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1 **Understanding everyday strategies used to manage indulgent food consumption: a**
2 **mixed-methods design**

3

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18 To maintain a healthy body weight or support weight loss efforts, dietary self-management
19 must allow for the limitation of tempting high energy-dense foods. We were interested in
20 people's implementation of day-to-day strategies in order to successfully manage their
21 indulgent food and beverage consumption. Participants from the Swansea area, UK (N=25;
22 $M_{age}=37$; 68% male) were divided into four focus groups. The average BMI was within the
23 healthy range (23 kg/m^2). Each group discussed the approaches that they used to manage their
24 consumption of indulgent foods and drinks. Group discussions were then transcribed,
25 thematically analysed and independently reviewed by a second researcher. In a follow-up
26 phase, participants were asked to rate how often they used the identified strategies and to rate
27 the perceived effectiveness of any that applied to them. The thematic analysis revealed four
28 major themes: Exercise, Cognitive Strategies, Availability and Meal Formation. Variability in
29 the frequency with which strategies were used and perceived as effective was evident.
30 Notably, participants tended to use multiple strategies and even lean participants who did not
31 identify themselves as 'dieters' none-the-less employed a variety of strategies to successfully
32 manage their exposure to and consumption of tempting foods. The findings suggest that
33 dietary advice could be improved by taking into account the strategies for managing indulgent
34 food consumption that are frequently used by individuals, as well as those that are perceived
35 as effective.

36

37 **Keywords: Mixed methods; dietary strategies; discretionary choices; perceived efficacy;**
38 **frequency**

39

40 **Introduction**

41 Overweight and obesity increase the risk of a series of health problems such as diabetes and
42 cardiovascular diseases, and negatively impacts quality of life (World Health Organisation,
43 2016). Despite increased understanding of the causes and health risks associated with
44 overweight and obesity, the upward trend in obesity persists (NCD Risk Factor Collaboration,
45 2016). Indeed, recent estimates produced by the World Obesity Federation suggest that by
46 2025 2.7 billion adults will suffer from overweight and obesity globally (World Obesity
47 Federation, 2017). As such, finding effective interventions to reverse this trend is of high
48 priority (Ells, Demaio, & Farpour-Lambert, 2018).

49 Calorie controlled diets can result in successful weight loss in the short-term, but this
50 is often not maintained, with weight regain in the longer-term (Rogge & Gautam, 2017). This
51 is likely due to poor adherence to dietary changes implemented with or without the help of a
52 commercial provider (Lemstra, Bird, Nwankwo, Rogers, & Moraros, 2016). This may partly
53 be explained by the high energy dense, indulgent food temptations in the modern food
54 environment (Houben, Nederkoorn, & Jansen, 2012; Stok, et al., 2015). Many people
55 experience great difficulty implementing the dietary self-management strategies that are
56 necessary for a healthy diet (which includes the limitation of tempting foods) in this
57 obesogenic environment (Kruger, Galuska, Serdula, & Jones, 2004; Thomas, Bond, Phelan,
58 Hill, & Wing, 2014). This is unlikely to be because there is a lack of awareness of what
59 constitutes a healthy diet but rather, a failure to translate this knowledge into everyday food
60 choices over a sustained period of time (Croll, Neumark-Sztainer, & Story, 2001).

61 Appelhans *et al.* have explored this ‘failure to translate’ within their ‘neurobehavioral
62 model of intervention strategies for managing temptation in obesity treatment’ (Appelhans,
63 French, Pagoto, & Sherwood, 2016). The model is based on known neurobehavioural
64 processes that are salient when lapses in dietary adherence occur. These are the ‘cold-hot
65 empathy gap’, ‘attentional bias’ and ‘temporal discounting’. Of particular focus in the model,
66 is the cold-hot empathy gap. In this context, the term ‘hot’ describes a state of increased
67 wanting, for example when hungry or thirsty. Conversely, the term ‘cold’ describes a state
68 that is neutral and un-motivated. The cold-hot empathy gap as a whole describes how people
69 in a ‘cold’ state underestimate their feelings and motivations in a ‘hot’ state and this leads to
70 unhealthy decisions that depart from plans made in a cold state. For a full review of all three
71 neurobehavioural processes mentioned we direct the reader to the paper presenting the full
72 model (Appelhans, et al., 2016).

73 The neurobehavioral model is organised into two dimensions and can be visualised as a three

74 by two table (see Table 1 in Appelhans, et al., 2016). Vertically, a dimension is presented that
75 reflects interventions' demand on executive function (cognitive processes that are important
76 for maintaining goal directed behaviour), from 'high' to 'none'; a) high, when individuals
77 implement strategies to manage temptation by themselves, b) minimal, when individuals
78 commit to interventions, e.g. by enrolling on to a lifestyle program, c) none, when
79 interventions are implemented by an external agent, such as a tax or a 'nudge'. Horizontally, a
80 dimension is presented that reflects 'the intended impact of an intervention on reward
81 processing'. This comprises a) prevention of temptation (implemented in a 'cold' state in
82 order to minimise or avoid temptation) and b) resistance of temptation (implemented in a
83 'hot' state in order to resist a temptation). Importantly, within a whole lifestyle approach to
84 the management of temptation, each part of the model has a role and the challenge is to find a
85 set of strategies that together reflect this (Appelhans, et al., 2016).

86 A number of studies have investigated the efficacy of strategies designed to help
87 individuals manage their intake of tempting foods and drinks, which can be viewed in terms
88 of Appelhans et al.'s two-dimensional model. Grieger, Wycherley, Johnson, and Golley
89 (2016), conducted a scoping review of these studies ($N = 44$) and identified 5 key groups of
90 strategies. These were the reformulation of foods from higher fat to lower fat, the substitution
91 of tempting choices for alternatives (e.g., a high fibre snack), restriction of portion size,
92 supplementation of the diet with nuts and wholegrain to improve overall diet quality and the
93 adoption of permissive and restrictive nutrition messages. However, it is unclear how the
94 strategies at the centre of these separate intervention studies might be integrated into a whole
95 lifestyle that is conducive to the effective long-term management of diet and weight.

96 An alternative methodological approach is taken by the 'National Weight Control
97 Registry' (see for example Gorin, Phelan, Wing, & Hill, 2004; Klem, Wing, McGuire, Seagle,
98 & Hill, 1998; McGuire, Wing, Klem, & Hill, 1999; Thomas, et al., 2014), which is a database
99 of individuals who have lost at least 13.6kg and maintained this weight loss for at least one
100 year (i.e., successful weight loss maintainers). Individuals reported the *combination* of
101 strategies that they use to maintain their weight (as opposed to specifically managing their
102 intake of tempting foods). Strategies reported included self-monitoring of weight, following a
103 low-calorie/ low fat diet, low variety, exercising daily for about one hour, eating breakfast
104 regularly and consistent eating patterns over weekday and weekend (for a recent summary see
105 Thomas, et al., 2014). Though it should be noted that strategies were selected from a list of
106 suggestions rather than being produced spontaneously and this may have limited findings
107 (i.e., the list may not have been exhaustive). Also, the focus of this study was weight

108 maintenance; therefore the strategies included but were not limited to those that could be
109 viewed in terms of the management of tempting food consumption.

110 A similar ‘whole lifestyle’ approach was taken by Allom and Mullan (2014) who
111 investigated the strategies used by healthy weight young adults (who also considered
112 themselves to be healthy eaters) to regulate their eating behaviour. In this case, a qualitative
113 approach was taken that was based around semi-structured focus groups, therefore, strategies
114 were provided spontaneously by participants. Again, whilst this study was not specifically
115 focussed on managing the intake of tempting foods, this topic featured as part of the broader
116 discussion of healthy eating strategies. This study suggested that this sample were
117 experiencing similar challenges to the maintenance of their healthy eating regime and weight
118 as anybody else. However, this group were *successful* at using strategies to change their
119 environment and engaged self-control to overcome said challenges. For example, they
120 prepared their own meals, made access to unhealthy food harder, planned and monitored their
121 food intake.

122 Falk, Sobal, Bisogni, Connors, and Devine (2001) also investigated strategies used to
123 manage healthy eating, though they included a broader sample than others having purposely
124 sought participants of varied ethnicity, age, gender and household composition. They
125 identified eight broad themes which related to strategies that were used to manage healthy
126 eating; substitution, avoidance, limitation, preparation of healthy foods, comparison when
127 selecting foods, addition of healthy foods to the diet, eating in specific locations and
128 compensation for unhealthy foods eaten.

