



**Manchester  
Metropolitan  
University**

---

Flannery, Orla and Walker, Lou (2020) Office cake culture: an exploration of its characteristics, associated behaviours and attitudes among UK office workers; implications for workplace health. *International Journal of Workplace Health Management*, 13 (1). pp. 95-115. ISSN 1753-8351

---

**Downloaded from:** <https://e-space.mmu.ac.uk/624449/>

**Version:** Accepted Version

**Publisher:** Emerald

**DOI:** <https://doi.org/10.1108/IJWHM-03-2019-0039>

Please cite the published version

<https://e-space.mmu.ac.uk>

1  
2  
3 1 **Office cake culture: an exploration of its characteristics and associated behaviours and attitudes**  
4  
5 2 **among UK office workers and implications for workplace health**

6  
7 3 **Short title: Office cake culture: implications for workplace health**  
8

9  
10 4 **Abstract**

11  
12 5 Purpose:

13 6 This paper explores the characteristics of office cake (OC) consumption and the associated attitudes  
14 7 and behaviours among UK office workers to gain insight into the implications for workplace health.

15  
16  
17 8 Design:

18 9 A cross-sectional online questionnaire was completed by 940 respondents. Data were analysed using  
19 10 descriptive statistics and cross-tabulation with Chi-square tests for between-group difference.

20  
21  
22 11 Findings:

23 12 Respondents reported both positive social and negative health-related consequences of OC. OC  
24 13 influenced eating behaviour through increased salience and availability, and the effects of social  
25 14 influencing. Almost all (94.8%) reported ideal OC frequency to be once/week or less. Gender and  
26 15 age significantly affected attitudes and behaviour.

27  
28  
29 16 Research limitations/implications:

30 17 The questionnaire was not validated so data accuracy could have been diminished or biased.  
31 18 Portion size was not examined and consumption data was self-reported which could have resulted in  
32 19 under-reporting. Only office workers were investigated therefore results may not be applicable to  
33 20 other workplaces.

34  
35  
36 21 Practical implications:

37 22 OC appears to influence both the workplace eating environment and employee eating behaviour. It  
38 23 could therefore affect employee health and workplace health promotion programme efficacy.  
39 24 However the findings suggest that nudge-based initiatives could reduce OC consumption to make  
40 25 workplaces healthier while retaining social benefits.

41  
42  
43 26 Originality/value:

44 27 The present study provides the first data on OC culture and insights on how to address it sensitively.  
45 28 It also highlights that sweet treats used for celebration and employee recognition should be  
46 29 considered a relevant part of workplace food provision alongside canteens and vending.

47  
48  
49  
50  
51  
52 30 **Keywords:** cake culture, obesity, workplace, environment, snacking, norms, health, nutrition  
53  
54  
55  
56  
57  
58  
59  
60

## 31 Introduction

32 Obesity prevalence continues to rise globally, as do associated co-morbidities and healthcare costs  
33 (N. C. D. Risk Factor Collaboration, 2016). Consequently obesity represents a major public health  
34 challenge (Public Health England, 2017). The workplace represents an important setting for the  
35 promotion of healthy lifestyle behaviours (Engbers et al., 2005; Black, 2008) and has been the focus  
36 of numerous studies examining health promotion.

37 Compared to interventions involving diet and/or physical activity, multicomponent workplace health  
38 promotion programmes (WHPPs) incorporating environment modification have the greatest effects  
39 improving dietary behaviour (Allan et al., 2017), diet quality (Engbers et al., 2005) and weight loss  
40 (Verweij et al., 2011). Environment modification can make environments less obesogenic (**Swinburn  
41 et al., 2011**) and therefore easier for individuals to make healthier lifestyle choices without  
42 conscious effort (Marteau et al., 2012; Salmon et al., 2014).

43 The social nature of offices would suggest that social influencing could affect workplace eating  
44 behaviour. Social influences affect the amount and types of food eaten (Herman et al., 2003;  
45 Robinson and Higgs, 2013; Cruwys et al., 2015) allowing people to feel they are behaving  
46 appropriately in a given group (Herman et al., 2003; Robinson et al., 2011; Cruwys et al., 2015).  
47 Interestingly, if available, sweet foods and cake appear to override salient social models and are  
48 chosen in preference to other available foods (Pliner and Mann, 2004). Similarly, when eating with  
49 friends, people eat significantly more cookies and cake than other available foods (Clendenen et al.,  
50 1994; Hetherington et al., 2006). The role of social norms on dietary behaviour has also been  
51 examined widely. Descriptive norms represent behaviour that is typical or normal ('what is done')  
52 while injunctive norms refer to behaviour considered morally-approved ('what ought to be done')  
53 (Deutsch and Gerard, 1955; Cialdini et al., 1990). Descriptive norms influence both healthy and  
54 unhealthy eating behaviour (Perkins et al., 2010; Lally et al., 2011; Cruwys et al., 2015) even without  
55 other people being present (Burger et al., 2010; Prinsen et al., 2013).

56 Combined as 'subjective norms', descriptive and injunctive norms form one of three constructs  
57 within The Theory of Planned Behaviour (TPB) (Ajzen, 1991; Ajzen, 2005) which holds that intention  
58 is the best predictor of behaviour. 'Attitude' is the product of beliefs about the consequences of  
59 performing or not performing a behaviour and the strength of those beliefs. 'Perceived behavioural  
60 control' (PBC) is a product of self-efficacy and perceived barriers to or facilitators of a behaviour. The  
61 more positive the combination of these constructs, the stronger the intention to perform a  
62 behaviour. The TPB is one of the most widely-tested health behaviour theories (Ajzen, 2011;

1  
2  
3 63 McEachan et al., 2011; Zoellner et al., 2012) and has been widely used to explore dietary behaviour  
4  
5 64 (Kelley and Abraham, 2004; Palmeira et al., 2007; Chung and Fong, 2015).

6  
7 65 Daily eating patterns may affect weight and health risk (Duffey and Popkin, 2011; Nicklas et al.,  
8  
9 66 2014; Leech et al., 2015; Murakami and Livingstone, 2016b). Recent decades have seen increases in  
10  
11 67 eating frequency (Popkin and Duffey, 2010; Kant and Graubard, 2015) and total energy intake from  
12  
13 68 snacking (Ovaskainen et al., 2006; Piernas and Popkin, 2010; Kant and Graubard, 2015). Snacking is  
14  
15 69 positively associated with energy intake (Duffey and Popkin, 2011; McCrory et al., 2011; Nicklas et  
16  
17 70 al., 2014; Kant and Graubard, 2015) and added sugar consumption (Ovaskainen et al., 2006; Louie  
18  
19 71 and Rangan, 2018) although not always with adiposity (Hampl et al., 2003; Nicklas et al., 2014).  
20  
21 72 Snacking has been associated with improved diet quality through increased nutrient intake from  
22  
23 73 fruit and vegetables (Holmback et al., 2010; Zizza et al., 2010; Zizza and Xu, 2012; Hartmann et al.,  
24  
25 74 2013) but also diminished diet quality from increased energy density, and sugar and fat intake,  
26  
27 75 (Hartmann et al., 2013; Murakami and Livingstone, 2016a). Cakes and similar sweet baked goods are  
28  
29 76 the primary energy contributors to snack food (Ovaskainen et al., 2006; Duffey et al., 2013; Nicklas  
30  
31 77 et al., 2014; Myhre et al., 2015) and are consumed equally by both healthy and unhealthy snackers  
32  
33 78 (O'Connor et al., 2015). Furthermore, added sugars are associated with obesity (Scientific Advisory  
34  
35 79 Committee on Nutrition, 2015) and ultra-processed foods such as commercially-produced cakes and  
36  
37 80 snacks are associated with cancer (Fiolet et al., 2018) and all-cause mortality (Schnabel et al., 2019).

38  
39 81 Workplace snacking has not been widely studied. One study found both unhealthy and healthy  
40  
41 82 snacking were significantly more likely in the workplace than the home (Liu et al., 2015), and ~~three~~  
42  
43 83 studies have found that workplace snacks were more likely to be eaten if they were visible,  
44  
45 84 accessible and convenient (**Painter et al., 2002; Baskin et al., 2016**). One form of workplace snacking  
46  
47 85 that has become prominent in recent years is the provision of cake and other sweet foods by  
48  
49 86 employees and management for colleagues to share, so-called 'office cake' (OC). Anecdotally, OC  
50  
51 87 consumption in the UK originated from employees providing cakes to celebrate social occasions.  
52  
53 88 Recently it has expanded to include support for charity fundraising efforts, baking inspired by TV  
54  
55 89 shows, employee rewards, and other morale-boosting events. It has been speculated that OC  
56  
57 90 consumption leads to increased energy intake, particularly from added sugars, and obesity (Royal  
58  
59 91 College of Surgeons, 2017). However, no data are available.

60  
61 92 The present study explored the characteristics of OC consumption and associated attitudes and  
62  
63 93 behaviours among UK office workers. Implications for workplace health were assessed. OC was  
64  
65 94 defined as cakes or other sweet foods (biscuits, pastries, confectionery) provided by employees or  
66  
67 95 managers to share with colleagues.

1  
2  
3 96 **Method**

4  
5 97 ***Study design***

6  
7  
8 98 A cross-sectional survey was conducted via a self-administered online questionnaire using Online  
9  
10 99 Surveys (www.onlinesurveys.ac.uk).

