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1 **Acceptability and feasibility of a café-based sustainable food intervention**
2 **in the UK**

3

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5

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18

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29

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31 FG, MB, MM and MH designed the study. FG collected the data, transcribed and analysed
32 the data. FG, MH interpreted the results. FG drafted the manuscript. FG, MH, MB and MM
33 revised the content and approved the manuscript for publication.

34

35 **Ethical approval**

36 This study was conducted according to the guidelines laid down in the Declaration of
37 Helsinki and all procedures involving research study participants were approved by the
38 University of Sheffield's Medical School Ethics Committee in 2015 (Approval number:
39 003879- caterers and 006925-customers). Written informed consent was obtained from all
40 subjects.

41

42 **Conflicts of interest**

43 None.

44

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48

49 **ABSTRACT**

50 Dietary change is needed to improve health and reduce the environmental burden of food
51 production and consumption. Using an Intervention Mapping approach, this study aimed to
52 explore the views caterers and customers held towards point-of-choice interventions that
53 promote healthy and environmentally friendly (EF) food and beverage choices at the
54 University of Sheffield.

55 Intervention options proposed during focus groups were devised using the Nuffield Bioethics
56 ladder of intervention. Ten focus groups were held involving caterers (n=16) and customers
57 (n=45). Thematic analysis of transcripts was conducted on the focus groups for caterers and
58 customers separately, and then comparisons were made to identify concerns about the
59 acceptability and feasibility of intervention options.

60 Attitudes towards intervention options varied considerably amongst stakeholders, with the
61 greatest disparity of opinion in the acceptability of interventions that restrict or limit personal
62 choice, particularly with regards to meat consumption. Information provision was favoured as
63 an acceptable intervention by both customers and caterers. However, labelling products in
64 terms of their environmental impact was considered practically unfeasible. Social norms
65 around eating also emerged as influencing the acceptability and feasibility of interventions
66 with concerns raised about: shaming customers who chose meat, the exclusivity of vegan
67 choices and the limited availability and appeal of meatless café options. Financial
68 considerations were the main priority of caterers when discussing point-of-choice
69 interventions.

70 An acceptable and feasible café-based intervention ought to increase awareness and
71 understanding of healthy and environmentally friendly food choices, protect customer choice
72 and avoid additional costs.

73

74 INTRODUCTION

75 Food consumption patterns have been associated with diet-related diseases and
76 environmental degradation (Tilman and Clark 2014; Springmann *et al.* 2016). Suboptimal
77 diets have been shown to be leading risk factors for mortality and disability adjusted life
78 years in many countries around the world (Afshin *et al.* 2019). The latest UK National Diet
79 and Nutrition Survey indicates that the diet of the UK population is failing to meet
80 recommended dietary guidelines for health (Roberts *et al.* 2018). Nutrition-related non-
81 communicable diseases such as cardiovascular disease and diabetes are amongst the leading
82 causes of mortality in the UK (Naghavi *et al.* 2017), costing the National Health Service
83 around £6 billion annually (Scarborough *et al.* 2011).

84

85 In addition to health implications, food production is associated with environmental impacts
86 and resource use. Food production and consumption accounts for around a third of UK
87 Greenhouse Gas emissions (GHGE), the majority of which arises from the production of
88 livestock through the release of methane from manure and enteric fermentation by ruminant
89 animals (Garnett 2011; Audsley *et al.* 2011). Livestock production uses large volumes of
90 water and land during the production of animal feed, maintenance and processing of animals
91 (Mekonnen and Hoekstra 2010). The environmental impact of food consumed in the UK
92 extends overseas, as over half of food consumed is imported (De Ruiter *et al.* 2016). Shifting
93 to healthier diets comprising plant-based foods, with less meat, dairy, energy dense and
94 processed foods can alleviate both health and environmental burdens (Aston, *et al.* 2012;
95 Aleksandrowicz *et al.* 2016; Garnett *et al.* 2015; Poore and Nemecek 2018;). The
96 development and implementation of policies to support the adoption of more healthy and
97 sustainable diets is particularly challenging given the large number of disparate stakeholders
98 involved. An orchestrated effort between the food industry, commercial enterprises, scientific
99 community and the public is needed to reach consensus and subsequently develop and
100 implement policies that support the adoption of more sustainable diets.