129 There are considerable commonalities among these studies in terms of identified
130 strategies adopted by individuals to manage their healthy eating or maintain their weight.
131 Moreover, some of these strategies for the management of temptation are part of broader
132 discussions on healthy eating or weight maintenance. However, a study which focusses
133 specifically (and in more depth) on strategies used by individuals to manage their
134 consumption of tempting foods is absent. Therefore, the first aim of the current study was to
135 comprehensively explore the variety of strategies used by individuals to manage their intake
136 of tempting foods and drinks on a day to day basis. Consistent with Allom and Mullan (2014),
137 a qualitative semi-structured focus group approach was taken and consistent with Falk, et al.
138 (2001) an unrestricted sample was recruited.

139 Information about the combination of strategies that individuals use to manage their
140 intake of tempting foods is likely to be of use to health professionals developing eating

141 behaviour interventions. Especially, if they are trying to ensure that they follow the
142 neurobehavioral model of intervention strategies for managing temptation in obesity treatment
143 (Appelhans, et al., 2016). Additionally, Falk, et al. (2001) suggest that there is likely to be a
144 benefit from maximising the use of strategies that individuals are already choosing to use.

145 Nevertheless, considerable questions remain about the implementation of these
146 strategies. For example, which strategies are used the most and which, whilst mentioned, are
147 used less often? If some strategies are used less frequently, is this because they are considered
148 less effective? Therefore, in order to understand the broader context within which these
149 strategies are employed, the second aim of the current study was to assess how often the
150 strategies identified in the qualitative phase were used ('frequency') as well as the perceived
151 effectiveness of these strategies ('effectiveness'). Here, a quantitative questionnaire approach
152 was taken in a follow-up phase to the qualitative focus groups.

153 Specifically, we hypothesised that a range of strategies would be mentioned by
154 participants that reflect those reported by previous studies but that not all of those strategies
155 would be used with the same frequency and would not be regarded as equally effective.

156

157 **Phase one: Qualitative focus groups**

158 *Methods*

159 *Participants*

160 25 participants took part in four focus groups at Swansea University with a mean number of
161 six individuals per group (in line with Howitt, 2013). Participants were recruited via social
162 media and the online university staff community board. They were told that we were
163 interested in the decisions that people make every day about which foods to eat or to avoid
164 and how people manage their bodyweight. The exclusion criteria were also clearly
165 communicated. Participants were excluded from taking part if they were under 18 years old,
166 pregnant or breastfeeding, taking medications or diagnosed with a condition that could affect
167 appetite, a historical or a current diagnosis of an eating disorder, or low proficiency in
168 English. Participants received £5 reimbursement for taking part in the study. The study was
169 approved by the Department of Psychology Research Ethics Committee.

170

171 *Qualitative focus group discussions*

172 The focus groups lasted around 60 minutes. The discussions explored if, why and how the
173 participants limit their intake of indulgent foods and drinks following a semi-structured
174 interview guide (Table 1). The lead researcher conducted each focus group to ensure
175 consistency. The discussions were audio-recorded and transcribed verbatim.

176 Table 1. Questions used to guide the focus group discussion.

Focus group question

Why did you volunteer to take part in this focus group?

What kinds of foods do you limit your intake of?

What rules do you set yourself for limiting foods?

When and how do you allow yourself to have these foods?

Why do you limit these foods?

How successful are you at limiting certain foods?

What does indulgence mean for you? Especially regarding
foods.

177

178 *Procedure*

179 Once participants had provided informed consent and demographic information, such as age,
180 gender, profession, living condition and dieting history were collected and confidentiality
181 assured. Following this, information about the aim of the study was given: we were interested
182 in the different approaches people take to manage what and how much they eat to keep a
183 stable weight. After the discussion, participants could ask questions and were debriefed.

184

185 *Analysis plan*

186 All of the information was anonymised and participants were assigned random numbers to
187 protect their identity. Transcripts of the focus groups were analysed using NVivo 10 (QSR
188 International) following Braun und Clarke's (2006) guidelines for an inductive thematic
189 analysis. A thematic analysis was chosen because it is a flexible tool to gain deep insight into
190 the data (Braun & Clarke, 2006). After repeated reading of the transcripts, the data was coded
191 and themes, sub- and sub-sub-themes were identified based on the coding by two independent
192 researchers (see also Table 3). The themes were reviewed against the original transcript. To
193 support our statements in the results section of this article, representative quotes were
194 obtained. If the researchers had a difference in opinion regarding a (sub)theme, the exact

195 definition of this (sub)theme was discussed and whether it should be merged, split or needed a
196 more precise name was considered.

197 We note that, prior to conducting the study, the authors had a general awareness of
198 Appelhans, et al. (2016) work, however, this study was not specifically designed around this
199 model. Considering this, thematic analysis remained the most appropriate approach. Our
200 findings based on the thematic analysis were compared and contrasted explicitly with the
201 Appelhans et al. model only after the analyses were complete.

202

203 *Results*

204 *Participants*

205 The participant age range was from 22 to 61 years old and they were generally lean ($M_{\text{BMI}} =$
206 23kg/m^2 , $SD_{\text{BMI}} = 3.24$) and active ($M_{\text{NrExercise}} = 4/\text{week}$). 17 of the participants were male and
207 8 were female. Most of the participants had never dieted ($n = 17$), five were current dieters
208 and three had dieted in the past. Most of the participants lived alone ($n = 8$) or with a partner
209 ($n = 8$), some lived in a shared flat ($n = 7$) and two participants lived with their families. All
210 baseline characteristics can be found in Table 2.

211 Table 2. Sample characteristics of all participants ($N = 25$).

Measurements	
Age (years)	37 (11.5)
Height (m)	1.73 (0.1)
Current weight (kg)	70.1 (13.5)
BMI (kg/m^2)	23 (3)
Difference between highest and current weight (kg)	5.28 (4.6)
No. of exercise occasions per week	4 (2)
Weight status	
Healthy weight range	21
Overweight	1
Obese	2
Unknown	1

212 For all measures the mean (SD) is reported except for weight status for which the number of participants is displayed.

213 *Qualitative focus group discussion*

214 Four major themes were identified: use of exercise, manipulation of the availability of
 215 tempting foods, implementation of cognitive strategies and the strategic formation of meals.
 216 Additionally, sub-themes and further sub-sub-themes were identified (see Table 3 and
 217 Appendix 1). These themes are discussed and illustrated with the inclusion of participants’
 218 quotes below.

219 Table 3. Identified strategies to reduce intake of tempting food.

Themes	Sub-themes	Sub-sub-themes
Availability	Accessibility	Avoiding places where there will be temptation
		Making access to tempting foods and drinks harder
	Shopping	Not having tempting foods and drinks around
		Choose a supermarket with limited choices
		Online Shopping
		Being more attentive at shopping
		Planning shopping/making lists
		Buying expensive foods
		Buying in smaller amounts
		Shopping for a longer period of time
Exercise		
Cognitive Strategies	Establishing rules	
	Finding distractions	
	Reflecting on usefulness/wanting	
	Changing mind-set	
	Implementing a flexible approach	
	Postponing indulgence	
Meal Formation	Food choice	Substituting
		Supplementation with low caloric choices

	Implementing variations in diet
	Choosing food according to time
	Listening to your body
Eating routine	Serving smaller portions
	Taking time
	Having a set meal frequency
	Having set eating times
	Implementing meal termination behaviour
Planning meals in advance	
Home cooking	
Diet	Using a commercial diet
	Fasting
	Using apps
	Being vegetarian/vegan

220

221 **Availability**

222 Participants described finding the resistance of temptation difficult when food or drinks are
 223 available in the immediate environment. A common example is when colleagues bring
 224 cookies or cakes into work. To avoid this temptation, participants identified techniques such
 225 as reducing the availability of these snacks and beverages by making it more difficult to
 226 access them or by not buying them. Such techniques are discussed below under the headings
 227 of accessibility and shopping respectively.

228 *Accessibility*

229 Some of the participants mentioned that they avoid places that are very likely to have
 230 temptations around for example, the kitchen or the staff room.

231 020: On a day that I have lower calories, I tend to eat as soon as I get [home] from
 232 work. [...] But the rest of my family will sometimes eat, but I would stay away from the
 233 kitchen. (FG3)

234 Another approach is to make access to tempting foods or drinks harder, for example, by
 235 putting the tempting food or drink at the back of a shelf. As a result, it requires more effort to
 236 obtain the food and participants are less likely to consume it.

237 019: I try not to have anything very accessfull [*sic*], you know, to be able to access very
238 easily. So I have everything in my cupboards, sealed as well, [...] So it takes some time
239 to open it [...] So, sometimes the whole procedure to open this stops me from actually
240 wanting [?]. (FG3)

241 A stricter strategy is to not have desired foods or drinks in the house or office, for example, by
242 giving items away as presents or by not buying them in the first place (see also the strategies
243 around shopping described below). As they are not confronted with temptation, participants'
244 report experiencing fewer cravings for these foods or drinks.