11  
12 100 **Materials**

13  
14 101 The questionnaire was specifically-developed, mainly using items adapted from validated eating  
15  
16 102 behaviour questionnaires (Stunkard and Messick, 1985; Clark et al., 1991; Fleurbaix Laventie Ville  
17  
18 103 Sante Study Group, 2004; Schembre et al., 2009; Tapper and Pothos, 2010; Greenwood et al., 2012;  
19  
20 104 Simmonds et al., 2016). Where possible, item wording and structure reflected that of validated  
21  
22 105 questionnaires. For example, the Healthy Eating Vital Signs assessment tool validation found that  
23  
24 106 asking about typical behaviour was more effective than asking about one-day or one-week recall,  
25  
26 107 and that asking about ‘frequency’ was more effective than ‘servings’ (Greenwood et al., 2012).  
27  
28 108 Several items were able to reflect validated questionnaire wording more directly. For example, the  
29  
30 109 item “I find it hard to resist cake even if I’m not hungry or have just eaten a meal” closely reflects  
31  
32 110 Item 1 of the Three-Factor Eating Questionnaire R-18: “When I smell a delicious food, I find it very  
33  
34 111 difficult to keep from eating, even if I have just finished a meal” (Fleurbaix Laventie Ville Sante Study  
35  
36 112 Group, 2004) and Item 13 of the Weight-Related Eating Questionnaire: “When I’m offered delicious  
37  
38 113 food, it’s hard to resist eating it even if I’ve just eaten” (Schembre et al., 2009). although some  
39  
40 114 items were developed in response to an informal qualitative enquiry on social media. Some of these  
41  
42 115 items were used to explore OC behaviour and attitudes eg “I feel regret after eating OC” and “I look  
43  
44 116 forward to OC”; and others to explore OC-related opinions– e.g. “I would like my workplace to do  
45  
46 117 more to help me be healthy” and “Do you think there is a healthier alternative to office cake?”.  
47  
48 118 Items about OC behaviour and attitudes were based on the TPB to allow exploration of respondents’  
49  
50 119 beliefs about the consequences of OC (attitude), their response to the behaviour and approval of  
51  
52 120 colleagues (subjective norms) and their ability to control or mitigate their OC own consumption  
53  
54 121 (PBC). Tables 3 and 4 indicate the corresponding TPB dimension for each item. Although the  
55  
56 122 questionnaire was not designed or validated to confirm the TPB’s role in OC consumption, the TPB  
57  
58 123 provided a framework from which to explore OC behaviour. This approach has been used elsewhere  
59  
60 124 (Tonglet et al., 2004). The questionnaire was developed using the TPB author’s guidelines (Fishbein,  
125  
126 2010).

126 Following ethical approval, the questionnaire was piloted with a convenient sample (*n* 9).

127 The questionnaire was structured as follows:

1  
2  
3 128 Section 1: nine items explored existing OC culture in respondents' workplaces e.g. "In a typical  
4 working week, on how many occasions are cakes available in your office?" (multiple choice  
5 129 response); and "Typically in your office, where are office cakes displayed?" (multiple choice  
6 130 response).  
7  
8 131

9  
10 132 Section 2: 20 items explored respondents' own OC behaviour e.g. "In a typical week, on how many  
11 133 occasions do you personally eat office cake?" (multiple choice response); 5-point Likert-style scale  
12 134 from Never to Always for items such as "If there is cake available, I eat it" and "It's hard to say no to  
13 135 cake if everyone else is eating it"; and 5-point Likert-style scale from Strongly Agree to Strongly  
14 136 Disagree for items such as "Office cake has made it harder to control my weight" and "Office cake  
15 137 has made it harder for me to eat healthily at work".-  
16  
17

18  
19 138 Section 3: nine items explored respondents' opinions of OC culture in general e.g. "In your opinion,  
20 139 what is the ideal frequency for office cakes?" (multiple choice response); -and 5-point Likert-style  
21 140 scale from Strongly Agree to Strongly Disagree for items such as "Overall, office cake is a good thing"  
22 141 and "Office cake brings people together".  
23  
24

25 142 Section 4: six demographic items requested gender, age group (AG), job role, working pattern and  
26 143 self-reported height (m) and weight (kg) from which body mass index (BMI) was calculated.  
27  
28

29 144 The questionnaire was voluntary, anonymous and confidential to encourage response.  
30  
31

### 32 145 ***Sampling***

33 146 Two sampling strategies were used to recruit office workers aged  $\geq 18$  years. Four demographically-  
34 147 diverse organisations were recruited before the survey opened, giving potential access to  
35 148 approximately 3500 participants through cluster sampling (Table 1). Organisations agreed to  
36 149 distribute questionnaires internally by email to minimise coverage and sampling error. Snowball  
37 150 sampling was conducted through the first author's social media and email contacts. Invitations to  
38 151 participate were objective and neutral to minimise non-response bias. Participants confirmed  
39 152 eligibility and consent by questionnaire submission. In accordance with ethics committee  
40 153 requirements, snowball sample participants confirmed they worked in England.  
41  
42

### 43 154 ***Data collection***

44 155 Data collection for both strategies occurred between 1<sup>st</sup> and 31<sup>st</sup> May 2017. Participants completed  
45 156 identical questionnaires, although each participating organisation had a unique identifier to enable  
46 157 between-company comparisons.  
47  
48

### 49 158 ***Statistical analysis***

50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 159 Descriptive statistics and cross-tabulations were used to analyse demographic data. Chi-square tests  
4 were used to test for between-group difference. Kruskal Wallis ANOVA were used to test for BMI  
5 160 difference between demographic groups with Mann Whitney-U post hoc tests and Bonferroni  
6 161 adjustment. The significance level was set at  $p < 0.05$ .  
7  
8 162

9  
10 163 After initial data exploration revealed significant differences for AG and gender, variables for Likert-  
11 164 type scale items were recoded and condensed to further investigate trends in demographic  
12 165 difference. 'Strongly agree' and 'agree' were condensed to 'strongly agree/agree'; 'disagree' and  
13 166 'strongly disagree' to 'disagree/strongly disagree'; 'sometimes' and 'about half the time' to  
14 167 'sometimes/half the time'; and 'often' and 'always' to 'often/always'. Responses to weekly OC  
15 168 refusals 'once/day' and 'several times/day' were also condensed. A similar approach has been taken  
16 169 in eating behaviour research (Ball et al., 2010; Hartmann et al., 2013) including workplace studies  
17 170 (Tabak et al., 2015; Watts et al., 2016).

18  
19 171 Data were analysed using the statistical software package IBM SPSS Statistics for Windows version  
20 172 23.

## 21 173 **Results**

22 174 Across both sampling strategies, 940 respondents completed the questionnaire. Missing data was  
23 175 0.4% for gender and 0.5% for AG. Percentages presented were calculated excluding missing data.

### 24 176 ***Participant characteristics***

25 177 Organisation D withdrew because the relevant internal permissions had not been given, although  
26 178 three people responded independently. Data from both sampling strategies were therefore  
27 179 combined to form a single sample of 940 respondents.

28 180 Table 2 summarises respondents' demographic characteristics. Means are presented  $\pm$  one standard  
29 181 deviation. Of the total sample, 39.3% were male. The mode AG was 30-49 years (30-49s) (55.6%)  
30 182 and 81.0% worked full-time. Mean BMI was  $25.9 \pm 5.24 \text{ kg/m}^2$  and was significantly ( $p < 0.001$ ) higher  
31 183 in men ( $26.1 \pm 4.4 \text{ kg/m}^2$ , [95% Confidence Interval (CI) 25.6, 26.5]) than women ( $25.7 \pm 5.7 \text{ kg/m}^2$ ,  
32 184 [95% CI 25.3, 26.2]). Mean BMI for the 18-29 AG (18-29s) ( $24.3 \pm 4.3 \text{ kg/m}^2$  [95% CI 23.6, 24.9]) was  
33 185 significantly ( $p < 0.001$  for all) lower than for both 30-49s ( $26.2 \pm 5.5 \text{ kg/m}^2$  [95% CI 25.7, 26.7]) and  
34 186  $\geq 50$  AG ( $\geq 50$ s) ( $26.3 \pm 5.1 \text{ kg/m}^2$  [95% CI 25.6, 26.9]). Kruskal Wallis ANOVA found no significant  
35 187 difference in BMI according to either OC availability or OC consumption frequency.

### 36 188 ***Characteristics of office cake culture***

37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 189 For weekly OC availability and consumption, results are reported for full-time workers (FTWs) only.  
4  
5 190 OC was typically available at least once-twice/week for 87.0% of respondents. The mode availability  
6  
7 191 was once-twice/week for 65.8%, with 7.9% reporting daily availability. There was no effect of gender  
8  
9 192 or AG. 'Hardly any' OC was homemade according to 51.0%. The most commonly-given reasons for  
10  
11 193 OC were birthdays/retirements/promotions (93.5%), meeting/event leftovers (55.0%), TV/charity  
12  
13 194 events (49.4%) and management rewards (37.8%), while 41.5% said no reason was needed. The  
14  
15 195 mode location for OC display was the main working area (70.9%). The most commonly-offered OC  
16  
17 196 alternative was fruit (46.9%), although 37.3% said no alternatives were ever available.  
18  
19 197 Half (50.5%) the respondents strongly disagreed and disagreed that meeting refreshments provided  
20  
21 198 sufficient healthy options, with significantly more ≥50s (15.6%) strongly disagreeing than 18-29s  
22  
23 199 (7.6%).

### 200 ***Respondents' own OC behaviour and attitudes***

201 The mode frequency of typical personal weekly OC consumption (57.8% of respondents) was once-  
202 twice/week. The mode number of refusals of OC (46.6%) was 1-3 times/week with 12.6% refusing  
203 several times/day. The condensed analysis found significantly more women (22.0%) than men  
204 (13.6%) refused at least once/day.

205 Responses to Likert-type scale items are summarised in Tables 3 and 4.

206 For attitude-related items, gender had an effect with significantly more women than men  
207 acknowledging negative consequences of OC. There were significant trends for fewer women than  
208 men, and fewer ≥50s than 18-29s to look forward to OC, and for more women than men to feel  
209 regret after eating it.

210 Subjective norm-related responses were mixed according to the type of norm and were influenced  
211 by AG and gender. Figure 1 shows the mode referent group was 'other'. Analysis of respondents'  
212 qualitative description of 'other' found that all but 11 of the 350 respondents selecting this option  
213 (36.1% of the total sample) defined 'other' as 'myself', 'me', 'no one else' or similar. Significantly  
214 fewer 18-29s responded other/'self' than older AGs, instead citing work colleagues and  
215 family/friends as key referents.

216 OC behaviour was not substantially affected by injunctive norms with the majority of respondents  
217 reportedly unaffected by colleagues' approval or disapproval of either OC or their (respondents')  
218 own OC behaviour. However, items with a descriptive norm component influenced behaviour for  
219 the total sample with significant differences for gender and AG. Significantly more women and  
220 younger respondents were persuaded by colleagues to change their minds about initially refusing OC



1  
2  
3 221 and struggled to refuse OC if others were eating it. The condensed analysis consolidated these  
4  
5 222 findings.

6  
7 223 PBC-related responses suggested that OC challenges respondents' self-efficacy, but to differing  
8  
9 224 extents according to gender and AG. If OC is available, over 90% reported eating it at least  
10  
11 225 sometimes and 41.5% often or always. Significantly more of these were men than women (48.9%  
12  
13 226 and 36.6% respectively in the condensed analysis). The condensed analysis also found significantly  
14  
15 227 more 18-29s than ≥50s reported eating OC often/always if it was available (52.3% and 35.4%  
16  
17 228 respectively). Significantly more women than men found it hard to resist OC even if they were not  
18  
19 229 hungry or had just eaten a meal, and to be distracted by it. Most respondents reported being less  
20  
21 230 likely to eat OC if it was out of view with the condensed analysis finding significantly more women  
22  
23 231 (61.8%) than men (52.4%) responded 'often/always'.