101

102 Food eaten outside the home comprises an increasingly important part of UK citizens' diets.
103 Over 10% of daily energy intake in the UK is from food prepared and consumed outside the
104 home (Brown *et al.* 2016), which tends to be more energy dense and nutrient poor compared
105 to foods consumed at home (Lachat *et al.* 2012). Frequent consumption of such foods is
106 linked with weight gain and unhealthy dietary habits (Seguin *et al.* 2016). Catering outlets in
107 the public sector, such as schools and universities, have been proposed as sites to foster more

108 healthy and sustainable dietary habits for employees, students and visitors (Wahlen *et al.*
109 2012). However, many dietary intervention studies have been developed without adhering to
110 theory for guidance (Atkins and Michie 2015) or consulting with stakeholders in the
111 development process, reducing the likelihood of success (Bartholomew *et al.* 2011). The
112 involvement of intervention implementers and beneficiaries in the planning stage brings
113 greater skills, knowledge and expertise to the intervention and can provide insights on an
114 acceptable balance of intervention burden-to-risk (Bartholomew *et al.* 2011).

115

116 Small changes to the food choices made by a large number of individuals have the potential
117 to reduce the environmental impacts associated with food consumption and benefits health at
118 a population level. The incorporation of environmental sustainability into UK dietary
119 guidance for the public (Public Health England 2016) shows commitment from the
120 government for dietary change. However, it is important that intervention strategies to
121 prompt change are acceptable to the intervention beneficiaries so as to minimise the prospect
122 of unintended or perverse responses to the intervention. This is particularly pertinent when
123 introducing the relatively new concept of a healthy and environmentally friendly diet.

124

125 This study aimed to explore the views caterers and customers held towards point-of-choice
126 interventions that promote healthy and environmentally friendly (EF) food and beverage
127 choices at the University of Sheffield.

128

129 **METHODS**

130 **Setting**

131 The University of Sheffield (TUOS) is a multi-site university, comprised of six academic
132 faculties. Food provision on campus is predominantly via catering establishments owned by
133 TUOS. Most university outlets emulate high-street cafés and fast-food outlets in terms of
134 their business model, thus are set up for ‘grab and go’ food and drink procurement. Food
135 outlets are located within university buildings across the city and within the Students’ Union
136 (SU) building situated centrally.

137

138 **Design**

139 Intervention options (Figure 1) were devised using literature and information regarding the
140 environmental impact of different food choices available on campus (Graham *et al.* 2019) and
141 the Nuffield bioethics ladder of intervention (Nuffield Council on Bioethics 2007), which

142 guided thinking about the acceptability and justification of different policy initiatives to
143 improve public health. This framework incorporates eight policy options that range from ‘no
144 intervention’ to ‘state intervention as one moves up the ladder. Intervention options on the
145 lowest rungs of the ladder are the least intrusive and primarily concerned with providing
146 information. Intervention ideas on the highest rungs of the ladder are the most intrusive and
147 concerned with legislation to restrict, e.g. remove meat options from the shelves one day a
148 week as part of a Meat Free Monday campaign (MFM)¹ or eliminate less healthy and EF
149 choices from the shelves altogether. Focus groups were used to explore the feasibility and
150 cultural acceptability of these proposed intervention options.

151

152 **[Insert Figure 1- Intervention options proposed to caterers for focus group discussion]**

153

154 **Recruitment**

155 *Catering staff*

156 Focus groups with catering managers in TUOS explored their views about the feasibility of
157 an intervention in university food outlets to encourage EF eating behaviours. Caterers were
158 invited via email to participate and those that agreed were sent information about the: i)
159 environmental impact of food production, ii) environmental impact of food and drink options
160 in university outlets, (Graham *et al.* 2019) and iii) suggested intervention options.