245 007: I get chocolate at Christmas and I give it away as New Year presents.

246 001: I had done that by myself. Yea, that's a good one. (FG1)

247 *Shopping*

248 Another sub-theme that was identified as a way to manage consumption of calorie-dense
249 foods and drinks was a strategy to *not* buy products and therefore they would be absent from
250 the home or workplace (see also the section above). However, these approaches only work if
251 participants do not then go to a vending machine or supermarket to buy a snack or sweetened
252 beverage when they feel a craving for it.

253 001: So the big thing for me is just to avoid the temptation to buy stuff when I am at
254 shopping, that means, I don't have it in the house. 'Cause inevitably if I do have things
255 in the house, sooner or later I am going to eat them. (FG1)

256 The choice of supermarket also has an influence. By going to a supermarket with a limited
257 choice of products or by shopping online, it decreases the number of unhealthy choices
258 available, according to the participants. In particular, buying groceries online reduces the
259 opportunity to browse and therefore to get tempted.

260 018: I do a lot online shopping, so ... That's how I avoid it [...] but if I bought it in the
261 shop, then I will put in a lot of stuff I didn't plan to buy, so... (FG3)

262 Similarly, writing a shopping list and planning a trip to the supermarket as well as being
263 attentive while shopping helped participants to make healthier choices. The list and
264 attentiveness keep them focused on buying only the products which are needed.

265 006: I go in [a supermarket] knowing what I want with a set list
266 and that's what I'm getting, that's what I'm coming out with. You know, I won't go
267 down the aisle and like 'Oh, I've that, that and that.' (FG1)

268 A few individuals mentioned deliberately buying more expensive products. This strategy
269 helped them to eat or drink smaller portions. They reasoned that the higher value of the
270 products resulted in them wanting to enjoy them for longer. This was in addition to their
271 awareness of product price.

272 002: I also, just realising now, [...] I buy very expensive foods, I buy all organic. Costs
273 quite a lot, so I can only [buy] bits of it. And then, there is something that comes from
274 long way back, [...] about being careful with your money. Which means then, I would
275 limit, I would only have one piece of bread a day, because it is very expensive. (FG1)

276 Another approach was to buy fewer high-caloric products. The following participant said they
277 use a basket to limit the number of products they buy.

278 006: Ehm, the best against desire was 'I always use a basket'. (FG1)

279 Many of the participants only go shopping once a week. This approach can have advantages
280 as well as disadvantages. The products purchased on this shopping occasion then dictate the
281 kinds of foods and beverages that are available at home for the rest of the week. If healthy
282 foods are bought, then healthy meals and snacks can be prepared and with the help of this
283 strategy participants reduced their intake of tempting products over the course of the week.

284 014: Ehm, but again going back to the weekly shop, you know, just do it sensibly and
285 that's probably the way I would stop or change. (FG2)

286 However, if unhealthy products were bought, participants would have unhealthy choices for
287 the whole week.

288 017: Yea, I mean, you can plan for [the whole week]. It is just, that if it [...] happens
289 that you were hang-over and not paying attention when you are shopping, then you buy
290 something slightly less healthy than usual and you have a week when you're not eating
291 quite as well and once you have started, you just don't stop for the entire week. So, it's
292 got drawbacks, but it's a method I try to implement. (FG3)

293

294 **Exercise**

295 Participants mentioned three different reasons for why they find exercise helpful: they can
296 reward themselves afterwards with food or 'burn off' calories with the help of exercise, after
297 exercising they feel less hungry and/or less tempted to eat high-caloric food, unhealthy foods

298 and drinks are counter-productive to the health goals participants want to achieve with the
299 help of exercise.

300 People think they can consume high-caloric products after exercising, because they burn
301 off the calories during training. Other participants saw it the other way around, they went to
302 the gym to burn off the food that they had already consumed.

303 004: ...when I went to the gym and worked really hard, then perhaps I reward myself
304 with something. (FG1)

305 009: Yea, that's my strategy. Eat as much chocolate as I like and go to the gym
306 afterwards. (FG2)

307 Some participants experienced reduced hunger and/or were less tempted by high-caloric food
308 after they exercised. On the other hand, some participants felt hungrier after physical activity
309 due to the energy that they had used.

310 009: On a day where I exercise, I tend to be less tempted by foods than on a day when I
311 don't exercise. (FG2)

312 025: I don't even know if I'm healthier when I'm exercising, 'cause I found I eat so
313 much more. Like I really noticed that I'm much more hungry. (FG4)

314 Along with physiological reasons, participants mentioned a more goal directed reason for
315 reducing their intake of unhealthy products - they exercise to keep healthy and fit, and
316 consuming unhealthy products would be counter-productive for those goals.

317 009: 'Cause one strategy I tend to use sometimes, is: I say to myself 'Well, you know,
318 you've been to the gym and worked your ass off basically. Why do you wanna self-
319 sabotage almost by, you know, indulge in biscuits and cakes and chocolate and things?'
320 It's a bit counter-productive. (FG2)

321

322 **Cognitive Strategies**

323 Six different cognitive approaches were mentioned: Establishing rules, finding a distraction,
324 reflecting on usefulness/wanting, changing mind-set, implementing a flexible approach and
325 postponing indulgence.

326 *Establishing rules*

327 Using rules to reduce intake is a very broad and flexible strategy and can therefore be adapted
328 to specific situations and goals. These rules can be strict and long term (such as not eating
329 meat anymore) or more flexible and short term (eating only one piece of chocolate in a
330 particular week).

331 002: I set myself rules, like if I had something one day, you know, it could be any sort
332 of rule, and then they may change every time. (FG1)

333

334 *Finding a distraction*

335 Distraction during a meal can lead to increased food intake (van Dillen & Andrade, 2016);
336 however, distraction is also seen as a way to prevent snacking. By engaging in another
337 activity such as exercise, thoughts about a temptation are interrupted and this can help with
338 forgetting about them.

339 011: it's very hard for me not to have [the temptation]. So I need to think of something
340 else, that could be like sport or like DVD or something. So if I don't think about it
341 anymore, I'm able to stop. (FG2)

342

343 *Reflecting on usefulness or wanting*

344 Once confronted with tempting foods or drinks, some participants reflected on the usefulness,
345 need or wanting associated with that food or drink. This reflection helped them to focus on
346 their goals and to assess their satiety-status which, in turn, made it easier for them to resist
347 consuming indulgent foods and drinks.

348 019: I always trying to think if it's, [...] from the practical point of view... if it's useful
349 what I'm gonna eat. [...] it helps me to think so "is this useful for my body or it's not. Is
350 it gonna offer me something good"... [...] So, sometimes it does [...] help me avoid
351 some stuff that [...] are not very healthy. Yea... (FG3)

352 *Changing your mind-set*

353 The mind-set that an individual has towards eating is an important influence on consumption
354 (Hege, et al., 2018). Some participants found it helpful to regard indulgent foods or drinks as
355 a treat or as a necessity ("fuel"). The view was that if indulgent products are seen as a treat or
356 reward, they are something special and therefore consumed rarely. Whereas, if food is seen as

357 a necessity or “fuel”, eating is not associated with pleasure and therefore cravings are
358 reduced.

359 Mind-set was also influenced by the negative consequences of overindulging (e.g. an
360 increased weight), which can motivate individuals to eat less energy-dense food.

361 013: before I noticed any difference, I ate whatever [...] I could and I wouldn't even
362 think about it. But as soon as I saw physical effect to eating certain food types, [...]...
363 so, that was the motivating for me to think ‘Oh, maybe I shouldn't do that.’ (FG2)

364 On the other hand, success (e.g., weight-loss) could be an incentive to continue with an
365 implemented strategy.

366 014: [...] whereas now with the [named diet plan], I don't have to do it. So it's more
367 difficult. But I think, once I start testing myself... maybe every week or every fortnight,
368 it'll give me the incentive then to perhaps do more... trying to get myself a bit more
369 balanced with the [named diet plan]. (FG2)

370 *Implementing a flexible approach*

371 The participants commented that a very strict approach to *not* consuming tempting products
372 did not always result in abstinence. Rather, it leads to increased craving and disinhibited
373 eating. Therefore participants described allowing themselves indulgent food and drinks, but
374 restricting the quantity and frequency of consumption. In cases where they could not resist the
375 temptation and indulged, they described how they tried to be compassionate to themselves
376 and accept the indulgence. This approach helped them to limit their intake in the future and
377 not give up on their goals.