23  
24 232 More than half (54.4%) the respondents said they never took action to avoid or compensate for OC  
25  
26 233 consumption. Of these, significantly more were men and ≥50s than women and 18-29s. Significantly  
27  
28 234 more women (34.9%) than men (23.9%) said they avoided or compensated for OC consumption  
29  
30 235 once-twice/week and significantly more 18-29s than ≥50s did so three-four times/week. Increased  
31  
32 236 exercise and reduced energy intake at other meals were typical examples of compensatory activities.

### 32 237 ***Participants' opinions about OC***

33  
34 238 Most respondents strongly agreed and agreed that OC 'is a good thing', 'is a great way to show  
35  
36 239 appreciation', 'brings people together' and 'cheers everyone up' with significantly more 18-29s and  
37  
38 240 men strongly agreeing. Table 5 shows that nearly all (94.8%) respondents said the ideal OC  
39  
40 241 frequency was once/week or less. The mode ideal frequency was once/month. There was a  
41  
42 242 significant trend for women to consider the ideal frequency to be lower than men.

43  
44 243 The condensed analysis found significantly more women than men strongly agreed/agreed (38.9%  
45  
46 244 and 31.5%% respectively) they would support initiatives to reduce OC consumption. Over half of  
47  
48 245 respondents strongly agreed or agreed they would like their workplace to do more to promote  
49  
50 246 health, with the condensed analysis revealing significant trends for more women and younger AGs  
51  
52 247 to strongly agree/agree.

53  
54 248 The most popular alternative to OC was fruit (51.5%), followed by 'cake less often' (47.9%), nuts  
55  
56 249 (33.0%) and raw vegetables and dips (33.0%).

### 56 250 ***Between-organisation comparisons***

57  
58 251 Between-organisation comparisons showed that the demographic profile of each organisation  
59  
60 252 affected responses in line with findings from the total sample.

1  
2  
3 253 **Discussion**  
4

5 254 To our knowledge, the present study provides the first data on UK OC culture, describing its main  
6  
7 255 characteristics and office workers' OC-related behaviour and attitudes. Two thirds of FTWs typically  
8  
9 256 ate OC at least once/week and in most workplaces OC was available up to five times/week. Most OC  
10  
11 257 is shop-bought, available most commonly to celebrate social occasions, and displayed in the main  
12  
13 258 office area. OC was generally considered to have morale-boosting characteristics as well as negative  
14  
15 259 consequences such as facilitating weight gain. Almost all respondents said ideal OC frequency was  
16  
17 260 once/week or less but only a third agreed they would welcome a workplace initiative to achieve  
18  
19 261 that. An important finding was that for most items exploring OC behaviour and opinions, gender had  
20  
21 262 a significant effect, with age significantly effecting some items. Apart from Organisation C having  
22  
23 263 higher availability and consumption frequency, there were no between-organisation differences,  
24  
25 264 suggesting OC impacts diverse office environments in similar ways.

26  
27 265 That OC was widely available aligns with evidence that an increasing proportion of daily energy  
28  
29 266 intake is from snacks (Kant and Graubard, 2015), cake and sweet baked goods are the primary  
30  
31 267 energy-contributors to snack foods (Duffey et al., 2013; Myhre et al., 2015) and snacking is more  
32  
33 268 likely in the workplace than at home (Liu et al., 2015).

34  
35 269 The effects of gender have implications for employers and WHPPs. It is well-established that gender  
36  
37 270 differences exist in food choice and behaviour (Rolls et al., 1991; Wardle et al., 2004; Li et al., 2012;  
38  
39 271 Cruwys et al., 2015). The present study found more women than men acknowledged OC's negative  
40  
41 272 consequences. This is consistent with evidence that women are more likely to avoid energy-dense  
42  
43 273 foods, eat fruit and vegetables, diet to lose weight and value healthy eating (Rolls et al., 1991; Fagerli  
44  
45 274 and Wandel, 1999; Wardle et al., 2004). Meanwhile, more men said they never refused OC and did  
46  
47 275 not acknowledge negative consequences. This aligns with evidence that men have poorer diet  
48  
49 276 quality (Wardle et al., 2004), food knowledge (Baker and Wardle, 2003) and less regard for healthy  
50  
51 277 eating behaviours and guidelines (Wardle et al., 2004).

52  
53 278 Findings on the effects of social influencing and subjective norms support previous research. While  
54  
55 279 nearly a third of respondents reported that work colleagues were their OC referents, more reported  
56  
57 280 they had no referent other than themselves. This may partially explain why respondents were not  
58  
59 281 influenced substantially by injunctive norms because injunctive norms relate to the approval of  
60  
282 others. Nevertheless, social modelling has been shown to influence eating behaviour (Herman et al.,  
283  
284 2003; Vartanian et al., 2015), especially in the workplace (Quist et al., 2014) and among socially-  
285  
connected people (Christakis and Fowler, 2007; Pachucki et al., 2011). Therefore, self-referents  
could have been demonstrating the third-person effect whereby individuals deny being affected by

1  
2  
3 286 social modelling (Davison, 1983). This has been reported in eating behaviour (Vartanian et al., 2008;  
4  
5 287 Croker et al., 2009). Because modelling is partly automatic (Cruwys et al., 2015) these individuals  
6  
7 288 could be more influenced by social influences than they realise.

8  
9 289 The lack of injunctive norm effect also aligns with evidence that injunctive norms are less effective  
10  
11 290 than descriptive norms in influencing eating behaviour (Stok et al., 2014; Cruwys et al., 2015).  
12  
13 291 Responses to the items with a descriptive norm component suggest OC consumption could be  
14  
15 292 influenced by descriptive norms, particularly among women and younger people. In particular, the  
16  
17 293 present study might help raise employers' awareness of how different types of norm-related  
18  
19 294 communication affect health behaviours (Croker et al., 2009; Stok et al., 2015). Information-based  
20  
21 295 messages typically rely on injunctive norms (eg 'eat salad for lunch') which are less effective than  
22  
23 296 messages based on descriptive norms (eg 'salad is one of our most popular dishes') (Rivis and  
24  
25 297 Sheeran, 2003; Croker et al., 2009; Mollen et al., 2013; Higgs and Thomas, 2016). One such message  
26  
27 298 provided by the present study's findings would be: '95% of office workers think the ideal frequency  
28  
29 299 for cake is once/week or less'. In the absence of adequate healthy descriptive norm information,  
30  
31 300 highlighting healthy intentions could be an effective way to promote healthy behaviour eg 'most  
32  
33 301 employees are committed to eating healthily' (Croker et al., 2009).

34  
35 302 PBC-related data indicated OC was generally hard to resist, with women struggling more than men.  
36  
37 303 These results support research using other behavioural models that found women have significantly  
38  
39 304 greater eating-related self-determined motivation than men (Ryan and Deci, 2000; Leblanc et al.,  
40  
41 305 2015) and higher dietary restraint (Stunkard and Messick, 1985; Provencher et al., 2003). Women  
42  
43 306 also generally show higher diet-related disinhibition levels than men (Stunkard and Messick, 1985;  
44  
45 307 Provencher et al., 2003) which could explain why more women than men reported being distracted  
46  
47 308 by OC and found it hard to resist even if they were not hungry.

48  
49 309 No gender difference was found in OC consumption frequency. This was unexpected because,  
50  
51 310 compared to men, women have a higher number of daily eating occasions (Kant and Graubard,  
52  
53 311 2015) and higher snacking frequency (Hartmann et al., 2013; O'Connor et al., 2015).

54  
55 312 The present study presents a picture of men being more able to take OC or leave it without anxiety,  
56  
57 313 guilt or concern for the consequences, whereas women appear more likely to be aware of OC and  
58  
59 314 less able to resist it, despite being cognisant of negative health consequences. This could make OC a  
60  
315 difficult topic to discuss in the workplace. Employers should consider how a workplace's gender  
316  
317 profile could affect initiatives to address OC consumption and other dietary-related initiatives. The  
effects of gender on workplace eating and snacking should be explored further.

1  
2  
3 318 ***The effect of age***  
4

5 319 AG affected some responses, particularly those investigating OC's morale-boosting attributes and  
6  
7 320 PBC. More 18-29s than ≥50s ate OC if it was available and acknowledged its morale-boosting  
8  
9 321 characteristics. 18-29s can be broadly classified as Generation Y (GenerationY.com, 2015), the  
10  
11 322 generation most likely to snack, with 24% considered 'super snackers' who snack four or more  
12  
13 323 times/day (Topper, 2015). Generation Y are accustomed to frequent snacking whereas older people  
14  
15 324 may tend to regard snacks as an occasional treat, potentially explaining why snacking frequency  
16  
17 325 declines with age (Topper, 2015). This could also explain why fewer ≥50s than 18-29s considered OC  
18  
19 326 a good way to show appreciation and has implications for employee performance management and  
20  
21 327 motivation.

22 328 Data on how age effects eating behaviour are scarce but the present study's findings are consistent  
23  
24 329 with studies using the Three-Factor Eating Questionnaire (Stunkard and Messick, 1985) which found  
25  
26 330 restraint scores increased and disinhibition and hunger scores decreased with age (Drapeau et al.,  
27  
28 331 2003; Harden et al., 2009; Löffler et al., 2015). The present study shows the behaviour and attitudes  
29  
30 332 towards OC of younger employees differ to those of older employees, possibly mediated by social  
31  
32 333 influencing, descriptive norms and generational effects. Further research would help establish  
33  
34 334 whether age effects could inform dietary behaviour interventions within and outside the workplace.

