmental Welfare	LocalSeasonal	Miscellaneous
Under Degree	Mean	3.2433	2.4105	2.8048	3.0610	2.9471	2.9633	2.6657	1.9648	3.8767	4.1795	2.8210	3.2676	1.6481
	N	21	21	21	21	21	21	21	21	21	21	21	21	21
	Std. Deviation	1.53051	1.15171	1.43260	.99401	1.71551	1.52951	1.05095	.78120	1.47898	1.72958	1.25823	1.58399	.88487
Above Degree	Mean	3.8675	2.6398	3.0278	3.4789	3.3891	3.4820	2.9913	2.2863	4.5400	4.6072	3.1928	3.4537	1.9616
	N	64	64	64	64	64	64	64	64	64	64	64	64	64
	Std. Deviation	.94146	1.13197	1.22076	.94778	1.20814	1.17288	1.06342	1.03599	1.20512	1.39238	.99585	1.26291	.90125
Total	Mean	3.7133	2.5832	2.9727	3.3756	3.2799	3.3539	2.9108	2.2068	4.3761	4.5015	3.1009	3.4078	1.8841
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Std. Deviation	1.13834	1.13434	1.27111	.97049	1.35358	1.28038	1.06352	.98474	1.30110	1.48348	1.07087	1.34169	.90228

Independent Samples Test													
Levene's Test for Equality of Variances					t-test for Equality of Means								
		F	Sig.	t	df	Significance One-Sided p	Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference			
										Lower	Upper		
Health	Equal variances assumed	12.355	<.001	-2.231	83	.014	.028	-.62417	.27973	-1.18053	-.06780		
	Equal variances not assumed			-1.763	25.151	.045	.090	-.62417	.35411	-1.35325	.10492		
Mood	Equal variances assumed	.011	.916	-.802	83	.212	.425	-.22937	.28588	-.79796	.33923		
	Equal variances not assumed			-.795	33.616	.216	.432	-.22937	.28842	-.81575	.35701		
Convenience	Equal variances assumed	.736	.393	-.696	83	.244	.489	-.22305	.32065	-.86081	.41471		
	Equal variances not assumed			-.641	30.123	.263	.526	-.22305	.34787	-.93338	.48728		
SensoryAppeal	Equal variances assumed	.036	.850	-1.733	83	.043	.087	-.41795	.24120	-.89770	.06179		
	Equal variances not assumed			-1.691	32.786	.050	.100	-.41795	.24716	-.92092	.08501		
NaturalContent	Equal variances assumed	7.191	.009	-1.304	83	.098	.196	-.44192	.33899	-1.11617	.23233		
	Equal variances not assumed			-1.095	26.814	.142	.283	-.44192	.40367	-1.27045	.38661		
Price	Equal variances assumed	2.559	.113	-1.627	83	.054	.108	-.51870	.31889	-1.15295	.11555		
	Equal variances not assumed			-1.423	28.130	.083	.166	-.51870	.36455	-1.26528	.22789		
WeightControl	Equal variances assumed	.012	.913	-1.221	83	.113	.226	-.32554	.26668	-.85595	.20488		
	Equal variances not assumed			-1.228	34.461	.114	.228	-.32554	.26507	-.86397	.21289		
Familiarity	Equal variances assumed	3.342	.071	-1.304	83	.098	.196	-.32149	.24662	-.81201	.16903		
	Equal variances not assumed			-1.502	44.987	.070	.140	-.32149	.21408	-.75267	.10970		
EthicalConcern	Equal variances assumed	1.367	.246	-2.066	83	.021	.042	-.66333	.32102	-1.30182	-.02484		
	Equal variances not assumed			-1.862	29.223	.036	.073	-.66333	.35617	-1.39153	.06487		
AnimalWelfare	Equal variances assumed	2.349	.129	-1.149	83	.127	.254	-.42766	.37236	-1.16828	.31295		
	Equal variances not assumed			-1.029	28.994	.156	.312	-.42766	.41562	-1.27771	.42239		
EnvironmentalWelfare	Equal variances assumed	3.179	.078	-1.388	83	.084	.169	-.37186	.26783	-.90457	.16084		
	Equal variances not assumed			-1.233	28.682	.114	.227	-.37186	.30147	-.98873	.24501		
LocalSeasonal	Equal variances assumed	3.465	.066	-.549	83	.292	.584	-.18613	.33882	-.86004	.48777		
	Equal variances not assumed			-.490	28.816	.314	.628	-.18613	.38000	-.96353	.59127		
Miscellaneous	Equal variances assumed	.004	.950	-1.389	83	.084	.169	-.31347	.22566	-.76230	.13537		
	Equal variances not assumed			-1.402	34.658	.085	.170	-.31347	.22356	-.76747	.14053		