378 021: [...] you know, eh, I tried to restrict myself on certain types of food. And what
379 happened is, there was a rebound, eh, craving for that food; say like sugar, crème. And
380 then whatever diet I used to do for a week or for a month, it used to get neutralised by
381 one day tasks. So, there I decided [...] [the] best [...] trick is to restrict the quantity.
382 (FG4)

383 *Postponing indulgence*

384 Another strategy mentioned was the postponement of indulgence. If a tempting food is
385 present, postponing consumption to a specific time-point in the future, such as the evening of
386 the same day or an unspecified ‘later’ time, helped to reduce temptation. A more general
387 approach is to set a certain time in the day or week at which indulgence is allowed. The

388 knowledge of the planned future indulgence can decrease cravings and increases one's ability
389 to say 'no' to unexpected opportunities to consume tempting products.

390 022: Yea, for me [indulgence is] also related to relaxing, in a sense. [...] after work or
391 Friday or so, I like to finish the week with going out and having dinner. Not at home,
392 just to break the routine. But then I like to have a beer in the pub. [...] but then you also
393 eat a burger or something similar. And eh, one strategy is... well it imposed by my
394 girlfriend and I do agree on that. Well let's not ever [go out] on a Wednesday or
395 Thursday, but wait until Friday or so. (FG4)

396

397 **Meal Formation**

398 A number of factors were identified which influence meal formation and the quality of eating
399 occasions. Based on the discussions with the participants, five themes could be identified:
400 food choice, eating routine, planning meals in advance, meal preparation and following a diet.

401 *Food choice*

402 An important factor is the choice of foods and how to change these choices to healthier ones.
403 One way is not to give up snacks completely, as many people find this very difficult, but to
404 replace unhealthy snacks with healthier choices like fruits.

405 001: because I try to replace, [...] chocolate or biscuits, unhealthy stuff with snack food
406 that would be more healthy [*sic*] like oranges or apples or nuts would be a good
407 example. (FG1)

408 These alternatives seemed to satisfy their desire for a snack. One participant mentioned
409 drinking tea instead of snacking. Other participants described drinking water first if they feel
410 hungry, which successfully keeps them full for a period of time.

411 Similarly, a smaller portion of a high energy-density dish can be supplemented with
412 lower energy-dense foods. This allows people to enjoy their desired food but also to restrict
413 the amount of it. However, they can eat a larger amount of the lower calorie food and
414 therefore do not feel hungry. One of the interviewees found that an additional advantage is the
415 knowledge that you can eat as much as you want of the low-caloric dish.

416 019: I eat something [...] substantial, so I would have some meat or some fish or
417 something [...] But then I eat a bucket of salad that actually helps, because it fills you

418 up and [...] you're not hungry anymore, yea... [...] Ah, it helps so much. Because [...]
419 you're allowed to eat as much as you want with the salad. (FG3)

420 Trying new dishes and products can start a reflective process about the healthiness and
421 wanting of this dish. Additionally, it increases variation in the diet. Enjoying food variety and
422 trying new dishes can be helpful in continuing a healthy lifestyle.

423 006: and then just for, [...] pretty much every day I am eating more, a lot more fruits
424 and vegs than I was. And I am enjoying it; making new dishes, trying out different
425 things. Because I am so much enjoying it, it's easier to carry on with that. (FG1)

426 A common strategy is to base the choice of foods or eating time on other factors like the time
427 of day or exercise. This can be achieved by following a specific diet which is based on the
428 time of day, not eating treats after a certain time or consuming high-caloric foods after
429 exercising.

430 021: Like, eh, I don't eat that stuff, whether chocolates, fried stuff, sugar stuff, oily...
431 [...] not after 6 pm. [...] I make sure that I eat my dinner before 7 o'clock or 8 o'clock.
432 (FG4)

433 Another technique that was mentioned was listening to one's body. Participants reported
434 stopping consumption of a meal when they no longer felt hungry or felt full, instead of eating
435 until the plate was empty or they did not feel well.

436 012: I agree with the volume comment. I usually just tend to eat until I'm just not
437 hungry, as supposed to being not full. But, to indulge myself I binge eat until I'm really
438 full. Usually if I go out and eat I do that. (FG2)

439 *Eating routine*

440 Daily eating routines were identified as an important way to control intake of indulgent
441 products.

442 Consistent reductions in the portion size of indulgent foods and drinks were identified
443 as a way to decrease intake. Participants could therefore enjoy these tempting products but
444 consume a smaller quantity. One participant mentioned that cutting down on their intake of
445 sweetened beverages in a step by step approach was useful. Each week he drank less per day
446 and he drew a line on the bottle to indicate how much he was allowed to consume on that day.
447 Another participant also described an eating routine around consuming smaller portions of
448 bread:

449 019: [I] try to avoid bread, at all costs. Because I was kind of addictive to it. So now I
450 just have a small slice of brown bread in the morning with my breakfast and then that's
451 it for the rest of the day. (FG3)

452 However, other participants could not follow this strategy because they felt too hungry after a
453 short period of time and got distracted by that hunger.

454 016: even when I try to limit how much I eat and [...] have, let's say, half of the usual
455 go-for. Then I will feel hungry again, you know, twice as fast as the normal period. And
456 then [...] I cannot really think properly, [...]. And when I'm hungry again, I just can't
457 think at all... (FG3)

458 Another strategy reported was taking more time over a meal. Eating more slowly, chewing the
459 food more or taking a short break before taking another portion were reported as useful for
460 giving the digestive system time to signal fullness. Therefore a smaller serving is consumed.

461 011: [...] I mean, I like to eat a lot and if I cook something delicious for example, [...] –
462 I try to eat like, eh, more slowly, so I chew a lot more. [...] ‘ ‘cause I think that the
463 feeling of being filled up takes a while to derive, so I think if you eat slow-more
464 slowly... it's not what I do often, actually, but sometimes I try to do it. So, and I found
465 that it helps me a lot, yea. To eat less. (FG2)

466 Participants found it helpful to consistently consume meals frequently over time. However,
467 there was variation in meal frequency routines with different outcomes on eating behaviour.
468 While some of the participants preferred to have fewer, larger meals, others favoured more
469 frequent but smaller meals. Individuals having fewer, larger meals reported feeling like
470 snacking less between meals. On the other hand, individuals with more frequent meals did not
471 mind eating more often because every portion is small.

472 006: In the same manner, I sort of force myself to make sure I actually have proper
473 meals instead of snacking here and there, because you grab what is quick and easy
474 instead of having proper set dinner. (FG1)

475 021: I have read a lot of articles that, [...] if you want to maintain your weight, [...] you
476 should eat frequent meals...frequent small meals. It boost your metabolism or even it is
477 better for our digestion system also. So that is the trick. I don't mind getting hungry
478 after two hours, rather than dumping myself at one time. Because [...] I feel sleepy or I
479 don't feel energetic then. So, that's the trick I do. (FG4)

480 In addition to frequency, having a set time for meals was important for some participants.
481 Knowing the time of the next meal helped them to reduce snacking. However, keeping to very
482 strict times is not always possible considering work.

483 017: I try to eat at very regular hours. [...] the time perspective of it is how I think I
484 manage or to make most of it. Because I know it's then and it's not any other time. It's
485 really help me reduce, eh, sort of snacking. [?] It really helps me [...] the notion that
486 you eat now and you don't eat any other time. (FG3)

487 Creating a habit of ending the meal in a certain way was perceived as helpful. It signals that
488 the meal is finished and that there is no need for food in the near future. For example, for one
489 of the interviewees the "food day" ends with cleaning the kitchen and they can move on to
490 other things. Another participant rounds off the meal with a tea.

491 019: And tea, actually. I found that it helps. [...] especially after lunch, I really want
492 something sweet just as a dessert. But with a cup of tea actually helps me to calm down
493 the feeling. [...] usually because I'm in front of my computer and eh, usually it's really
494 nice to have something to snack on. Actually tea helps a lot, just to have something to
495 drink... kind of.

496 020: That's probably ritual, perhaps, you know...to finish off.

497 019: Yea, I've really need to finish off my lunch with something else, so, yea.

498 017: The body understands: now you can't eat anymore. You've had your tea

499 019: And actually, yea, it makes you full, if you drink something afterwards, [...]. So
500 you don't want anything else, you know. (FG3)

501 However, a third participant associates tea with biscuits. Therefore having tea as a signal for
502 the end of eating would be the wrong choice. So people have to be careful what habits they
503 create.