35  
36 335 ***The effect of the environment on OC consumption***

37 336 The present study demonstrates several ways in which the presence of OC appears to influence  
38  
39 337 eating behaviour, supporting previous research findings that the physical food environment affects  
40  
41 338 dietary behaviour (Graham et al., 2013), including in the workplace (Kleef et al., 2012; Velema et al.,  
42  
43 339 2018). First, OC was mostly displayed openly in the working area and almost all respondents said if it  
44  
45 340 is available they eat it at least sometimes. This suggests an OC display prompts consumption which  
46  
47 341 is consistent with evidence that the thought, sight or smell of palatable food stimulates hunger and  
48  
49 342 motivation to eat (Ferriday and Brunstrom, 2011; Ramaekers et al., 2014). Additionally, nearly all  
50  
51 343 respondents said they thought they were less likely to eat OC if it is out of view, which is consistent  
52  
53 344 with evidence that consumption decreases as food becomes more inaccessible (Meiselman et al.,  
54  
55 345 1994; Scott et al., 2011; Maas et al., 2012) including in the workplace (Painter et al., 2002).  
56  
57 346 Furthermore, habitual disinhibition is a strong behavioural correlate with weight gain in older  
58  
59 347 women (Hays and Roberts, 2008) therefore a regular OC display could create conditions in which  
60  
348 individuals, particularly women, habitually respond by eating available OC. Lastly, an environment  
349 where OC consumption increases could lead to formation of new social norms and social modelling  
350 which encourages OC consumption (Cruwys et al., 2015).

1  
2  
3 351 'Choice architecture', or 'nudging' techniques express desired behaviours as descriptive norms  
4  
5 352 without choice being removed or forced in any direction (Thaler R. & Sunstein, 2009). Nudging has  
6  
7 353 improved eating behaviours (Mela, 2006; Thaler R. & Sunstein, 2009; Bucher et al., 2016), including  
8  
9 354 in the workplace (Thorsen et al., 2010; Kleef et al., 2012; Velema et al., 2018), and has reduced  
10  
11 355 energy intake without individuals realising or feeling dissatisfied (Petrescu et al., 2016). Nudging  
12  
13 356 could therefore be acceptable to employees as a way to reduce OC consumption.

14 357 Over half the respondents reported OC made it harder to eat healthily at work. The present study  
15  
16 358 found no association between BMI and either OC availability or consumption frequency although it  
17  
18 359 was not designed to do so. Nonetheless, almost a third of respondents reported OC had contributed  
19  
20 360 to weight gain, so research to investigate relationships between OC, obesity and its comorbidities  
21  
22 361 would be worthwhile.

### 23 362 *Ideal OC frequency*

24  
25 363 Of interest is the discrepancy between almost unanimous support for an ideal OC frequency of  
26  
27 364 once/week or less, and the relative lack of support for interventions to achieve lower OC  
28  
29 365 consumption levels. Gender could be a factor: significantly more women than men said they would  
30  
31 366 support an initiative to reduce OC and would welcome more WHPP. Another factor could relate to  
32  
33 367 commensality, defined as people eating and drinking together at the same time (Kerner, 2015).  
34  
35 368 Commensality has been associated with improved cooperation and performance among workgroups  
36  
37 369 (Kniffin et al., 2015), cooperation and trust (Allen-Arave et al., 2008; Mameli, 2013) and connection  
38  
39 370 between eating companions (Alley, 2012). Morale-boosting consequences of OC reported by  
40  
41 371 respondents could result from their subliminal recognition of the benefits of commensality. It is  
42  
43 372 therefore possible that respondents assumed OC reduction would mean reduction in opportunities  
44  
45 373 to socialise. A contrasting proposal is that reducing OC frequency could enhance commensality  
46  
47 374 benefits by making OC a treat to look forward to with people gathering together. This could be  
48  
49 375 considered more socially beneficial than the current prevalent situation where cake is displayed  
50  
51 376 openly all day for people to help themselves to, with no group social interaction at all. It would be  
52  
53 377 useful to investigate this and explore which elements of OC culture people value most - the cake  
54  
55 378 itself, social interaction or having a break from work for example.

56  
57 379 The question arises that if 95% of respondents considered once/week or less to be the ideal OC  
58  
59 380 frequency and the second most popular OC alternative was 'cake less often', why is availability high?  
60  
381 Social influences affect the amount and type of foods eaten (Herman et al., 2003; Cruwys et al.,  
382 2015) and social modelling occurs because individuals seek social cues that indicate appropriate  
383 behaviour (Herman et al., 2003; Robinson, 2015) and ways to affiliate and ingratiate (Hermans et al.,

1  
2  
3 384 2009; Robinson et al., 2011; Cruwys et al., 2015). In a workplace setting, this would suggest that  
4  
5 385 individuals wanting to achieve workgroup acceptance are more likely to comply with established OC  
6  
7 386 culture norms than risk alienation by refusing it or challenging it. The present study provides an  
8  
9 387 evidence-based method to counteract this. As previously suggested, a descriptive norm-based  
10  
11 388 message that 95% of office workers consider the ideal frequency for OC to be once a week or less  
12  
13 389 could nudge employees towards new norms, healthier eating behaviours and healthier workplaces.

14 390 *Relatedly, social influencing and modelling theories contribute to some descriptions of social*  
15  
16 391 *contagion theory (Marsden, 1998). Social contagion may be responsible for the spread of positive*  
17  
18 392 *and negative health-related behaviours including smoking (Christakis and Fowler, 2008), happiness*  
19  
20 393 *(Fowler and Christakis, 2008) and obesity (Christakis and Fowler, 2007) so it is reasonable to propose*  
21  
22 394 *that it may provide a mechanism for increasing OC availability and consumption. Additionally, as in*  
23  
24 395 *the present study, social contagion has been shown to be affected by gender (Christakis and Fowler,*  
25  
26 396 *2007). Furthermore, social contagion may affect work colleagues differently to friends (Christakis and*  
27  
28 397 *Fowler, 2008; Fowler and Christakis, 2008).* Future *research to explore workplace eating through the*  
29  
30 398 *lens of social contagion theory would be useful.*

31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

400 The present study demonstrates that when considering the health of the workplace eating  
401 environment, food provision by employers - canteens, vending etc - should not be considered in  
402 isolation. Food supplied by employees, managers and clients should also be taken into account as  
403 part of that workplace's food environment. Furthermore, by impacting employee eating behaviour,  
404 OC could undermine WHPP effectiveness, reducing return on workplace health investment.

#### 405 **Recommendations**

406 Recommendations for employers can be drawn from the present study's findings. Making changes  
407 to the workplace environment to reduce the salience of OC and create new social norms would help  
408 employees make healthier food choices without effort. Initiatives to gain acceptance that OC access  
409 be restricted to time-limited occasions, and keeping OC out of sight until those occasions, would  
410 prevent mindless OC consumption and distraction. Encouraging healthier OC alternatives extends  
411 choice and commensal inclusivity. Starting a conversation that leads to fewer OC occasions,  
412 informed by descriptive norm-based messages, would provide commensality benefits from social  
413 occasions that employees can look forward to. Recognising that a workplace's gender and AG  
414 profile creates differences in OC-related attitudes may improve chances of effective change.

1  
2  
3 415 Communicating with health-related messages based on descriptive norms rather than injunctive  
4 norms is more likely to change dietary behaviour.  
5 416

6  
7 417 ***Strengths/limitations***  
8

9 418 The present study has some strengths. It supplies the first data on the well-recognised but poorly-  
10 419 understood OC phenomenon and contributes to the literature on the effects of gender and age on  
11 420 social influences on eating behaviour. The sampled population was large enough to provide  
12 421 significant results and, unlike many studies investigating obesity and dietary behaviour, 39.3% of the  
13 422 participants were male which improved the representative quality of the sample and adds to the  
14 423 literature on male eating behaviour. It also provides insights into constructive ways to improve  
15 424 employee health and therefore public health through achievable adjustments to workplace culture  
16 425 and environments.  
17

18 426 There were limitations. The questionnaire was non-validated so data accuracy could have been  
19 427 diminished. Relatedly, some items were not optimally operationalised which could have led to  
20 428 measurement and response bias. Insufficient items were included to explore the effect of descriptive  
21 429 norms. Portion size was not examined and consumption data was self-reported which could have  
22 430 resulted in under-reporting. The social media-based recruitment strategy could have been subject to  
23 431 response bias. Differences in comparator group size could have skewed between-AG comparisons.  
24 432 Only office workers were investigated therefore results may not be applicable to other workplace  
25 433 environments such as factories, hospitals or retail. Similar studies in other workplace environments  
26 434 are warranted.  
27

28 435 **Conclusion**  
29

30 436 In UK offices, OC appears to influence the physical workplace environment and dietary behaviour  
31 437 through increased salience and availability, and social influencing effects. OC behaviour and  
32 438 attitudes vary widely and are significantly affected by gender and age, therefore WHPP design  
33 439 should reflect salient gender and age profiles. There is consensus on ideal OC frequency which  
34 440 suggests nudge techniques to reduce salience and frequency of OC and reduce OC consumption  
35 441 could make workplaces healthier while retaining commensality benefits.  
36

37 442  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 443 **References**  
4  
5 444