Location – Urban or Rural

Report														
Location		Health	Mood	Convenience	SensoryAppeal	NaturalContent	Price	WeightControl	Familiarity	EthicalConcern	AnimalWelfare	Environmental Welfare	LocalSeasonal	Miscellaneous
Out of City	Mean	3.6712	2.5444	3.0011	3.3195	3.0947	3.3444	2.9426	2.2979	4.3060	4.4967	3.0256	3.3323	1.8326
	N	57	57	57	57	57	57	57	57	57	57	57	57	57
	Std. Deviation	1.17696	1.14486	1.24484	.97888	1.36917	1.27145	1.01410	.95163	1.34633	1.54864	1.09699	1.34441	.88647
From City	Mean	3.7989	2.6621	2.9150	3.4900	3.6568	3.3732	2.8461	2.0214	4.5189	4.5114	3.2543	3.5614	1.9889
	N	28	28	28	28	28	28	28	28	28	28	28	28	28
	Std. Deviation	1.07100	1.12917	1.34443	.96051	1.26186	1.32166	1.17450	1.04185	1.21477	1.36830	1.01755	1.34725	.94123
Total	Mean	3.7133	2.5832	2.9727	3.3756	3.2799	3.3539	2.9108	2.2068	4.3761	4.5015	3.1009	3.4078	1.8841
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Std. Deviation	1.13834	1.13434	1.27111	.97049	1.35358	1.28038	1.06352	.98474	1.30110	1.48348	1.07087	1.34169	.90228

Independent Samples Test											
		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Significance One-Sided p	Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
										Lower	Upper
Health	Equal variances assumed	.406	.526	-.484	83	.315	.630	-.12770	.26391	-.65260	.39720
	Equal variances not assumed			-.500	58.595	.310	.619	-.12770	.25548	-.63898	.38358
Mood	Equal variances assumed	.032	.859	-.448	83	.328	.656	-.11776	.26304	-.64092	.40541
	Equal variances not assumed			-.450	54.459	.327	.655	-.11776	.26178	-.64250	.40699
Convenience	Equal variances assumed	.001	.971	.292	83	.386	.771	.08605	.29495	-.50060	.67270
	Equal variances not assumed			.284	50.235	.389	.777	.08605	.30289	-.52224	.69435
SensoryAppeal	Equal variances assumed	.010	.919	-.759	83	.225	.450	-.17053	.22453	-.61711	.27606
	Equal variances not assumed			-.764	54.713	.224	.448	-.17053	.22307	-.61762	.27657
NaturalContent	Equal variances assumed	.300	.585	-1.824	83	.036	.072	-.56205	.30814	-1.17492	.05082
	Equal variances not assumed			-1.876	57.920	.033	.066	-.56205	.29959	-1.16177	.03767
Price	Equal variances assumed	.005	.944	-.097	83	.461	.923	-.02883	.29724	-.62003	.56237
	Equal variances not assumed			-.096	51.952	.462	.924	-.02883	.30124	-.63333	.57567
WeightControl	Equal variances assumed	.235	.629	.391	83	.348	.696	.09656	.24668	-.39408	.58720
	Equal variances not assumed			.372	47.336	.356	.711	.09656	.25944	-.42526	.61838
Familiarity	Equal variances assumed	2.472	.120	1.220	83	.113	.226	.27647	.22660	-.17423	.72716
	Equal variances not assumed			1.183	49.646	.121	.243	.27647	.23378	-.19318	.74611
EthicalConcern	Equal variances assumed	.984	.324	-.707	83	.241	.481	-.21296	.30116	-.81196	.38604
	Equal variances not assumed			-.733	59.048	.233	.467	-.21296	.29069	-.79463	.36870
AnimalWelfare	Equal variances assumed	.928	.338	-.043	83	.483	.966	-.01476	.34441	-.69977	.67025
	Equal variances not assumed			-.045	60.181	.482	.964	-.01476	.33006	-.67495	.64542
EnvironmentalWelfare	Equal variances assumed	.472	.494	-.925	83	.179	.358	-.22867	.24735	-.72063	.26329
	Equal variances not assumed			-.949	57.582	.173	.347	-.22867	.24102	-.71120	.25386
LocalSeasonal	Equal variances assumed	.006	.941	-.738	83	.231	.463	-.22915	.31047	-.84667	.38837
	Equal variances not assumed			-.738	53.682	.232	.464	-.22915	.31070	-.85215	.39385
Miscellaneous	Equal variances assumed	.365	.547	-.749	83	.228	.456	-.15630	.20877	-.57154	.25894
	Equal variances not assumed			-.733	50.988	.233	.467	-.15630	.21314	-.58419	.27159

Online Questionnaire

Microsoft Forms link to Online SUS-FCQ questionnaire: -

<https://forms.office.com/Pages/DesignPageV2.aspx?prevorigin=shell&origin=NeoPortalPage&subpage=design&id=-REPTm4EBUWcuNshUjEelYBrIC7MkLNLmoiZui3ylDNUMkNIR1NaTDQ2U1RNQjZGTzE1SkwyVKjTVy4u&tab=0&analysis=true>

Social Media Recruitment

X (formally Twitter)

Joe Muldoon (1st November 2023) X (formally Twitter) Available

at: https://twitter.com/joe_muldoon/status/1719681277098393683 (Accessed: 02/04/24)

Instagram

Joe Muldoon (14th November 2023) Instagram Available at:

<https://www.instagram.com/p/CznyJzMtGwJ/> (Accessed: 02/04/24)