504 018: If I have a cup of tea though, I also want a biscuit with it. (FG3)

505 *Planning meals in advance*

506 A common approach was to plan meals ahead of time for the whole day, the next few days or
507 for the whole week. It was felt that the knowledge of meal times and composition helped to
508 reduce snacking between meals.

509 003: It's good to actually plan your meals ahead, [...] what am I going to eat that day.
510 And [...] during that period when you are trying to stop, [...] I know, [what] I am going

511 to eating and when. And I know I just have to last until that time. I find that works.
512 (FG3)

513 Alongside main meals, snacks can also be planned in advance. Since healthy snacks are often
514 hard to access in work and university environments, participants brought their own snacks to
515 the office such as fruits or nuts.

516 022: Sometimes it is also a bit of organisation. Once I know that if I'm here until late
517 [...] then at seven or so I get really hungry. And eh, sometimes I think about it earlier,
518 the day before, in the morning I take a banana or so. Because otherwise, [...] you get
519 some-some chocolate, just... to get enough sugar. So... sometimes it helps a bit to plan.
520 (FG4)

521 *Home cooking*

522 Being able to cook and enjoy cooking was perceived as being advantageous. Meals that are
523 cooked at home and brought to work facilitated healthier choices as participants were not
524 reliant on supermarkets, cafes or cafeterias close to the workplace.

525 015: which helped me a lot was a learning to cook. [...] And as soon as I started
526 cooking, you don't buy processed food anymore. (FG2)

527 One interviewee described taking his prepared meals to a friend's BBQ, if he had left-overs
528 from previous dishes. This strategy prevented him from eating the higher caloric choices at
529 the BBQ.

530 Additionally, cooking dishes a few days or a whole week in advance was perceived as being
531 helpful as it reduced the time spent cooking in the week and meals are quickly and easily
532 prepared. In addition, the influence of factors like tiredness on the choice of food was reduced
533 due to ease of preparation.

534 023: Yea, I try to cook, ehm,... for instance if I have chicken breast, I tend to cook all
535 the things I have and make portions for the week. So, that way I know that I can bring
536 stuff, healthy things. And I don't worry for cooking more things. Just maybe a salad that
537 is quick. (FG4)

538 However, the disadvantage is that it is hard to catch up with cooking if the usual time for
539 cooking is missed, e.g. by meeting friends, going on a trip.

540 019: One thing with planning though is that if you actually miss-[...] for me it's every
541 Sunday or Saturday, I have time, so I cook for the next week. But if I miss that, go on a
542 trip or anything, then that's quite hard during the week to cook... (FG3)

543 *Diets*

544 Another approach was changing the diet with the help of commercial diets or apps. However,
545 in the questionnaire distributed after the focus groups, only 8 of the 25 participants indicated
546 that they had ever dieted.

547 All commercial diets were perceived as helpful and could be continued over a longer
548 period of time (except one of the diets which was started only a few weeks before the
549 discussion).

550 020: I am on a [named diet plan] at the moment. [...] for two days a week I eat only
551 500 cal. [...] I would indulge myself and then it's two days. That's quite nice. It's
552 only any other days, I don't have to worry. Really, it's on two days discipline [...] because
553 sometimes I do get hungry on the 500 calorie days, I have to manage two days
554 well. And here it's small lunch and then at least something for dinner. Usually in the
555 evening I think "Ah, I miss food". Not really hungry, really miss food. I think it's
556 more emotional, me feeling sorry for myself. [...] But the next day, it's part of the sort
557 of feast-fasting thing, the next day your hunger switches low. I wake up the next
558 morning not hungry. That's quite interesting. To see, to-to see I can do it. Eh, but also
559 I don't need the whole world. (FG3)

560 Fasting was not only mentioned as part of a commercial diet, but also independently on single
561 occasions within a week.

562 002: And the other thing I do, [...], that I fast once a week and that then helps me to
563 reregulate my foods. And get in touch with it. (FG1)

564 Some participants reported using mobile devices to support weight loss, healthy eating and
565 physical activity.

566 004: I haven't actually done it strictly, but I started using [named fitness app] now and
567 then I have started to log my foods and I think I feel a lot better since doing that.
568 (FG1)

569 Lastly, following a vegetarian, vegan or pescetarian diet was perceived as helpful for
570 facilitating healthy eating.

571 008: But putting less on my plate and eating less meat. Makes for me a massive
572 difference. (FG2)

573

574 **Phase 2: Quantitative Follow-up**

575 *Methods*

576 *Personality trait measures*

577 Following Oldham-Cooper, Wilkinson, Hardman, Rogers, and Brunstrom (2017), we
578 characterised our sample in terms of dietary traits by asking participants to complete the short
579 Three Factor Eating Questionnaire (TFEQ-18R: Karlsson, Persson, Sjostrom, & Sullivan,
580 2000) which includes subscales concerned with dietary restraint, uncontrolled eating and
581 emotional eating. In addition, given that the study is concerned with the management of
582 temptation, we also included a measure of impulsivity (the Barratt Impusiveness Scale (BIS-
583 11); Patton, Stanford, & Barratt, 1995), which has been shown to moderate the relationship
584 between food reward responsivity and BMI (Price, Higgs, & Lee, 2015). Including these
585 measurements made it possible to compare our population to the samples of previous studies
586 in the literature. Additionally, these data on the characteristics of our sample have potential to
587 contextualise the strategies mentioned, for example, if the overall sample is particularly high
588 in cognitive restraint they might discuss many highly restrained strategies.

589 More detailed information about the questionnaires can be found in Appendix 2.

590

591 *Measures of 'frequency' and 'effectiveness' of the strategies*

592 The themes, sub-themes and sub-sub-themes identified in the analysis of the transcripts in the
593 qualitative phase of the study were used to design a quantitative questionnaire for follow up.
594 For every sub-theme or sub-sub-theme, which relates to a strategy to manage the intake of
595 tempting foods and drinks (e.g. serving smaller portions), participants were asked how often
596 they use this strategy (e.g. How often do you consume smaller portions, for example, just one
597 piece of chocolate, less sugar in your tea, a smaller piece of meat?). Some (sub-)sub-themes
598 contained very similar strategies to each other. To avoid ambiguity in these cases, there was a
599 different question for every strategy, for example, for the sub-sub-theme “Having a set meal
600 frequency”, we split it up into two questions: “How often do you eat proper meals to reduce
601 snacking behaviour?” and “How often do you have small, but more frequent meals in order to

602 reduce intake?”. This variable was called ‘Frequency’ and was measured on a 5-point Likert-
603 scale ranging from ‘Never’ to ‘Always’. If anything other than ‘Never’ was selected in the
604 above questions, they were then asked how effective they thought this strategy was in
605 reducing their intake of tempting foods or drinks. Responses were provided on a 100mm VAS
606 scale anchored with ‘Not at all’ to the left and ‘Extremely’ to the right. Examples of questions
607 include “How effective is distraction in limiting your intake of tempting food/drinks?” or
608 “How effective is buying smaller/reasonable amounts in limiting your intake of tempting
609 food/drinks?”. This variable was labelled ‘Effectiveness’.

610 92% (23 out of 25) of the focus group participants took part in this follow-up questionnaire.
611 Due to technical issues, four participants had to do the questionnaire a second time. Only the
612 answers entered last and were complete were considered for analysis.

613

614 *Procedure*

615 At least five working days after the focus group, participants received emails containing a
616 hyperlink to an online questionnaire. Following an information and informed consent screen,
617 basic information about height, weight, the highest weight since reaching their current height
618 and how often participants exercise for more than 30 min per week was collected. Then the
619 impulsivity questionnaire (BIS-11; Patton, et al., 1995) and the short version of the Three
620 Factor Eating Questionnaire (TFEQ-18R; Karlsson, et al., 2000) were completed. Following
621 this, participants answered questions about the frequency and perceived efficacy of strategies.
622 Finally, debriefing information was provided including the aim of the study and the possible
623 future application of the results. The questionnaire was hosted by Qualtrics (Provo, Utah,
624 USA).

625

626 *Analysis plan*

627 All quantitative analyses were conducted using SPSS v22 software (IBM, New York, USA).

628 ‘Frequency’ was coded such that ‘Never’ equals 0 to ‘Always’ equals 4. Then the
629 strategies were grouped based on sub-themes and the mean ‘frequency’ and the mean
630 ‘effectiveness’ for each of these was calculated. These sub-themes were ranked based on their
631 mean value from most used or most effective to the least used or least effective. Current and
632 highest weight of one participant was not provided and therefore their BMI could not be
633 calculated. These data were excluded from the analyses.