- 6  
7 445 Ajzen, I. (1991), "The Theory of Planned Behavior", *Organ Behav Hum Decis Process*, 50, 179-211.  
8 446 Ajzen, I. (2005), *Attitudes, personality and behavior*, Maidenhead, Open University Press.  
9 447 Ajzen, I. (2011), "The theory of planned behaviour: Reactions and reflections", *Psychol Health*, 26,  
10 448 1113-1127.  
11 449 Allan, J., Querstret, D., Banas, K. and De Bruin, M. (2017), "Environmental interventions for altering  
12 450 eating behaviours of employees in the workplace: a systematic review", *Obes Rev*, 18, 214-  
13 451 226.  
14 452 Allen-Arave, W., Gurven, M. and Hill, K. (2008), "Reciprocal altruism, rather than kin selection,  
15 453 maintains nepotistic food transfers on an Ache reservation", *Evol Hum Behav*, 29, 305-318.  
16 454 Alley, T. R. (2012), "Contaminated and uncontaminated feeding influence perceived intimacy in  
17 455 mixed-sex dyads", *Appetite*, 58, 1041-1045.  
18 456 Baker, A. H. and Wardle, J. (2003), "Sex differences in fruit and vegetable intake in older adults",  
19 457 *Appetite*, 40, 269-275.  
20 458 Ball, K., Jeffery, R. W., Abbott, G., Mcnaughton, S. A. and Crawford, D. (2010), "Is healthy behavior  
21 459 contagious: associations of social norms with physical activity and healthy eating", *Int J*  
22 460 *Behav Nutr Phys Act*, 7, 86.  
23 461 Baskin, E., Gorlin, M., Chance, Z., Novemsky, N., Dhar, R., Huskey, K. and Hatzis, M. (2016),  
24 462 "Proximity of snacks to beverages increases food consumption in the workplace: A field  
25 463 study", *Appetite*, 103, 244-248.  
26 464 Black, C. (2008), "*Working for a healthier tomorrow*". London: TSO.  
27 465 Bucher, T., Collins, C., Rollo, M. E., Mccaffrey, T. A., De Vlieger, N., Van Der Bend, D., Truby, H. and  
28 466 Perez-Cueto, F. J. (2016), "Nudging consumers towards healthier choices: a systematic  
29 467 review of positional influences on food choice", *Br J Nutr*, 115, 2252-63.  
30 468 Burger, J. M., Bell, H., Harvey, K., Johnson, J., Stewart, C., Dorian, K. and Swedroe, M. (2010),  
31 469 "Nutritious or Delicious? The Effect of Descriptive Norm Information on Food Choice", *J Soc*  
32 470 *Clin Psychol*, 29, 228-242.  
33 471 Christakis, N. A. and Fowler, J. H. (2007), "The Spread of Obesity in a Large Social Network over 32  
34 472 Years", *N Engl J Med*, 357, 370-379.  
35 473 Christakis, N. A. and Fowler, J. H. (2008), "The collective dynamics of smoking in a large social  
36 474 network", *The New England journal of medicine*, 358, 2249-2258.  
37 475 Chung, L. M. Y. and Fong, S. S. M. (2015), "Predicting actual weight loss: A review of the  
38 476 determinants according to the theory of planned behaviour", *Health Psychol Open*, 2,  
39 477 205510291456797.  
40 478 Cialdini, R. B., Reno, R. R. and Kallgren, C. A. (1990), "A Focus Theory of Normative Conduct:  
41 479 Recycling the Concept of Norms to Reduce Littering in Public Places", *J Pers Soc Psychol*, 58,  
42 480 1015-1026.  
43 481 Clark, M. M., Abrams, D. B., Niaura, R. S., Eaton, C. A. and Rossi, J. S. (1991), "Self-efficacy in weight  
44 482 management", *Journal of Consulting and Clinical Psychology*, 59, 739-744.  
45 483 Clendenen, V. I., Herman, C. P. and Polivy, J. (1994), "Social facilitation of eating among friends and  
46 484 strangers", *Appetite*, 23, 1.  
47 485 Croker, H., Whitaker, K. L., Cooke, L. and Wardle, J. (2009), "Do social norms affect intended food  
48 486 choice?", *Preventive Medicine*, 49, 190-193.  
49 487 Cruwys, T., Bevelander, K. E. and Hermans, R. C. (2015), "Social modeling of eating: a review of when  
50 488 and why social influence affects food intake and choice", *Appetite*, 86, 3-18.  
51 489 Davison, W. P. (1983), "The Third-Person Effect in Communication", *Public Opin Q*, 47, 1-15.  
52 490 Deutsch, M. and Gerard, H. B. (1955), "A study of normative and informational social influences  
53 491 upon individual judgement", *J Abnorm Psychol*, 51, 629.  
54  
55  
56  
57  
58  
59  
60



- 1  
2  
3 492 Drapeau, V., Provencher, V., Lemieux, S., Després, J. P., Bouchard, C. and Tremblay, A. (2003), "Do 6-  
4 493 y changes in eating behaviors predict changes in body weight? Results from the Québec  
5 494 Family Study", *Int J Obes*, 27, 808-814.
- 6 495 Duffey, K. J., Pereira, R. A. and Popkin, B. M. (2013), "Prevalence and energy intake from snacking in  
7 496 Brazil: analysis of the first nationwide individual survey", *Eur J Clin Nutr*, 67, 868-74.
- 8 497 Duffey, K. J. and Popkin, B. M. (2011), "Energy density, portion size, and eating occasions:  
9 498 contributions to increased energy intake in the United States, 1977-2006", *PLoS Med*, 8,  
10 499 e1001050.
- 11 500 Engbers, L. H., Poppel, V. M. N. M., Chin a Paw, M. J. M. and Mechelen, V. W. (2005), "Worksite  
12 501 health promotion programs with environmental changes a systematic review", *Am J Prev  
13 502 Med*, 29, 61.
- 14 503 Fagerli, R. A. and Wandel, M. (1999), "Gender Differences in Opinions and Practices with Regard to a  
15 504 "Healthy Diet"", *Appetite*, 32, 171-190.
- 16 505 Ferriday, D. and Brunstrom, J. M. (2011), "'I just can't help myself': effects of food-cue exposure in  
17 506 overweight and lean individuals", *Int J Obes*, 35, 142-149.
- 18 507 Fiolet, T., Srour, B., Sellem, L., Kesse-Guyot, E., Allès, B., Méjean, C., Deschasaux, M., Fassier, P.,  
19 508 Latino-Martel, P., Beslay, M., Hercberg, S., Lavalette, C., Monteiro, C. A., Julia, C. and  
20 509 Touvier, M. (2018), "Consumption of ultra-processed foods and cancer risk: results from  
21 510 NutriNet-Santé prospective cohort", *BMJ (Clinical research ed.)*, 360, k322.
- 22 511 Fishbein, M., Ajzen, I. (2010), *Predicting and changing behavior: The reasoned ation approach.*, New  
23 512 York, Psychology Press, Taylor and Francis Group.
- 24 513 Fleurbaix Laventie Ville Sante Study Group (2004), "The Three-Factor Eating Questionnaire-R18 Is  
25 514 Able to Distinguish among Different Eating Patterns in a General Population", *The Journal of  
26 515 Nutrition*, 134, 2372-2380.
- 27 516 Fowler, J. H. and Christakis, N. A. (2008), "Dynamic spread of happiness in a large social network:  
28 517 longitudinal analysis over 20 years in the Framingham Heart Study", *BMJ*, 337, a2338.
- 29 518 Generationy.Com. (2015), "Generation Y age range" [Online]. Available:  
30 519 <http://www.generationy.com/about-generation-y-in-the-workforce/age-range/> [Accessed  
31 520 27 July 2018].
- 32 521 Graham, D. J. P., Pelletier, J. E. M. P. H., Neumark-Sztainer, D. P. M. P. H. R. D., Lust, K. P. M. P. H. R.  
33 522 D. and Laska, M. N. P. R. D. (2013), "Perceived Social-Ecological Factors Associated with Fruit  
34 523 and Vegetable Purchasing, Preparation, and Consumption among Young Adults", *J Acad Nutr  
35 524 Diet*, 113, 1366-1374.
- 36 525 Greenwood, J. L. J., Lin, J., Arguello, D., Ball, T. and Shaw, J. M. (2012), "Healthy Eating Vital Sign: A  
37 526 New Assessment Tool for Eating Behaviors", *ISRN Obesity*, 2012, 7.
- 38 527 Hampl, J. S., Heaton, C. L. and Taylor, C. A. (2003), "Snacking patterns influence energy and nutrient  
39 528 intakes but not body mass index", *J Hum Nutr Diet*, 16, 3-11.
- 40 529 Harden, C. J., Corfe, B. M., Richardson, J. C., Dettmar, P. W. and Paxman, J. R. (2009), "Body mass  
41 530 index and age affect Three-Factor Eating Questionnaire scores in male subjects", *Nutr Res  
42 531 29*, 379-382.
- 43 532 Hartmann, C., Siegrist, M. and Van Der Horst, K. (2013), "Snack frequency: associations with healthy  
44 533 and unhealthy food choices", *Public Health Nutr*, 16, 1487-96.
- 45 534 Hays, N. P. and Roberts, S. B. (2008), "Aspects of Eating Behaviors "Disinhibition" and "Restraint" Are  
46 535 Related to Weight Gain and BMI in Women", *Obesity*, 16, 52-58.
- 47 536 Herman, C. P., Roth, D. A. and Polivy, J. (2003), "Effects of the presence of others on food intake: a  
48 537 normative interpretation", *Psychol Bull*, 129, 873-86.
- 49 538 Hermans, R. C. J., Engels, R. C. M. E., Larsen, J. K. and Herman, C. P. (2009), "Modeling of palatable  
50 539 food intake. The influence of quality of social interaction", *Appetite*, 52, 801-804.
- 51 540 Hetherington, M. M., Anderson, A. S., Norton, G. N. and Newson, L. (2006), "Situational effects on  
52 541 meal intake: A comparison of eating alone and eating with others", *Physiol Behav*, 88, 498-  
53 542 505.
- 54  
55  
56  
57  
58  
59  
60