161

162 *Café customers*

163 Focus groups with university food outlet customers were held to explore factors influencing
164 food decisions made on campus, including perceived healthiness and environmental
165 considerations. They were also used to gather customers’ perspectives about the acceptability
166 of point-of-choice interventions to encourage healthy and environmentally friendly eating on
167 campus. Café customers were invited to participate via an email using the university’s
168 announcement system. Cafe customers received a £10 high street voucher for participating in
169 the research.

170

171 **Data collection**

¹ Meat Free Monday is ‘a not-for-profit campaign that aims to raise awareness of the detrimental environmental impact of animal agriculture and industrial fishing and encourages people to help slow climate change, conserve natural resources and improve their health by having at least one plant-based day each week’ (Meat Free Monday 2019).

172 All focus groups were facilitated by FG on campus within working hours in private rooms
173 close to their place of work; and were audio recorded. Topic guides for the focus groups with
174 caterers and customers were devised to ensure key topics were covered during the discussions
175 (Appendix 1).

176

177 **Data Analysis**

178 The focus groups were fully transcribed by FG and analysed thematically following the 6-
179 phase reiterative process outlined by Braun & Clarke (2006). The computer software NVivo
180 version 11.4.1 (QSR International Pty Ltd, Doncaster, Australia) was used as a tool to index
181 the electronic version of the transcripts by the emerging themes. Thematic analysis was
182 conducted on the caterer and customers focus groups transcripts separately, then comparisons
183 were made between the two sets of results to identify shared and contrasting views regarding
184 the acceptability and feasibility of an intervention.

185

186 **RESULTS**

187 *Participant characteristics*

188 Focus groups with caterers (n=17) were held between December 2015 and March 2016,
189 lasting 60-94 minutes. In total four groups took place with between 2 and 6 participants, each
190 involving commercial service managers (n=6), retail operations managers (n=6) and café
191 managers (n=5).

192

193 Focus groups with café customers (n=45) were held between March-April 2016, lasting 45-
194 90 minutes. Six groups separately involved undergraduate students (UG) (n=14),
195 postgraduate students (PG) (n=13) and university staff members, (MS) (n=18), with between
196 six to nine participants each. The age range was 18-58 years, and three-quarters were female
197 (n=34).

198

199 *Key acceptability and feasibility views relating to of a café-based intervention*

200

201 **Low awareness and understanding**

202 Two themes emerged from the focus groups with both caterers and customers that indicated
203 limited awareness and understanding of EF food and beverages ‘**Awareness, complexity and**
204 **confusion**’ (customer) and ‘**Catering staff support, skills and knowledge**’ (caterers).

205

206 Besides vegetarian/vegan customers, most did not mention environmental sustainability as a
207 factor influencing their food choices. Customers were also unsure what was meant by the
208 term 'environmentally friendly'. Discussions around EF foods tended to focus on food
209 packaging, localism, air-freighted food and Fairtrade. This was the case for focus groups of
210 staff, UG and PG, highlighting a low awareness amongst all age groups. Participants believed
211 that they were unable to choose EF food in the university because of insufficient information.

212 *"...for environmentally friendly food, they don't actually have single [label for that]
213 saying this product is greener, so I wouldn't say I pay a lot of attention at the
214 moment."* (PG)

215 A minority of participants, including students and members of staff explained that they
216 actively avoided meat and chose a plant-based diet on the grounds of environmental
217 protection. However, some participants raised concerns over the economic and social
218 implications of the movement towards plant-based diets. This confusion appeared to stem
219 from mixed media messages.

220 *"I get sort of bogged down in the complexity of the thing, because I thought, oh yeah
221 vegetarian is the way to go and everything, and then you read an article about soya
222 beans causing detrimental impacts in the areas where people were previously
223 growing their own food and they stopped doing that, and they're doing cash crops,
224 and that's having a bad impact on the country... you don't know what to do for the
225 best."* (MS)

226 One postgraduate rejected the notion of adopting plant-based diets on the grounds of this
227 uncertainty and implied that the university should not support the consumption of EF food
228 choices, since it was unclear which foods are sustainable and some changes could cause more
229 harm than good. Some catering managers and team leaders also expressed a lack of
230 understanding around what constitutes EF food and why. There were several occasions where
231 the researcher was asked to explain the reason why the food choices were ranked as they
232 were.