634 *Results*

635 *Personality trait measures*

636 TFEQ and BIS-11 scores were collected to characterise our sample. TFEQ and BIS-11 scores
637 were comparable to samples within the literature; the means were around the middle of the
638 scales except for the emotional eating mean score (TFEQ) which was relatively low in the
639 present sample (Price, et al., 2015) (Table 4).

640 Table 4. Baseline scores in the TFEQ and BIS-11 subscales.

Personality traits	Mean	SD
TFEQ-Cognitive Restraint score	57.2	14.3
TFEQ-Uncontrolled Eating score	50.6	12.4
TFEQ-Emotional Eating score	46.3	17.9
BIS11-Attentional Impulsiveness	16.2	2.7
BIS11-Motor Impulsiveness	21.8	3.6
BIS11-Nonplanning Impulsiveness	23.3	3.3

641

642 *Frequency and perceived efficacy*

643 Results showed that the strategies which involve home cooking and planning ahead are the
644 most frequently used and were also perceived as the most effective (Table 5). In contrast, the
645 frequency of use for diets (commercial diets, fasting and mobile apps) was low with a mean
646 of less than one and ranked at position 11 out of 14 with a mean of 56.88 (SD = 22.29)
647 measured on VAS scale from 0-100. Generally, the difference in absolute means between
648 each rank is small both in frequency of usage and perceived effectiveness of each sub-theme.
649 An exception is the perceived effectiveness of ‘exercise’ which has a mean that is less than
650 half of the strategy ranked directly above, which is ‘postponing of indulgences’ (M=22.09 and
651 M=53.14, respectively). Only the first five sub-themes are used at least ‘sometimes’ (on
652 average), the other nine sub-themes are only used ‘rarely’ or ‘never’. All sub-themes – except
653 ‘exercise’ – are perceived to be 50-75% effective.

654 A more detailed ranking of sub-sub-theme strategies can be found in Appendix 3 and
655 Appendix 4.

656

657 Table 5. Ranking of the sub-themes according to their mean frequency (on a 5-point Likert scale from 0-4) and
 658 mean effectiveness (on a 100mm VAS scale).

Sub-themes	Themes	Frequency of use			Perceived effectiveness		
		Rank	Mean	SD	Rank	Mean	SD
Home cooking	Meal Formation	1	2.78	1.00	2	72.3	20.82
Planning meals in advance	Meal Formation	2	2.36	1.06	1	73.07	17.86
Implementing a flexible approach	Cognitive Strategies	3	2.26	0.92	7	62.00	21.94
Food choice	Meal Formation	4.5	2.04	0.53	8	61.49	9.72
Eating routine	Meal Formation	4.5	2.04	0.64	9	61.03	12.96
Changing mind-set	Cognitive Strategies	6	1.85	0.42	12	55.21	16.65
Exercise	Exercise	7	1.74	0.58	14	22.09	15.81
Postponing of indulgence	Cognitive Strategies	8	1.70	0.82	13	53.14	21.41
Reflecting on usefulness/wanting	Cognitive Strategies	9	1.65	1.07	4	67.80	20.14
Shopping	Availability	10	1.64	0.68	5	65.18	20.15
Accessibility	Availability	11	1.60	0.64	3	70.46	16.88
Establishing rules	Cognitive Strategies	12	1.43	1.20	6	64.25	22.51
Finding distraction	Cognitive Strategies	13	1.17	1.23	10	60.21	29.29
Diet	Meal Formation	14	0.93	0.62	11	56.88	22.29

659

660

661 **General discussion**

662 The aim of this study was to understand the everyday strategies used to manage intake of
 663 tempting foods and drinks and how they are implemented, by assessing their frequency of use
 664 and perceived efficacy. Four broad strategy themes were identified; these were the use of
 665 exercise, manipulation of the availability of tempting foods, implementation of cognitive

666 strategies and the strategic formation of meals. Our quantitative measures of the personality
667 characteristics of the sample, which were in the 'middle range' and comparable to previous
668 literature, suggest that these strategies are used by individuals without a particularly strong
669 tendency towards impulsiveness, restraint or uncontrolled eating.

670 Two of the four major themes identified here strongly echoed the themes identified by
671 Allom and Mullan (2014) and Falk, et al. (2001) in their qualitative studies investigating
672 strategies to maintain healthy eating. The first of these themes concerned avoiding temptation
673 altogether by avoiding certain locations and ensuring that certain foods are not 'around'. The
674 second concerned 'meal formation' and in particular planning and preparation. Thirdly, whilst
675 cognitive strategies were mentioned to some extent by Allom and Mullan (2014), it was not
676 such an elaborated theme as it was here (further discussion of specific sub-themes below).

677 The fourth theme, exercise, has had little mention in previous studies in the specific
678 context of avoiding tempting foods (see Grieger, et al., 2016), though this is a prominent
679 theme in research concerned with strategies for weight maintenance; e.g., Foright, et al.
680 (2018). In our study, 23 of our 25 participants mentioned feeling less tempted to eat high
681 calorie food following exercise. This strategy was in the top 15 of frequently used strategies,
682 however, it was also the lowest rated in terms of efficacy. One possibility is that these
683 findings reflect a role of engaging in exercise as a motivator for health goals (e.g.,
684 motivational spill-over described by Mata, et al., 2009) whilst also reflecting the increases in
685 appetite, hunger and food intake that are known to accompany increases in physical activity
686 (Beaulieu, Hopkins, Blundell, & Finlayson, 2016; Blundell, Gibbons, Caudwell, Finlayson, &
687 Hopkins, 2015; Foright, et al., 2018).

688 Strategy sub-themes were also identified ($N = 14$). The majority of these sub-themes
689 can be viewed in terms of the neurobehavioral model of intervention strategies for managing
690 temptation in obesity treatment (Appelhans, et al., 2016) and therefore offer support for the
691 applicability of this model. First, considering the 'executive functioning' dimension of the
692 model, the vast majority of the strategies reported here were self-initiated and therefore
693 demand high executive functioning. Considering the reward processing dimension, there were
694 six strategies that seem to be aimed at preventing temptation, these were home cooking,
695 advanced meal planning, eating routine, exercise, shopping and accessibility. There were four
696 strategies that seem to be aimed at resisting temptation which were implementing a flexible
697 approach, food choice (e.g., listening to your body), reflecting on usefulness or wanting and
698 finding a distraction.

699 However, three of our sub-themes seem to reflect both the prevention and resistance of
700 temptation. These were the postponement of indulgence, establishing rules, and diet. For
701 example, postponing indulgence by planning to consume a tempting food or drink at a later
702 time may occur at a time when an individual is not specifically tempted (discussed in
703 Appelhans, et al., as a 'cold state'). This planning behaviour reflects facets of the prevention of
704 temptation. In addition, when an individual is specifically tempted (discussed in Appelhans, et
705 al., as a 'hot state') remembering this plan to indulge later may help to resist temptation in the
706 moment. These kind of dual-purpose plans must be reflected in Appelhans et al's model,
707 perhaps with an addition to the 'reward processing dimension'. Importantly, such approaches
708 may help to bridge the 'cold-hot empathy gap' (where long-term health goals made in a cold
709 state do not account for the short-term hedonistic goals of the hot state; Fisher & Rangel,
710 2014; Loewenstein, 1996).

711 Consistent with our hypothesis, there was variability in the frequency with which
712 strategies were used, with the most used sub-theme ('Home cooking') scoring an average of
713 2.78 (SD = 1.00) on a 5-point Likert scale (0 - 4) and the least used sub-theme ('Diet') scoring
714 an average of 0.93 (SD = 0.62). There was also variability in the perceived efficacy of those
715 strategies, from the top strategy ('Planning meals in advance') mean of 73.07mm (SD =
716 17.86) on a 100mm VAS to the bottom strategy ('Exercise') mean of 22.09mm (SD = 15.81).
717 Notably, the three sub-themes perceived as most efficient are temptation prevention strategies
718 considering Appelhans, et al. (2016) model. These results are supported by Milyavskaya and
719 Inzlicht (2017), who found that goals are reached more easily if temptation is prevented as
720 opposed to resisted.

721 Nevertheless, the congruence of perceived efficacy with *actual* efficacy must be
722 considered. A comparison between our perceived efficacy findings at the sub-sub-theme level
723 and Grieger, et al. (2016) scoping review of the actual efficacy of interventions aimed at
724 reducing intake of discretionary (tempting) foods and beverages (as described in the
725 introduction) allows for such an assessment¹. Two of the strategies mentioned by Grieger, et
726 al. (2016) as effective strategies for reducing energy intake featured in the top ten of our most
727 perceived effective strategies (see Appendix 4); these were substitution for healthier items
728 (ranked 4th; $n = 22$) and portion size restriction (ranked 6th; $n = 18$). Other strategies
729 mentioned by Grieger, et al. (2016) were those that could not be implemented by an
730 individual e.g., reformulation of products.