- 1  
2  
3 543 Higgs, S. and Thomas, J. (2016), "Social influences on eating", *Curr Opin Behav Sci*, 9, 1-6.  
4 544 Holmback, I., Ericson, U., Gullberg, B. and Wirfalt, E. (2010), "A high eating frequency is associated  
5 545 with an overall healthy lifestyle in middle-aged men and women and reduced likelihood of  
6 546 general and central obesity in men", *Br J Nutr*, 104, 1065-73.  
7 547 Kant, A. K. and Graubard, B. I. (2015), "40-year trends in meal and snack eating behaviors of  
8 548 American adults", *J Acad Nutr Diet*, 115, 50-63.  
9 549 Kelley, K. and Abraham, C. (2004), "RCT of a theory-based intervention promoting healthy eating and  
10 550 physical activity amongst out-patients older than 65 years", *Soc Sci Med*, 59, 787-797.  
11 551 Kerner, S., Chou, C., & Warmind, M. (2015), *Commensality. From everyday food to feast.*, London,  
12 552 Bloomsbury.  
13 553 Kleef, V. E., Otten, K. K. and Trijp, V. J. C. M. (2012), "Healthy snacks at the checkout counter: A lab  
14 554 and field study on the impact of shelf arrangement and assortment structure on consumer  
15 555 choices", *BMC Public Health*, 12, 1072.  
16 556 Kniffin, K. M., Wansink, B., Devine, C. M. and Sobal, J. (2015), "Eating Together at the Firehouse: How  
17 557 Workplace Commensality Relates to the Performance of Firefighters", *Hum Perform*, 28,  
18 558 281-306.  
19 559 Lally, P., Bartle, N. and Wardle, J. (2011), "Social norms and diet in adolescents", *Appetite*, 57, 623-  
20 560 627.  
21 561 Leblanc, V., Bégin, C., Corneau, L., Dodin, S. and Lemieux, S. (2015), "Gender differences in dietary  
22 562 intakes: what is the contribution of motivational variables?", *J Hum Nutr Diet*, 28, 37-46.  
23 563 Leech, R. M., Worsley, A., Timperio, A. and Mcnaughton, S. A. (2015), "Understanding meal patterns:  
24 564 definitions, methodology and impact on nutrient intake and diet quality", *Nutr Res Rev*, 28,  
25 565 1-21.  
26 566 Li, K.-K. P., Concepcion, R. Y. P., Lee, H. M. S., Cardinal, B. J. P., Ebbeck, V. P., Woekel, E. M. A. and  
27 567 Readdy, R. T. P. (2012), "An Examination of Sex Differences in Relation to the Eating Habits  
28 568 and Nutrient Intakes of University Students", *J Nutr Educ Behav*, 44, 246-250.  
29 569 Liu, J. L., Han, B. and Cohen, D. A. (2015), "Associations between eating occasions and places of  
30 570 consumption among adults", *Appetite*, 87, 199-204.  
31 571 Löffler, A., Löffler, M., Luck, T., Then, F. S., Lupp, M., Sikorski, C., Kovacs, P., Tönjes, A., Böttcher, Y.,  
32 572 Breitfeld, J., Horstmann, A., Engel, C., Thiery, J., Stumvoll, M. and Riedel-Heller, S. G. (2015),  
33 573 "Age- and gender-specific norms for the German version of the Three-Factor Eating-  
34 574 Questionnaire (TFEQ)", *Appetite*, 91, 241-247.  
35 575 Louie, J. C. Y. and Rangan, A. M. (2018), "Patterns of added sugars intake by eating occasion among a  
36 576 nationally representative sample of Australians", *Eur J Nutr*, 57, 137-154.  
37 577 Maas, J., De Ridder, D. T. D., De Vet, E. and De Wit, J. B. F. (2012), "Do distant foods decrease intake?  
38 578 The effect of food accessibility on consumption", *Psychol Health*, 27, 59-73.  
39 579 Mameli, M. (2013), "Meat made us moral: a hypothesis on the nature and evolution of moral  
40 580 judgment", *Biol Philos*, 28, 903-931.  
41 581 Marsden, P. (1998), "Memetics and Social Contagion: Two Sides of the Same Coin?", *Journal of*  
42 582 *Memetics*, 2, 171-185.  
43 583 Marteau, T. M., Hollands, G. J. and Fletcher, P. C. (2012), "Changing human behavior to prevent  
44 584 disease: the importance of targeting automatic processes", *Science*, 337, 1492-5.  
45 585 Mccrory, M. A., Howarth, N. C., Roberts, S. B. and Huang, T. T. (2011), "Eating frequency and energy  
46 586 regulation in free-living adults consuming self-selected diets", *J Nutr*, 141, 148-53.  
47 587 Mceachan, R. R. C., Conner, M., Taylor, N. J. and Lawton, R. J. (2011), "Prospective prediction of  
48 588 health-related behaviours with the Theory of Planned Behaviour: a meta-analysis", *Health*  
49 589 *Psychol Rev*, 5, 97-144.  
50 590 Meiselman, H. L., Hedderley, D., Staddon, S. L., Pierson, B. J. and Symonds, C. R. (1994), "Effect of  
51 591 effort on meal selection and meal acceptability in a student cafeteria", *Appetite*, 23, 43.  
52 592 Mela, D. J. (2006), "Eating for pleasure or just wanting to eat? Reconsidering sensory hedonic  
53 593 responses as a driver of obesity", *Appetite*, 47, 10-17.

- 1  
2  
3 594 Mollen, S., Rimal, R. N., Ruiters, R. A. C. and Kok, G. (2013), "Healthy and unhealthy social norms and  
4 595 food selection. Findings from a field-experiment", *Appetite*, 65, 83-89.
- 5 596 Murakami, K. and Livingstone, M. B. (2016a), "Associations between meal and snack frequency and  
6 597 diet quality and adiposity measures in British adults: findings from the National Diet and  
7 598 Nutrition Survey", *Public Health Nutr*, 19, 1624-34.
- 9 599 Murakami, K. and Livingstone, M. B. (2016b), "Energy density of meals and snacks in the British diet  
10 600 in relation to overall diet quality, BMI and waist circumference: findings from the National  
11 601 Diet and Nutrition Survey", *Br J Nutr*, 116, 1479-1489.
- 12 602 Myhre, J. B., Loken, E. B., Wandel, M. and Andersen, L. F. (2015), "The contribution of snacks to  
13 603 dietary intake and their association with eating location among Norwegian adults - results  
14 604 from a cross-sectional dietary survey", *BMC Public Health*, 15, 369.
- 15 605 N. C. D. Risk Factor Collaboration (2016), "Trends in adult body-mass index in 200 countries from  
16 606 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2  
17 607 million participants", *Lancet*, 387, 1377-1396.
- 19 608 Nicklas, T. A., O'neil, C. E. and Fulgoni, V. L., 3rd (2014), "Snacking patterns, diet quality, and  
20 609 cardiovascular risk factors in adults", *BMC Public Health*, 14, 388.
- 21 610 O'connor, L., Brage, S., Griffin, S. J., Wareham, N. J. and Forouhi, N. G. (2015), "The cross-sectional  
22 611 association between snacking behaviour and measures of adiposity: the Fenland Study, UK",  
23 612 *Br J Nutr*, 114, 1286-93.
- 24 613 Ovaskainen, M. L., Reinivuo, H., Tapanainen, H., Hannila, M. L., Korhonen, T. and Pakkala, H. (2006),  
25 614 "Snacks as an element of energy intake and food consumption", *Eur J Clin Nutr*, 60, 494-501.
- 26 615 Pachucki, M. A., Jacques, P. F. and Christakis, N. A. (2011), "Social network concordance in food  
27 616 choice among spouses, friends, and siblings", *Am J Public Health*, 101, 2170-2177.
- 29 617 Painter, J. E., Wansink, B. and Hieggelke, J. B. (2002), "How visibility and convenience influence  
30 618 candy consumption", *Appetite*, 38, 237-8.
- 31 619 Palmeira, A. L., Teixeira, P. J., Branco, T. L., Martins, S. S., Minderico, C. S., Barata, J. T., Serpa, S. O.  
32 620 and Sardinha, L. B. (2007), "Predicting short-term weight loss using four leading health  
33 621 behavior change theories", *Int J Behav Nutr Phys Act*, 4, 14-14.
- 34 622 Perkins, J. M., Perkins, H. W. and Craig, D. W. (2010), "Misperceptions of peer norms as a risk factor  
35 623 for sugar-sweetened beverage consumption among secondary school students", *J Am Diet  
36 624 Assoc*, 110, 1916-21.
- 38 625 Petrescu, D. C., Hollands, G. J., Couturier, D.-L., Ng, Y.-L. and Marteau, T. M. (2016), "Public  
39 626 Acceptability in the UK and USA of Nudging to Reduce Obesity: The Example of Reducing  
40 627 Sugar-Sweetened Beverages Consumption", *PloS one*, 11, e0155995.
- 41 628 Piernas, C. and Popkin, B. M. (2010), "Snacking increased among U.S. adults between 1977 and  
42 629 2006", *J Nutr*, 140, 325-32.
- 43 630 Pliner, P. and Mann, N. (2004), "Influence of social norms and palatability on amount consumed and  
44 631 food choice", *Appetite*, 42, 227-37.
- 45 632 Popkin, B. M. and Duffey, K. J. (2010), "Does hunger and satiety drive eating anymore? Increasing  
46 633 eating occasions and decreasing time between eating occasions in the United States", *Am J  
47 634 Clin Nutr*, 91, 1342-7.
- 49 635 Prinsen, S., De Ridder, D. T. and De Vet, E. (2013), "Eating by example. Effects of environmental cues  
50 636 on dietary decisions", *Appetite*, 70, 1-5.
- 51 637 Provencher, V., Drapeau, V., Tremblay, A., Després, J.-P. and Lemieux, S. (2003), "Eating Behaviors  
52 638 and Indexes of Body Composition in Men and Women from the Québec Family Study", *Obes  
53 639 Res*, 11, 783-792.
- 55 640 Public Health England. (2017), "Guidance. Health matters: obesity and the food environment"  
56 641 [Online]: Gov.UK. Available: [https://www.gov.uk/government/publications/health-matters-  
57 642 obesity-and-the-food-environment/health-matters-obesity-and-the-food-environment--2](https://www.gov.uk/government/publications/health-matters-obesity-and-the-food-environment/health-matters-obesity-and-the-food-environment--2)  
58 643 [Accessed July 2018].
- 59  
60