233 *"I don't understand why it's so, if you're talking about, like the sustainability as far as
234 using wheat and things, why is that more environmentally friendly than having a field
235 full of cattle?"* (C)

236 Catering managers expressed concerns about the accuracy of environmental impact scores of
237 the café products calculated by the researcher, given that they are based on generic food
238 commodity data and therefore did not account for the fact milk procured on campus was
239 sourced locally. Furthermore, catering managers considered uncertainty and limited
240 knowledge amongst catering staff as potentially problematic, given that catering staff would
241 need to have sound knowledge of the environmental impact of foods to support the
242 implementation of an intervention, particularly those conveying information.

243

244 **Shame, distrust and scepticism**

245 Customer and caterers welcomed the idea to provide general information about the
246 environmental impact of food choices in the outlets. However, three themes emerged that
247 revealed concerns about the acceptability of information provision interventions: **'Fairness**
248 **and shaming'** (caterers) **'Doubts about effectiveness'** (customer) and **'Scepticism in**
249 **sustainability claims'** (customer).

250

251 Caterers expressed concern that labelling café options according to the extent of their
252 environmental impact (low, moderate, high) was financially risky as it may cause customers
253 who usually consume high impact products to feel ashamed, and thus discourage return
254 custom. Several customers expressed the belief that if a product had a label to indicate that it
255 was 'local' or 'environmentally friendly' then they would be more likely to consider
256 purchasing it. However, other customers expressed the concern that information provided as
257 part of an intervention may not be trustworthy and therefore the intervention may not have
258 the desired effect. Moreover, some customers expressed the view that the intervention was
259 unlikely to have an impact on their food choices, given the time frame in which their choice
260 is made.

261 *"Personally I don't think if food was...[labelled] environmentally friendly, I don't*
262 *think it would effect me at all... when you're... [short of] time it's a matter of... just*
263 *getting food and whatever looks nice."* (UG)

264 Most participants suggested the university should run campaigns to raise awareness and
265 provide guidance about the environmental impact of different food choices. However, several
266 customers expressed doubt and distrust about the existing claims that the university was
267 making about the sustainability of products available and the intervention options proposed.
268 Another postgraduate student also expressed scepticism over the long-term effectiveness of

269 such an intervention, suggesting that education around plant-based alternatives to meat from
270 a young age would be a more effective strategy in the long term.

271 **Protect customer choice**

272 Both customer and caterers' focus groups revealed that providing choice was important and
273 desirable. Intervention options that restricted choice revealed mixed views around who is
274 responsible for the health or environmental outcomes of the food choices made on campus, as
275 revealed by the four themes: **'Role and responsibility of university catering service'**
276 (caterer) **'Institutional or personal responsibility'** (customer), **'Customer expectations**
277 **and acceptability'** (caterer) and **'Forcing change versus freedom to choose'** (customer).

278

279 Whilst most managers expressed support for using university food outlets to support EF food
280 consumption, some caterers believed interventions to directly influence customer purchases
281 was beyond their remit, especially when it restricted customer choice, and was potentially
282 counter to their commercial interests, posing a financial risk.

283 *"We've had this debate previously whether we should sell healthy or healthier*
284 *products, or things that people want like chocolate muffins. So we can put the choice*
285 *there and people can choose, they're educated to make that decision."* (C)

286 One customer echoed these concerns around the implications of a café-based intervention,
287 arguing that it was not the role of the university to influence people's dietary choices.

288 *"I don't think it's actually the university's business to tell people how they should eat*
289 *and do things, if they're making a profit on the food that people buy... .."* (PG)

290 However, most participants did not share this view and expressed support towards a
291 university based intervention to encourage EF food consumption. Furthermore, two members
292 of staff and an undergraduate participant implied that they would prefer to be absolved of the
293 responsibility to choose to purchase EF food and thought it was appropriate for the university
294 to procure only EF foods.