¹ We recognise that this approach does not allow for an exhaustive assessment of the actual efficacy of every strategy mentioned in this study.

731 More generally, considering that these strategies are those that participants are
732 choosing to engage in frequently and perceive as effective, one possibility is that they are
733 relatively acceptable and likely to facilitate adherence. Future research might test this
734 hypothesis by investigating if these strategies also relate to actual efficacy. Such strategies
735 could be emphasised within programmes or advice aiming to reduce consumption of tempting
736 foods for weight-loss or general healthy eating. Furthermore, what may be of particular
737 interest are those strategies that have been shown to be effective at intervention but that are
738 viewed particularly negatively by participants (i.e., those that are used the least frequently and
739 viewed as the least effective). It may be helpful to consider how to make such strategies more
740 acceptable before basing dietary advice or programmes around them.

741 It is important to consider these findings in the broader context of the healthy eating
742 and weight maintenance literatures of which the management of tempting food intake is only
743 a part. A number of the strategies reported here are also used by individuals to improve their
744 healthy food consumption (as opposed to limiting their tempting food consumption). For
745 example, Crawford, Ball, Mishra, Salmon, and Timperio (2007) conducted a cross-sectional
746 questionnaire study to investigate the relationship between eating behaviours and fruit and
747 vegetable consumption. They found that home cooking, meal planning, trying new dishes,
748 planning shopping and shopping in more expensive supermarkets were associated with a
749 higher consumption of fruit and vegetables.

750 Furthermore, a number of the strategies used to manage temptation that were
751 discussed here also feature in the weight maintenance literature as part of individuals' overall
752 strategy to maintain a healthy weight. For example, Stelmach-Mardas, Mardas, Walkowiak,
753 and Boeing (2014), in a literature review, found that planning meals ahead, allowing
754 occasional indulgences and increased physical activity are associated with successful weight
755 loss maintenance. Moreover, eating regularly at home is associated with less weight gain
756 (Zong, Eisenberg, Hu, & Sun, 2016) and a regular meal pattern is associated with a higher
757 chance of success in weight maintenance (Westenhoefer, von Falck, Stellfeldt, & Fintelmann,
758 2004).

759 A number of limitations of this study must be noted. Firstly, many of our participants
760 reported that they had never dieted to lose weight but were nevertheless lean. On the one-
761 hand, the serendipitous recruitment of this sample provided an opportunity to understand the
762 habits of people who have achieved the health goals that elude many. Notably, participants in
763 our study did not explicitly refer to the use of these strategies to reduce the intake of tempting
764 foods and beverages as 'dieting'. However, participants were able to identify said strategies

765 when asked and seemed to actively and effortfully implement them. This is at odds with
766 Allom and Mullan's (2014) suggestion that for healthy weight individuals, such behaviours
767 may be relatively automatic. However, it is important to acknowledge that the development of
768 individuals' habits may reflect broader natural tendencies and personality traits. This is likely
769 to be of use to understand the strategies that are acceptable to those who are intending to lose
770 weight or those who have already lost weight. A future study might consider using a similar
771 methodology to the present study but with a more targeted sample.

772 Secondly, the results describing the perceived effectiveness of the strategies should
773 not be over-interpreted as they are based on only the participants who reported using that
774 particular strategy and therefore the samples are at times small. Thirdly, in this study self-
775 reported weight and height were used to calculate BMI and could therefore be biased because
776 weight is often under-reported. Fourthly, most participants lived alone or with their partner
777 and only two out of 25 participants lived with their families. Some of the presented strategies
778 might be more difficult to implement when other family members, especially children, with
779 their own needs and wishes have to be taken into account. Finally, as information was
780 considered at a group level, differences in participant characteristics could not be analysed.

781

782 In sum, the current study identified four major strategy themes to manage tempting
783 food and drink consumption; the use of exercise, manipulation of the availability of tempting
784 foods, implementation of cognitive strategies and the strategic formation of meals. These
785 findings support the neurobehavioral model of intervention strategies for managing
786 temptation in obesity treatment (Appelhans, et al., 2016) and offer evidence in support of the
787 extension of the 'reward processing dimension' that features as part of this model. We suggest
788 that this dimension should also account for strategies that have a dual purpose (both
789 temptation prevention and resistance); this possibility may help to close the key issue of the
790 'hot-cold empathy gap'. For the first time, this study showed that participants are using a
791 range of strategies with differential frequency and perceived efficacy. This information is
792 likely to be useful in the context of increasing acceptability and adherence to dietary
793 programmes and advice to improve food choices, support weight loss and weight loss
794 maintenance. There is also the potential for some of these strategies to be used across
795 modalities (i.e., these strategies can be applied to any temptation not just food); specifically,
796 by focusing on strategies that are used frequently and have high perceived efficacy and
797 minimising focus on strategies that are used infrequently and perceived as having little
798 efficacy.

799

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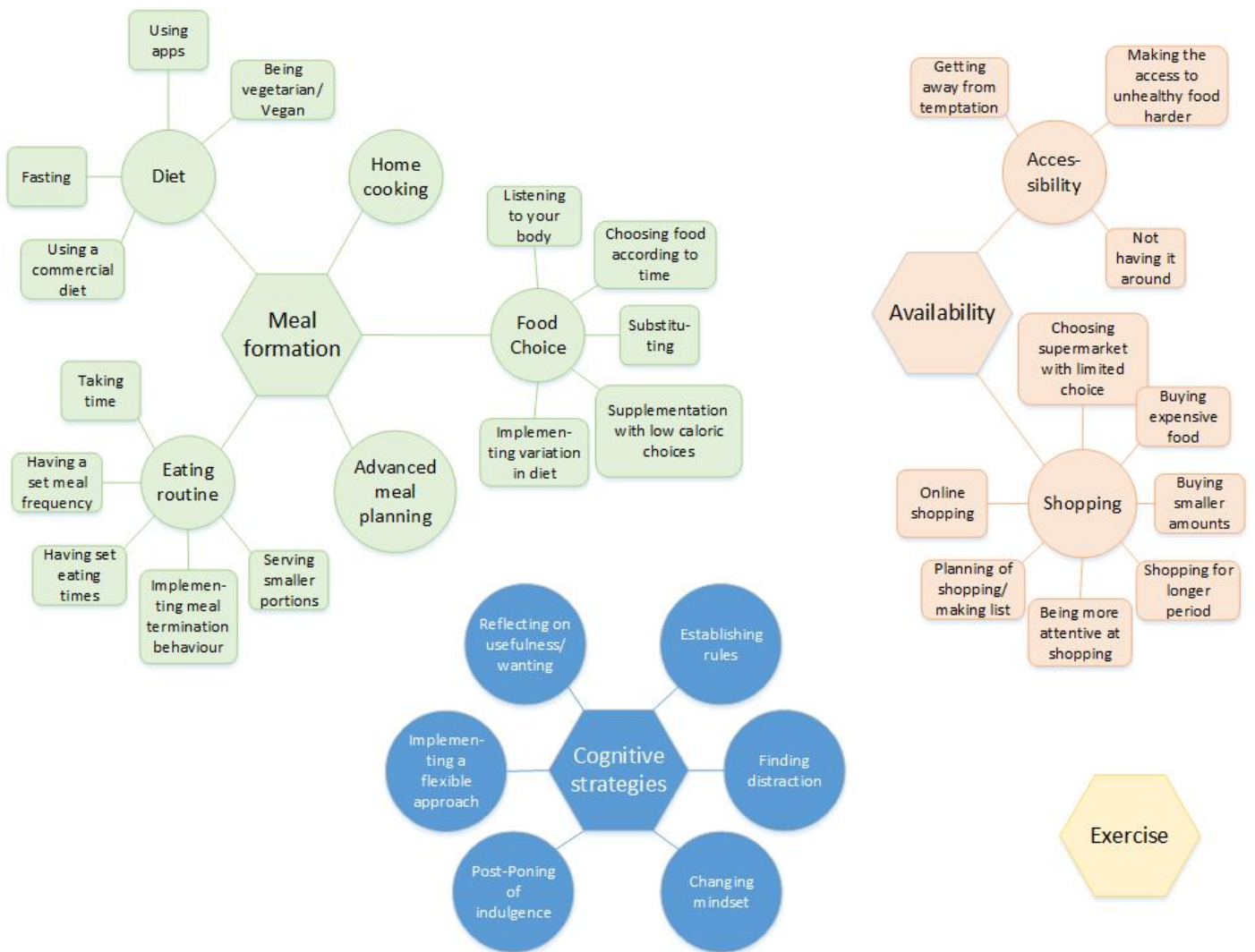
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915