- 1  
2  
3 644 Quist, H. G., Christensen, U., Carneiro, I. G., Hansen, J. V. and Bjorner, J. B. (2014), "Do colleagues  
4 645 influence our lifestyle: The matter of smoking, body mass index and leisure-time physical  
5 646 activity?", *Prev Med*, 67, 166-170.
- 6 647 Ramaekers, M. G., Boesveldt, S., Lakemond, C. M. M., Boekel, V. M. a. J. S. and Luning, P. A. (2014),  
7 648 "Odors: appetizing or satiating? Development of appetite during odor exposure over time",  
8 649 *International Journal of Obesity*, 38, 650-656.
- 9 650 Ravis, A. and Sheeran, P. (2003), "Descriptive norms as an additional predictor in the theory of  
10 651 planned behaviour: A meta-analysis", *Curr Psychol*, 22, 218-233.
- 11 652 Robinson, E. (2015), "Perceived social norms and eating behaviour: An evaluation of studies and  
12 653 future directions", *Physiology & Behavior*, 152, 397-401.
- 13 654 Robinson, E. and Higgs, S. (2013), "Food choices in the presence of 'healthy' and 'unhealthy' eating  
14 655 partners", *Br J Nutr*, 109, 765-71.
- 15 656 Robinson, E., Tobias, T., Shaw, L., Freeman, E. and Higgs, S. (2011), "Social matching of food intake  
16 657 and the need for social acceptance", *Appetite*, 56, 747-52.
- 17 658 Rolls, B. J., Fedoroff, I. C. and Guthrie, J. F. (1991), "Gender differences in eating behavior and body  
18 659 weight regulation", *Health psychol*, 10, 133-142.
- 19 660 Royal College of Surgeons. (2017), "Resolve to cut 'cake culture' in your workplace in 2017 " [Online].  
20 661 Available: [https://www.rcseng.ac.uk/news-and-events/media-centre/press-releases/cake-](https://www.rcseng.ac.uk/news-and-events/media-centre/press-releases/cake-culture/)  
21 662 [culture/](https://www.rcseng.ac.uk/news-and-events/media-centre/press-releases/cake-culture/) [Accessed June 2018].
- 22 663 Ryan, R. M. and Deci, E. L. (2000), "Self-Determination Theory and the Facilitation of Intrinsic  
23 664 Motivation, Social Development, and Well-Being", *Am Psychol*, 55, 68-78.
- 24 665 Salmon, S. J., Fennis, B. M., De Ridder, D. T., Adriaanse, M. A. and De Vet, E. (2014), "Health on  
25 666 impulse: when low self-control promotes healthy food choices", *Health Psychol*, 33, 103-9.
- 26 667 Schembre, S., Greene, G. and Melanson, K. (2009), "Development and validation of a weight-related  
27 668 eating questionnaire", *Eating Behaviors*, 10, 119-124.
- 28 669 Schnabel, L., Kesse-Guyot, E., Allès, B., Touvier, M., Srour, B., Hercberg, S., Buscail, C. and Julia, C.  
29 670 (2019), "Association Between Ultraprocessed Food Consumption and Risk of Mortality  
30 671 Among Middle-aged Adults in France", *JAMA Intern Med* [Online]. Available:  
31 672 <https://dx.doi.org/10.1001/jamainternmed.2018.7289> [Accessed 13 February 2019].
- 32 673 Scientific Advisory Committee on Nutrition. (2015), "Carbohydrates and Health". Available:  
33 674 [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/445503/SACN_Carbohydrates_and_Health.pdf)  
34 675 [data/file/445503/SACN\\_Carbohydrates\\_and\\_Health.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/445503/SACN_Carbohydrates_and_Health.pdf).
- 35 676 Scott, S., Dingley, M., Urbanek, J. K., Kaltenbach, M., Jiang, H. and Rozin, P. (2011), "Nudge to  
36 677 nobesity I: Minor changes in accessibility decrease food intake", *Judgm Decis Mak*, 6, 323-  
37 678 332.
- 38 679 Simmonds, G., Tinati, T., Barker, M. and Bishop, F. L. (2016), "Measuring young women's self-efficacy  
39 680 for healthy eating: Initial development and validation of a new questionnaire", *Journal of*  
40 681 *Health Psychology*, 21, 2503-2513.
- 41 682 Stok, F. M., De Ridder, D. T., De Vet, E. and De Wit, J. B. (2014), "Don't tell me what I should do, but  
42 683 what others do: the influence of descriptive and injunctive peer norms on fruit consumption  
43 684 in adolescents", *Br J Health Psychol*, 19, 52-64.
- 44 685 Stok, F. M., De Vet, E., De Wit, J. B. F., Renner, B. and De Ridder, D. T. D. (2015), "Communicating  
45 686 eating-related rules. Suggestions are more effective than restrictions", *Appetite*, 86, 45-53.
- 46 687 Stunkard, A. J. and Messick, S. (1985), "The three-factor eating questionnaire to measure dietary  
47 688 restraint, disinhibition and hunger", *J Psychosom Res*, 29, 71.
- 48 689 Swinburn, B. A., Sacks, G., Hall, K. D., Mcpherson, K., Finegood, D. T., Moodie, M. L. and Gortmaker,  
49 690 S. L. (2011), "The global obesity pandemic: shaped by global drivers and local environments",  
50 691 *Lancet*, 378, 804-14.
- 51 692 Tabak, R. G., Hipp, J. A., Marx, C. M. and Brownson, R. C. (2015), "Workplace social and  
52 693 organizational environments and healthy-weight behaviors", *PLoS One*, 10, e0125424.
- 53  
54  
55  
56  
57  
58  
59  
60

- 1  
2  
3 694 Tapper, K. and Pothos, E. M. (2010), "Development and validation of a Food Preoccupation  
4 695 Questionnaire", *Eating Behaviors*, 11, 45-53.  
5 696 Thaler R. & Sunstein, C. (2009), *Nudge: Improving decisions about health, wealth and happiness*,  
6 697 London, Penguin.  
7 698 Thorsen, A. V., Lassen, A. D., Tetens, I., Hels, O. and Mikkelsen, B. E. (2010), "Long-term sustainability  
8 699 of a worksite canteen intervention of serving more fruit and vegetables", *Public Health Nutr*,  
9 700 13, 1647-1652.  
10 701 Tonglet, M., Phillips, P. S. and Read, A. D. (2004), "Using the Theory of Planned Behaviour to  
11 702 investigate the determinants of recycling behaviour: a case study from Brixworth, UK",  
12 703 *Resour Conserv Recycl*, 41, 191-214.  
13 704 Topper, A. (2015), "Snacking motivations and attitudes - US - April 2015" [Online]. Available:  
14 705 <http://reports.mintel.com/display/716516/> [Accessed June 2018].  
15 706 Vartanian, L. R., Herman, C. P. and Wansink, B. (2008), "Are We Aware of the External Factors That  
16 707 Influence Our Food Intake?", *Health Psychology*, 27, 533-538.  
17 708 Vartanian, L. R., Spanos, S., Herman, C. P. and Polivy, J. (2015), "Modeling of food intake: a meta-  
18 709 analytic review", *Soc Infl*, 10, 119-136.  
19 710 Velema, E., Vyth, E. L., Hoekstra, T. and Steenhuis, I. H. M. (2018), "Nudging and social marketing  
20 711 techniques encourage employees to make healthier food choices: a randomized controlled  
21 712 trial in 30 worksite cafeterias in The Netherlands", *Am J Clin Nutr*, 107, 236-246.  
22 713 Verweij, L. M., Coffeng, J., Van Mechelen, W. and Proper, K. I. (2011), "Meta-analyses of workplace  
23 714 physical activity and dietary behaviour interventions on weight outcomes", *Obes Rev*, 12,  
24 715 406-29.  
25 716 Wardle, J., Haase, A. M., Steptoe, A., Nillapun, M., Jonwutiwes, K. and Bellis, F. (2004), "Gender  
26 717 differences in food choice: The contribution of health beliefs and dieting", *Ann Beh Med*  
27 718 27, 107-116.  
28 719 Watts, A. W., Laska, M. N., Larson, N. I. and Neumark-Sztainer, D. R. (2016), "Millennials at work:  
29 720 workplace environments of young adults and associations with weight-related health", *J*  
30 721 *Epidemiol Community Health*, 70, 65-71.  
31 722 Zizza, C. A., Arsiwalla, D. D. and Ellison, K. J. (2010), "Contribution of snacking to older adults'  
32 723 vitamin, carotenoid, and mineral intakes", *J Am Diet Assoc*, 110, 768-72.  
33 724 Zizza, C. A. and Xu, B. (2012), "Snacking is associated with overall diet quality among adults", *J Acad*  
34 725 *Nutr Diet*, 112, 291-6.  
35 726 Zoellner, J., Estabrooks, P. A., Davy, B. M., Chen, Y. C. and You, W. (2012), "Exploring the theory of  
36 727 planned behavior to explain sugar-sweetened beverage consumption", *J Nutr Educ Behav*,  
37 728 44, 172-7.

38 729

39 730

40

41

42

43

44

45

46

47

48

49

50

51

731 **Tables**

732

733 **Table 1: Descriptions of organisations recruited for the cluster sample**

Organisation	Description	Location	Employee description
A	Engineering and innovation function of an international manufacturer. Approximately 800 staff	The Midlands	Predominantly educated to at least graduate level. Professional plus admin staff
B	UK office of international operator in transport and infrastructure solutions. Approximately 1000 staff	Southern England	Predominantly educated to at least graduate level. Professional plus admin staff
C	Health-based charity. Approximately 250 staff	Mainly London, plus smaller offices around the UK	Mix of education level. Professional plus admin staff
D	Group of three local authorities. Up to 1500 staff.	Home counties	Mix of education level. Professional plus admin staff

734

735

736 **Table 2: Demographic characteristics of survey respondents**

	Cluster sampling				Snowball sampling n (%)	Total sample n (%)
	Organisation A n (%)	Organisation B n (%)	Organisation C n (%)	Organisation D n (%)		
<b>Number of respondents</b>	173 (18.4)	107 (11.4%)	38 (4.0)	3 (0.03)	619 (65.9)	940 (100)
<b>Gender</b>						
Male	126 (73.3)	61 (57.5)	6 (15.8)	0 (0)	175 (28.3)	368 (39.3)
Female	46 (26.7)	45 (42.4)	32 (84.2)	3 (100)	442 (71.6)	568 (60.7)
Total	172 (100)	106 (100)	38 (100)	3 (100)	617 (100)	936 (100)
Missing	1	1	-	-	2	4
<b>Age group</b>						
18-29 years	57 (33.1)	17 (15.9)	6 (15.8)	0	92 (15.0)	172 (18.4)
30-49 years	83 (48.3)	54 (50.5)	23 (60.5)	1 (33.3)	359 (58.4)	520 (55.6)
≥50 years	32 (18.6)	36 (33.6)	9 (23.7)	2 (66.7)	164 (26.7)	243 (26.0)
Total	172 (100)	107 (100)	38 (100)	3 (100)	615 (100)	935 (100)
Missing	1	-	-	-	4	5
<b>Pro-rata work time</b>						
Full time	170 (98.3)	100 (93.5)	32 (84.2)	2 (66.7)	457 (73.8)	761 (81.0)
80%	2 (1.2)	4 (3.7)	2 (5.3)	1 (33.3)	78 (12.6)	87 (9.3)
60%	1 (0.6)	3 (2.8)	3 (7.9)	0	53 (8.6)	60 (6.4)
50%	0	0	0	0	18 (2.9)	18 (1.9)
≤40%	0	0	1 (2.6)	0	13 (2.1)	14 (1.5)
Total	173 (100)	107 (100)	38 (100)	3 (100)	619 (100)	940 (100)
Missing	-	-	-	-	-	-
<b>Mean BMI (kg/m<sup>2</sup>)</b>	26.0	26.5	24.5	-	-	25.9

737

738

739 **Table 3: Responses from questionnaire Likert-type scale items ‘Never’ to ‘Always’**