295 *"I think if you want to make it more environmentally friendly then, you shouldn't give*
296 *us a choice, you should just enforce it."* (UG)

297 However, focus group discussions were initially focused on non-specific 'environmentally-
298 friendly foods' that were perceived to be local and organic produce. When it was explained to

299 participants that café options containing meat and animal products carried the greatest
300 environmental burden and implementation of a meat-free day was proposed, reactions were
301 less favourable. Caterers and customers expressed the belief that interventions to restrict or
302 eliminate meat choices were likely to cause frustration to customers who expected to be able
303 to purchase meat.

304 *“...My concern is, they might walk in on a Monday morning expecting to be able to*
305 *buy a coffee and a bacon sandwich, and we immediately put them on the back foot,*
306 *and ourselves on the back foot, by saying actually we're not doing it today or any*
307 *Monday herein after...” (C)*

308 Managers implied they could lose customers to other outlets on and off campus where their
309 preferred choices were available. These ideas were described as economically dangerous and
310 could lead risk the livelihoods of the catering service employees. However, not all catering
311 managers shared this view. One commercial service manager implied that they would be
312 willing to consider removing meat from the shelves one day a week, so long as it was
313 supported with information. Similarly, another team leader believed that providing a variety
314 of appealing options were available to customers, that included meat with a lower
315 environmental impact.

316
317 Customers expressed mixed views about the proposal to implement a meat-free day as part of
318 a MFM campaign. A common view was that whilst they personally supported the initiative, it
319 could cause upset amongst *other* staff and students who could perceive it as reducing
320 freedom of choice. Some participants did not want to be ‘aggressively forced’ into choosing a
321 meatless option. Others suggested that gradually introducing plant-based options would be
322 more acceptable. For example, increasing proportion of meatless options available would
323 appease meat-eaters whilst increasing the profile of plant-based options. However, some
324 participants implied they would prefer the meat options to restricted.

325 *“I'd never, normally consider having [Quorn]... if there's that and a meat option, I*
326 *would probably go for a meat option. So yeah I like the idea of being forced into*
327 *being environmentally friendly sometimes.” (PG)*

328 **Avoid additional costs**

329 A common concern raised by participants was the potential additional costs of some of the
330 proposed interventions. The two themes from caterers' focus groups of '**Physical space,**
331 **facilities and resources**' and '**Impact on profit margins**' revealed that caterers considered
332 some intervention ideas financially unfeasible due to additional implementation costs, but
333 also by the potential impact the interventions could have on their income due to customer
334 dissatisfaction and desertion. The customers subtheme '**Information and labels: trust, use**
335 **and affordability**' revealed concerns about the additional costs associated with food labelled
336 as environmentally friendly or organic.

337

338 Intervention options that provided customers with information about food related health and
339 environmental sustainability implications were considered easy and quick to implement thus
340 practically feasible. However, lack of space in the outlets was given as a barrier. Intervention
341 options that utilised existing resources and aligned with current catering practices were
342 considered more practical and financially feasible. For example, incentivising EF options
343 using the University's electronic loyalty rewards system, (GeniUS card²) was considered
344 feasible by catering management and team leaders. This system was currently in place and
345 commonly used for promoting specific products in cafés.

346 *"I think that if you had posters up in the venues, where people can see that they'd*
347 *collect points if you buy eco-friendly sandwich...I think that is a great choice, I think*
348 *it would work, definitely."* (C)

349 However, other participants expressed the view that whilst it was feasible, they were
350 unconvinced that it would influence customer choices, as they believed that not all customers
351 were interested in collecting GeniUS points. Some commercial service managers expressed
352 the view that financial gains could be made through a sustainable food intervention as some
353 believed the products with a high environmental impact cost more, yet this view was not
354 expressed by the majority. Interventions ideas to guide choice through disincentives, such as
355 increase the price of products with a high environmental cost, were unanimously considered
356 financially unfeasible. Similarly, the idea to have an EF meal deal was unfeasible due to the

² GeniUS cards are electromagnetic cards that customers can use at point of purchase to collect points, 5 points for every £1 spent. These points can be collected and redeemed to receive discount on future purchases in the university outlets.

357 perceived impact this would have on profit margins. Altering prices evoked concern, as
358 catering outlets were already in competition with much larger retailers, and given that price is
359 such as important factor influencing food choices, any price changes would not be well
360 received by customers. Furthermore, concern over additional financial costs of procuring EF
361 products for meals prepared internally were raised by two catering managers.