916 **Supplementary data**



917

918 Appendix 1. Identified strategies to reduce intake of tempting food <online only coloured>

919 Appendix 2: Descriptions of the personality trait measures BIS-11 and TFEQ.

920

921 *The Barratt Impulsiveness Scale (BIS-11; Patton, Stanford, & Barratt, 1995)*

922 A common questionnaire to measure impulsivity is the BIS-11. This 39-item questionnaire is
923 comprised of the second order sub-scales Motor Impulsiveness, Attentional Impulsiveness
924 and Nonplanning Impulsiveness. The Motor Impulsiveness sub-scale is a measure for the
925 tendency to act without thinking (e.g. “I act on the spur of the moment”) and has eleven items.
926 Attentional Impulsiveness is defined as the lack of concentration or attention (e.g. “I have
927 ‘racing’ thoughts”) and consists of eight items. The Nonplanning Impulsiveness sub-scale is
928 comprised of eleven items and is defined as an orientation on the present or a lack of “future
929 thinking” (e.g. “I say think without thinking”). A score is obtained by summing up items for
930 each sub-scale and a total score can then be acquired. Higher scores indicate higher
931 impulsiveness. Internal consistency measured by Cronbach’s α for the original BIS-11 scale
932 is .82 (Patton et al., 1995).

933

934 *The Three Factor Eating Questionnaire (TFEQ-18R short version; Karlsson et al.,*
935 *2000)*

936 The TFEQ-18R measures cognitive and behavioural components of eating and has three sub-
937 scales. The cognitive restraint sub-scale is designed to measure the tendency to restrict dietary
938 intake in order to control weight and has six items (e.g. “I deliberately take small helpings as a
939 means of controlling my weight”). The uncontrolled eating sub-scale is designed to measure
940 the extent of control over eating behaviour (e.g. “Sometimes when I start eating I just can't
941 seem to stop”) and has nine items. The emotional eating subscale is designed to measure the
942 tendency to eat in response to negative emotions (e.g. “When I feel blue, I often overeat”) and
943 has three items. The short version was selected as it has been shown to be a valid measure of
944 eating behaviour (Keranen et al., 2009; Keranen, Strengell, Savolainen, & Laitinen, 2011).
945 Scores are calculated for each sub-scale as a proportion of the highest possible value and
946 expressed on a scale of 0-100 and higher scores indicating greater tendencies to restrain, lose
947 control over eating or eat when in a negative mood respectively. Cronbach's α for the original
948 TFEQ-18R Cognitive Restraint scale is .77, Uncontrolled Eating scale .83 and Emotional
949 Eating scale .85 (Karlsson et al., 2000).

Rank	Strategy usage	Mean	SD
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1.5	Being more attentive at shopping	2.87	0.92
1.5	Eating bigger, but fewer meals to avoid snacking	2.87	0.92
3.5	Home cooking	2.78	1.00
3.5	Bringing own food/snacks to uni/work	2.78	1.31
5.0	Listening to your body	2.74	0.75
6.0	Having a mindset of seeing food/drinks as necessity	2.65	0.98
7.0	Having set eating times	2.61	1.08
8.0	Not having tempting foods/drinks around	2.52	0.90
9.0	Substituting with healthier options	2.48	0.85
10.5	Eating vegetarian, vegan, pescetarian or similar	2.43	1.12
10.5	Planning meals in advance	2.43	1.12
12.0	Finding success as incentive to continue	2.30	1.11
13.5	Feeling less hungry or tempted to eat high caloric food after doing exercises	2.26	0.81
13.5	Implementing a flexible approach	2.26	0.92
15.5	Shopping for a longer period of time	2.22	1.28
15.5	Trying different dishes and foods	2.22	0.67
17.0	Implementing variation in diet	2.09	0.90
18.5	Avoiding situations with temptations	2.04	0.98
18.5	Serving smaller portions	2.04	1.33
20.0	Implementing a meal termination behaviour	2.00	1.31
21.0	Cooking in advance	1.87	1.32
22.0	Post-poning of indulgence	1.77	0.81
23.0	Reflecting on usefulness/wanting	1.65	1.07
24.5	Taking time during a meal	1.61	1.03
24.5	Having a certain time for indulgence	1.61	0.99
26.5	Having a mindset of seeing food/drinks as "fuel"	1.48	1.12
26.5	Taking negative feedback as a motivation to change eating behaviour	1.48	1.04
28.5	Supplementation with low caloric choices	1.43	1.16
28.5	Establishing eating rules	1.43	1.20
30.0	Having a mindset for seeing food/drinks as reward/treat	1.35	0.98
31.0	Choosing food according to time	1.26	1.14
32.0	Using exercises to reward yourself afterwards with tempting food or to burn off food	1.22	0.90
33.0	Finding distraction	1.17	1.23

34.0	Doing grocery shopping online	1.13	1.25
35.5	Buying smaller/reasonable amounts	1.09	1.20
35.5	Having small, but more frequent meals in order to reduce intake	1.09	0.85
37.0	Buying expensive food/drinks	0.91	1.08
38.5	Using a commercial diet plan	0.48	1.20
38.5	Fasting	0.48	0.99
40.0	Making the access to unhealthy food harder	0.43	0.73
41.0	Using fitness apps	0.35	0.78

950 Appendix 3. Ranking of the strategies according to their mean frequency on a 5-point Likert scale (0-4).

951

Rank	Strategy effectiveness	N ¹	Mean	SD
1.0	Not having tempting foods/drinks around	22	81.95	12.48
2.0	Bringing own food/snacks to uni/work	21	80.90	14.01
3.0	Being more attentive at shopping	23	80.22	20.52
4.0	Substituting with healthier options	22	79.59	13.02
5.0	Listening to your body	23	72.52	15.18
6.0	Serving smaller portions	18	72.50	16.66
7.0	Eating bigger, but fewer meals to avoid snacking	22	72.41	21.68
8.0	Home cooking	23	72.30	20.82
9.0	Planning meals in advance	21	70.71	26.19
10.0	Cooking in advance	18	70.67	22.24
11.0	Using a commercial diet plan	4	69.75	29.15
12.5	Fasting	5	67.80	18.82
12.5	Reflecting on usefulness/wanting	20	67.80	20.14
14.0	Having set eating times	21	67.05	22.58
15.0	Using fitness apps	5	65.60	21.59
16.0	Shopping for a longer period of time	21	65.19	27.39
17.0	Establishing eating rules	16	64.25	22.51
18.0	Supplementation with low caloric choices	18	63.72	22.96
19.0	Avoiding situations with temptations	21	63.71	23.18
20.0	Finding success as incentive to continue	21	63.67	20.09
21.0	Choosing food according to time	15	62.47	24.20
22.0	Implementing a flexible approach	22	62.00	21.94
23.0	Having a mindset of seeing food/drinks as "fuel"	17	60.82	21.53
24.0	Finding distraction	14	60.21	29.29
25.0	Buying smaller/reasonable amounts	13	59.54	26.92
26.0	Taking time during a meal	20	56.55	25.41
27.0	Having a mindset of seeing food/drinks as necessity	23	56.35	27.95
28.0	Having a certain time for indulgence	20	55.35	22.88
29.0	Using exercises to reward yourself afterwards with tempting food or to burn off food	17	53.88	21.66
30.0	Doing grocery shopping online	13	53.77	31.09
31.0	Post-poning of indulgence	21	52.05	25.95
32.0	Eating vegetarian, vegan, pescetarian or similar	22	51.82	27.92
33.0	Having small, but more frequent meals in order to reduce intake	17	49.88	20.95

34.0	Making the access to unhealthy food harder	7	49.57	19.10
35.0	Taking negative feedback as a motivation to change eating behaviour	18	49.44	25.67
36.0	Implementing variation in diet	22	47.32	22.89
37.0	Implementing a meal termination behaviour	19	47.26	26.13
38.0	Having a mindset for seeing food/drinks as reward/treat	19	44.32	30.99
39.0	Trying different dishes and foods	23	42.78	23.71
40.0	Buying expensive food/drinks	12	41.75	31.63
41.0	Feeling less hungry or tempted to eat high caloric food after doing exercises	23	2.17	10.43

952 ¹ N represents the number of participants which indicated that they used this strategy (either 'Rarely', 'Sometimes', 'Often'
953 or 'Always') and therefore answered the second question about perceived effectiveness of the strategy.

954 Appendix 4. Ranking of the strategies according to their mean effectiveness on a 100mm VAS scale.

955