Item (TPB construct explored)	Demographic group	Never n (%)	Sometimes n (%)	About half the time n (%)	Often n (%)	Always n (%)
If OC is available, I eat it (PCB)	Total	76 (8.1)	369 (39.3)	105 (11.2)	256 (27.2)	134 (14.3)
	Men/Women 18-29/30-49/≥50		(33.7/42.8) <sup>a</sup> (29.7/38.5/47.7) <sup>b</sup>	(8.4/13.0) <sup>a</sup>	(32.6/27.9/21.8) <sup>b</sup>	(21.2/9.9) <sup>a</sup>
I find it easy to refuse OC (PBC)	Total	115 (12.2)	230 (24.45)	119 (12.7)	225 (23.9)	251 (26.7)
	Men/Women 18-29/30-49/≥50					
I get distracted by the thought, smell or sight of OC (PBC)	Total	360 (38.3)	305 (32.4)	65 (6.9)	151 (16.1)	59 (6.3)
	Men/Women 18-29/30-49/≥50	(44.6/34.0) <sup>a</sup>		(4.9/8.3) <sup>a</sup>		
If I refuse OC, colleagues persuade me to change my mind (Inj + Desc)	Total	453 (48.2)	320 (34.0)	59 (6.3)	887 (9.3)	21 (2.2)
	Men/Women 18-29/30-49/≥50	(57.3/42.1) <sup>a</sup> (40.1/45.4/60.1) <sup>b</sup>	(26.6/39.1) <sup>a</sup> (32.0/38.3/27.2) <sup>b</sup>	(11.6/5.2/4.9) <sup>b</sup>		
I feel regret after eating OC (Att)	Total	356 (37.9)	311 (33.1)	65 (6.9)	134 (14.3)	74 (7.9)
	Men/Women 18-29/30-49/≥50					
I feel I cause offense if I refuse OC (Inj)	Total	572 (60.9)	217 (23.1)	41 (4.4)	91 (9.7)	19 (2.0)
	Men/Women 18-29/30-49/≥50		(22.1/20.4/29.2) <sup>b</sup>			
It's hard to say no if everyone else is eating OC (Desc)	Total	395 (42.0)	256 (27.2)	75 (8.0)	151 (16.1)	63 (6.7)
	Men/Women 18-29/30-49/≥50	(51.1/35.9) <sup>a</sup> (36.6/39.8/50.6) <sup>b</sup>	(22.6/30.5) <sup>a</sup>		(22.1/16.3/10.7) <sup>b</sup>	
I feel hurt if OC I've brought to share is refused (Inj)	Total	676 (71.9)	139 (14.8)	41 (4.4)	62 (6.6)	22 (2.3)
	Men/Women 18-29/30-49/≥50	(77.7/68.1) <sup>a</sup> (62.2/73.7/75.3) <sup>b</sup>	(22.1/12.7/14.0) <sup>b</sup>	(4.7/5.4/1.6) <sup>b</sup>	(3.8/8.5) <sup>a</sup>	
I am made to feel uncomfortable if I refuse OC (Inj)	Total	736 (78.3)	125 (13.3)	44 (4.7)	28 (3.0)	7 (0.7)
	Men/Women 18-29/30-49/≥50					
I find it hard to resist OC even if not hungry/have just eaten (PBC)	Total	303 (32.2)	286 (30.4)	85 (9.0)	168 (17.9)	98 (10.4)
	Men/Women 18-29/30-49/≥50	(37.5/28.7) <sup>a</sup>	(23.3/30.4/36.2) <sup>b</sup>	(17.4/8.8/3.7) <sup>b</sup>		
If OC is out of view I am less likely to eat some (PBC)	Total	157 (16.7)	142 (15.1)	95 (10.1)	284 (30.2)	262 (27.9)
	Men/Women 18-29/30-49/≥50	(21.7/13.2) <sup>a</sup>				
I look forward to OC (Att)	Total	191 (20.3)	290 (30.9)	140 (14.9)	177 (18.8)	142 (15.1)
	Men/Women 18-29/30-49/≥50	(23.4/18.0) <sup>a</sup> (12.8/17.3/31.7) <sup>b</sup>	(26.1/34.2) <sup>a</sup> (22.7/31.2/36.6) <sup>b</sup>		(26.7/19.2/12.3) <sup>b</sup>	(22.1/16.0/8.2) <sup>b</sup>

740 TPB, Theory of Planned Behaviour; OC, office cake; Att, attitude; Inj; injunctive norm; Desc; descriptive norm; PBC,  
741 perceived behavioural control

742 <sup>a</sup>: values differ significantly between genders at p<0.05

743 <sup>b</sup>: values differ significantly between age groups at p<0.05

744

745 **Table 4: Responses from questionnaire Likert-type scale items ‘Strongly agree’ to ‘Strongly disagree’**

Item (TPB construct explored)	Demographic groups	Strongly agree n (%)	Agree n (%)	Undecided n (%)	Disagree n (%)	Strongly disagree n (%)
OC has contributed to increase in my weight (Att)	Total	73 (7.8)	221 (23.6)	174 (18.6)	257 (27.5)	211 (22.5)
	Men/women 18-29/30-49/≥50	(5.4/9.3) <sup>a</sup>	(17.9/27.3) <sup>a</sup> (21.5/27.1/17.3) <sup>b</sup>			(28.8/18.5) <sup>a</sup> (20.3/19.8/30.0) <sup>b</sup>
OC has made it harder for me to control my weight (Att)	Total	64 (6.8)	268 (28.6)	122 (13.0)	271 (29.0)	211 (22.5)
	Men/women 18-29/30-49/≥50	(4.3/8.5) <sup>a</sup>	(24.2/31.5) <sup>a</sup>			(30.7/17.3) <sup>a</sup> (22.7/19.6/28.8) <sup>b</sup>
OC makes a weight loss diet harder to stick to (Att)	Total	142 (15.1)	409 (43.5)	103 (11.0)	154 (16.4)	132 (14.0)
	Men/women 18-29/30-49/≥50		(36.7/47.9) <sup>a</sup>	(14.1/8.8) <sup>a</sup>		(17.9/11.4) <sup>a</sup>
OC has made it harder for me to eat healthily (Att)	Total	89 (9.5)	264 (28.1)	136 (14.5)	270 (28.7)	181 (19.3)
	Men/women 18-29/30-49/≥50	(7.1/11.1) <sup>a</sup>				(25.8/15.0) <sup>a</sup> (16.9/16.5/26.7) <sup>b</sup>
OC is a good thing	Total	121 (12.9)	448 (47.7)	208 (22.1)	115 (12.2)	48 (5.1)
	Men/women 18-29/30-49/≥50	(17.9/9.7) <sup>a</sup> (19.2/12.1/10.3) <sup>b</sup>				(1.7/4.6/8.2) <sup>b</sup>
OC is great way to show appreciation	Total	109 (11.6)	519 (55.2)	143 (15.2)	135 (14.4)	34 (3.6)
	Men/women 18-29/30-49/≥50	(15.5/9.2) <sup>a</sup> (17.4/11.5/7.8) <sup>b</sup>	(64.5/53.8/51.9) <sup>b</sup>	(9.3/16.0/17.7) <sup>b</sup>	(6.4/15.6/17.3) <sup>b</sup>	
OC brings people together	Total	161 (17.1)	596 (63.4)	79 (8.4)	82 (8.7)	22 (2.3)
	Men/women 18-29/30-49/≥50	(24.4/17.3/11.5) <sup>b</sup>			(3.5/9.6/10.7) <sup>b</sup>	
OC cheers everyone up	Total	178 (18.9)	598 (63.6)	96 (10.2)	53 (5.6)	15 (1.6)
	Men/women 18-29/30-49/≥50	(23.1/16.2) <sup>a</sup> (29.7/18.5/11.9) <sup>b</sup>	(57.9/67.6) <sup>a</sup>			(1.2/0.8/3.3) <sup>b</sup>
I would support an initiative to reduce OC consumption	Total	104 (11.1)	235 (25.0)	278 (29.6)	238 (25.3)	85 (9.0)
	Men/women 18-29/30-49/≥50		(20.1/28.2) <sup>a</sup>		(29.1/23.1) <sup>a</sup>	(12.2/6.9) <sup>a</sup>
I would like my work-place to do more to help my health	Total	172 (18.3)	317 (33.7)	196 (20.9)	195 (20.7)	60 (6.4)
	Men/women 18-29/30-49/≥50		(29.6/36.4) <sup>a</sup>		(16.3/19.8/26.3) <sup>b</sup>	(8.4/5.1) <sup>a</sup>

746 TPB, Theory of Planned Behaviour; OC, office cake; Att, attitude; Inj; injunctive norm; Desc; descriptive norm; PBC,  
747 perceived behavioural control

748 <sup>a</sup>: values differ significantly between genders at p<0.05

749 <sup>b</sup>: values differ significantly between age groups at p<0.05

750

751 **Table 5: Ideal office cake frequency**

	Never n (%)	Once per month n (%)	Once per fortnight n (%)	Once per week n (%)	Twice per week n (%)	Daily n (%)	Total n (%)
<b>Gender</b>							
Male	28 (7.6) <sup>a</sup>	120 (32.6) <sup>a</sup>	90 (24.5) <sup>a</sup>	104 (28.3) <sup>a</sup>	14 (3.8) <sup>a</sup>	12 (3.3) <sup>a</sup>	368 (100)
Female	29 (5.1) <sup>a</sup>	267 (47.0) <sup>b</sup>	129 (22.7) <sup>a</sup>	120 (21.1) <sup>b</sup>	17 (3.0) <sup>a</sup>	6 (1.1) <sup>b</sup>	568 (100)
Total	57 (6.1)	387 (41.3)	219 (23.4)	224 (23.9)	31 (3.3)	18 (1.9)	936 (100)
<b>Age group</b>							
18-29 years	5 (2.9) <sup>c</sup>	52 (30.2) <sup>c</sup>	53 (30.8) <sup>c</sup>	48 (27.9) <sup>c</sup>	10 (5.8) <sup>c</sup>	4 (2.3) <sup>c</sup>	172 (100)
30-49 years	22 (4.2) <sup>c</sup>	233 (44.8) <sup>d</sup>	121 (23.3) <sup>c,d</sup>	120 (23.1) <sup>c</sup>	14 (2.7) <sup>c</sup>	10 (1.9) <sup>c</sup>	520 (100)
≥50 years	29 (11.9) <sup>d</sup>	102 (42.0) <sup>d</sup>	45 (18.5) <sup>d</sup>	56 (23.0) <sup>c</sup>	7 (2.9) <sup>c</sup>	4 (1.6) <sup>c</sup>	243 (100)
Total	56 (6.0)	387 (41.4)	219 (23.4)	224 (24.0)	31 (3.3)	18 (1.9)	935 (100)

752 <sup>a, b</sup>: Values with different superscript letters differ significantly between genders at p<0.05

753 <sup>c, d</sup>: Values with different superscript letters differ significantly between age groups at p<0.05

754



1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

755 **Figure Legend**

756

757 Figure 1: Respondents' most influential referent according to age group (■, total sample [*n*  
758 935]; □, 18-29s [*n* 172]; ■, 30-49s [*n* 520]; ■, ≥50s [*n* 243]). a, b: values with different  
759 superscript letters differ significantly at  $p \leq 0.05$ .

760