362 *“There’s a misconception that they’re a cheaper option if it’s meat free or something*
363 *like that, a lactose-free product for example...it costs us more to produce that for a*
364 *particular client or event, so the margins are already less because those kinds of*
365 *things do cost more.” (C)*

366 As such, these intervention ideas were therefore considered too great a financial risk to be
367 feasible. Similarly, several customers expressed concerns over the additional cost of products
368 that were labelled local, organic and free-range or Marine Stewardship Council Certified.
369 They believed that other university customers might be less inclined or afford to purchase
370 these.

371 **Availability, exclusivity and appeal of meatless meals**

372 Customers and caterers both discussed vegetarian and vegan options as discrete choices for
373 those with specific dietary requirements as opposed to options that everyone can enjoy. This
374 shared belief appears to hinder the acceptability of a café based intervention to increase
375 healthy and EF food consumption. Three subthemes relate to this belief: ‘**customer**
376 **preferences**’ (caterers), ‘**Appeal and availability of healthy and plant-based choices**’
377 (customers) and ‘**exclusivity of veganism**’ (customers).

378

379 Caterers believed that customer demand for vegan options was limited and that few
380 customers considered environmental sustainability when choosing food in university cafés. In
381 light of this, the catering managers were not inclined to change the proportions of meatless
382 options available. Some catering staff expressed the opinion that a cafe-based intervention
383 would not be an effective strategy to change dietary behaviours...

384 *“I think there are things we can actually do to try and redirect people, [but] I*
385 *suppose my point is that we can't change what people desire.” (C)*

386 Caterers believed that most customers preferred food options containing meat and or animal
387 products to the vegetarian and vegan options available. Some customers expressed the belief

388 that foods labelled vegetarian and vegan were avoided as they were perceived to be less tasty
389 and less satiating. Considering this, it was suggested that an intervention should focus on
390 encouraging people to try new foods without using the labels vegetarian and vegan.
391 Providing people with an opportunity to try plant-based foods was proposed as a way to
392 enable people to overcome any misconceptions.

393 Vegetarian and vegan participants expressed mixed views about the availability and appeal of
394 vegetarian and vegan options on campus. One vegetarian student explained that they try to
395 choose the vegan options as far as possible, but the vegan options on campus tend to be
396 tasteless so they chose dairy products. Another vegetarian added:

397 *“... because I don't eat meat, sometimes I find that the kind of unhealthy stuff ...looks*
398 *a bit more appetising than the vegetarian stuff on offer... there's not really that much*
399 *to choose from, so like I might sometimes end up going for like a piece of cake instead*
400 *of like a sandwich that I don't find appealing.” (MS)*

401 There were also mixed views about the availability of appealing healthy options by
402 participants more broadly. Some members of staff expressed frustration at the lack of healthy
403 options on campus.

404 *“I feel that the university is investing in an awful lot of money in trying to promote a*
405 *healthy work force by the Juice project etc. But no way is that reflected in the food*
406 *offered across the campus.” (MS)*

407 Students believed there were options available when you wanted to choose healthy but they
408 were limited, mainly to the salad bar. One UG mentioned that their friends who are on diets
409 brought their own packed lunch as they did not think the options available in the students
410 union were healthy. Two female participants (MS and PG) said ‘it was difficult to find
411 something on campus for lunch when you were watching what you eat’ This highlights that
412 some university staff and students actively seek healthier options for weight control and that
413 availability is an important factor to consider when developing café-based intervention in the
414 university setting. In addition to the low appeal of healthy plant-based options available,
415 students alluded to the exclusivity surrounding the vegetarian and vegan options of campus.
416 This contributed to their concerns around the acceptability of an intervention to reduce meat
417 consumption on campus.

418

419 **DISCUSSION**

420 This study aimed to explore the views caterers and customers held towards point-of-choice
421 interventions that promote healthy and environmentally friendly (EF) food and beverage
422 choices at the University of Sheffield. This study revealed differences in opinion amongst the
423 university population over the extent to which the university should or could be promoting
424 EF food choices in university cafés. Whilst most catering managers agreed that they should,
425 and believed that they were already supporting EF food choices on campus³, the extent to
426 which they should start to alter or reduce the availability of unhealthy or high impact options
427 was disputed. Some caterers expressed reservations over implementing a point-of-choice
428 intervention to influence food choices as this was perceived to be the responsibility of the
429 individual, rather than the institution. This could have implications for the extent to which the
430 scheme is supported and implemented effectively by caterers. Personal views and perceived
431 obligations are important factors influencing the caterer's intention to adopt sustainable
432 practises (Chao-Jung *et al.* 2011), thus raising awareness and understanding of this issue
433 amongst caterers is important for successful intervention implementation.

434 Most customers in this study expressed support for a university intervention to promote
435 healthy and EF eating. This is consistent with other studies that have found that employees
436 believed that the public sector should promote healthy eating at work (Devine *et al.* 2007)
437 and ought to consider sustainability and environmental issues in their food provision
438 (Pridgeon and Whitehead 2013). In the university setting, Howse *et al.* (2017) found that
439 95% of students surveyed agreed that the university should promote the health of its students
440 and staff. However, they also found that whilst most participants in the study supported the
441 notion of regulating sugar-sweetened beverage consumption, their support varied with the
442 type of intervention proposed. Interventions requiring higher levels of personal choices, such
443 as information provision and incentives were considered more favourable than those
444 perceived to remove personal freedom (Howse *et al.* 2017). This was particularly apparent
445 when discussions focussed around restricting the availability of meat options, more
446 customers tended to change their position towards favouring interventions with higher
447 personal responsibility. This is consistent with others who have found that some people are
448 less willing than others to reduce their meat consumption (De Boer *et al.* 2014). An

³ Prior to the start of this study, the university catering service food sustainability policy included procuring only locally sourced milk, Fairtrade coffee in their food outlets and serving Marine Stewardship Council certified fish and certified free-range eggs in their dining halls.

449 undergraduate study in Canada exploring the acceptability of a cafeteria intervention to
450 reduce meat consumption of food found that MFM were considered least acceptable to
451 university students and caterers (Gao *et al.* 2014). The most acceptable strategy was replacing
452 a greater proportion of lamb and beef with other meat alternatives such as chicken, pork or
453 fish, followed by reducing portion sizes of lamb and beef dishes with a concomitant reduction
454 in price. This affirms the growing body of literature around the concept of meat-attachment,
455 where people express an attachment towards meat that reduces the likelihood of them
456 accepting strategies to reduce meat consumption (Ao Graça *et al.* 2015; Graça, Oliveira, and
457 Calheiros 2015; Circus 2015). Men tend to be more reluctant than women to endorse meat
458 reduction and reduce their meat consumption (Ruby and Heine 2012).

459
460 Information provision was favoured as an acceptable intervention by both customers and
461 caterers. However, the trustworthiness of the product information was a concern raised by
462 participants. This is consistent with the findings of Turconi *et al.* (2012) where students
463 reported having nutritional information at point of purchase useful and allowed them to plan
464 their meals according to a more balanced diet, yet expressed distrust in the accuracy of the
465 information provided. Price *et al.* (2016) noted that nutritional information and labels are
466 important as they provide transparency and reassurance to the consumer, though they are not
467 always utilised. Grunert *et al.* 2014 explored the use of sustainability labels on food products
468 and concluded that they are used by those actively seeking them, thus are useful for making
469 informed decisions (Grunert *et al.* 2014). The findings of this study suggest that participants
470 may be more receptive to messages around healthy eating rather than environmental
471 sustainability, given that some participants consciously sought healthier options. The
472 practical feasibility concerns about labelling café choices raised by caterers in this study, are
473 consistent with the views of other restaurant managers in the UK (Filimonau and Krivcova
474 2017).

475 Financial considerations were the main priority of caterers when discussing point-of-choice
476 interventions. The perceived additional cost of some of the intervention ideas reduced their
477 feasibility. This is a similar finding to Smith *et al.*, (2017) who noted tight budgets were a
478 perceived barrier to providing healthy choices in workplaces in the North East of England.
479 Furthermore, the financial risk associated with providing only healthy and EF options was a
480 key concern of caterers Whilst the healthy and EF cafe choices (sandwiches, soups and baked

481 potatoes) cost the same as the high impact options, the caterers main concern was that
482 restricting choices to those that were preferred less by customers could lead to a loss of
483 custom and income. This is consistent with the results of Park & Lee (2015) where the need
484 to adhere to customer preferences for financial viability was a key barrier to the
485 implementation of reduced sodium meals in worksite cafeterias in Korea. Caterers considered
486 the use of the existing loyalty rewards scheme more financially feasibility than reducing costs
487 of café options. Customers considered the use of the GeniUS rewards points to be an
488 acceptable strategy to promote healthy and EF options in university cafés. This finding
489 supports that of a study in New Zealand (Ni Mhurchu *et al.*, 2012), which explored the
490 acceptability of economic incentives to promote healthier food purchases. Their study
491 revealed that delivery and magnitude of the incentive were factors that influenced uptake of
492 the scheme. Electronic swipe cards were considered the most convenient mode of delivery of
493 the incentive with 10% cash-back or vouchers for items other than food considered the most
494 desirable form of incentive.

495 The qualitative approach of this study enabled a greater understanding of the variety of
496 stakeholder views about food choices on campus and intervention options. Understanding the
497 key drivers of food choices on campus helped to identify the key behavioural determinants
498 that the intervention should target. This also helped to ensure that the intervention developed
499 was culturally appropriate in that it aligned with customer preferences and values. Similarly,
500 insights into the specific context in which the intervention was to be implemented helped us
501 identify intervention options that would be most feasible and likely to be adopted and
502 implemented most effectively. One of the key methodological issues faced during discussions
503 with participants was ambiguity over the term ‘environmentally friendly’ food and beverages.
504 Despite having been provided with information explaining that dietary shifts away from meat
505 and animal products towards plant-based options and sustainable sourced fish was
506 environmentally beneficial, participants were often confused as to whether EF choices were
507 products with less packaging, locally-sourced goods or plant-based choices. Whilst it was
508 useful to explore what ‘environmentally friendly’ meant to participants, clarification from the
509 outset about what specific café option were EF was necessary to elicit further insights into
510 acceptability and feasibility concerns.

511 According to Kersh and Morone (2002), communities or societies will mobilise to support
512 the necessary political solutions to societal problems provided three conditions are met: the

513 population must perceive the problems exist, there must have been a steady build-up of
514 evidence detailing the harmful effects of the problem, and the scientific data must have been
515 debated and acknowledged and accepted by society. Whilst there is growing scientific data
516 supporting the need to reduce animal source products for environmental gains, participants of
517 this study showed low awareness and understanding of EF dietary choices, particularly
518 around plant-based diets. This study highlights that more credible evidence about the benefits
519 of dietary change for the environment needs to be communicated from trustworthy sources to
520 overcome the scepticism and distrust exhibited in this small population sample.

521

522 In conclusion, low awareness and understanding of the environmental impact of foods, along
523 with the perception that plant-based diets are marginal not mainstream, reduces the
524 acceptability of intervention options that restrict or limit choice. Balancing practical
525 feasibility concerns with financial risk is important to caterers when implementing café-based
526 interventions. This study emphasises the need to identify an intervention that encompasses all
527 dimensions of sustainability: social, economic and environmental. An acceptable and feasible
528 café-based intervention ought to increase awareness and understanding of healthy and
529 environmentally friendly food choices, protect customer choice and avoid additional costs.
530 The intervention idea that most closely aligned with these findings was the use of the existing
531 GeniUS rewards scheme to promote healthy and EF options accompanied by the provision of
532 general information about the health and environmental impact of food choices to raise
533 awareness.

534

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536

537 **Figure 1 Intervention options proposed to caterers for focus group discussion. EF,**
538 **Environmentally Friendly. *Café options refers to hot dishes, hot and cold beverages, snacks**
539 **and pre-packaged sandwiches.**

540

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