Eating like family and friends: the role of perceived descriptive and injunctive norms on the frequency of meat and plant-based meal intake in UK-based adults.

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Abstract

People's perceptions of the food intake of people in their social environment have been shown to be associated with their own intake of a variety of foods. However, less is known about whether people's perceptions of the meat and plant-based meal intake and approval of people in their social environment are associated with their own intake. Using a cross-sectional survey design 137 participants (aged 19-66 years, mean age = 39.50, SD = 12.89 years, mean BMI = 25.71, SD = 5.33, 80.3% female, 78.8% omnivores, 21.2% flexitarians) answered questions about how frequently they consumed meat and plant-based meals, and how frequently they perceived people in their social environment to consume (perceived descriptive norms), and approve of consuming (perceived injunctive norms) meat and plant-based meals. The results showed that perceived descriptive norms were positively associated with people's own frequency of meat and plant-based meal intake. In particular, people ate meat more frequently when they perceived people in their home environment to frequently eat meat, and people ate plant-based meals more frequently when they perceived people in their home environment and their friends to frequently eat plant-based meals. Furthermore, perceived injunctive norms were positively associated with meat, and negatively associated with plant-based meal intake. In particular, the perception that friends approved of frequent meat intake was positively associated with people's own frequency of meat intake. Thus, perceived descriptive and injunctive norms may be an important influence on meat and plant-based meal intake, and people in the home environment, and friends may be particularly important social influences.

Keywords: social norms; plant-based eating; meat intake; eating behaviour

1. Introduction

The farming and intake of animal products has potentially negative consequences for the environment and human health (Chai et al., 2019; Godfray et al., 2018; Hunter & Rööß, 2016; Willett et al., 2019). The production of animal products generates 72-78% of total greenhouse gas emissions from agriculture, and meat intake, especially red and processed meat, is linked with poorer health outcomes (Godfray et al., 2018). A Lancet commissioned report concluded that a diet higher in plant-based foods, and lower in foods from animal sources may have health and environmental benefits (Willett et al., 2019). Research has shown that people are increasingly intending to eat less meat (Duchene & Jackson, 2019), and large reductions of greenhouse gas emissions are possible by reducing meat intake (Martin & Brandão, 2017). Thus, it is important to identify factors which may contribute to meat and plant-based meal intake (i.e. meals not containing meat) in order to improve the understanding of potential avenues for reducing meat, and increasing plant-based meal intake in the population. Social norms are codes of conduct about how to behave (Cialdini & Goldstein, 2004; Higgs, 2015) and may be an important factor in people's meat and plant-based meal intake. There are two types of social norms; descriptive norms, which refer to what other people do, and injunctive norms, which refer to what other people approve of (Cialdini & Goldstein, 2004). Descriptive and injunctive norms have been shown to be associated with eating behaviour in a number of studies (Higgs, 2015; Mollen, Rimal, Ruiter, & Kok, 2013; E. Robinson, Sharps, Price, & Dallas, 2015; Eric Robinson, Thomas, Aveyard, & Higgs, 2014; Schenk, Rössel, & Scholz, 2018; Sharps & Robinson, 2015; Stok, de Vet, de Ridder, & de Wit, 2016). Descriptive norms in particular have been shown to have a powerful influence on eating behaviour (Higgs, 2015; Eric Robinson et al., 2014). The evidence surrounding the influence of injunctive social norms on eating behaviour is more mixed, with some studies showing no influence of injunctive norms in experimental studies, however, the majority of

studies support the role of injunctive norms on eating behaviour in cross-sectional studies (Stok et al., 2016).

Research has started to examine the role of social norms on meat and plant-based meal intake. A recent study showed that descriptive and injunctive norms were associated with the adoption of a vegetarian diet in university students (Schenk et al., 2018). In another study, descriptive norms were shown to increase interest in eating less meat, and doubled the percentage of people ordering a meatless lunch (Sparkman & Walton, 2017). However, less is known about how the perceived meat and plant-based meal intake (perceived descriptive norms) and approval (perceived injunctive norms) of different social groups (i.e. friends and family) in the individual's social environment can affect people's own intake. Pelletier, Graham and Laska (2014) showed that fruit and vegetable intake was associated with the perceived behaviour of friends, whereas, fast food intake was associated with the perceived behaviour of family, friends, and significant others. Therefore, it is possible that different social groups have different impacts on people's meat and plant-based meal intake, and this requires further investigation.

The present study aimed to examine whether people's perceptions of the meat and plant-based meal intake (descriptive norms) and approval (injunctive norms) of people in their social environment were associated with their own intake, and whether different social groups (home environment, wider family and friends) had different impacts on their behaviour.

2. Method

2.1 Participants and design

297 UK-based adults were recruited through opportunity sampling and snowballing from social media. Due to drop out, incomplete responses, and the exclusion of people who follow an exclusive plant-based diet ¹, the final sample consisted of 137 participants (aged 19-66 years, mean age = 39.50, SD = 12.89 years, mean BMI = 25.71, SD = 5.33, 80.3% female, 78.8% omnivores, 21.2% flexitarians. See Table 1 for a breakdown of the demographic characteristics by diet type (omnivore vs. flexitarian). An *a-priori* power analysis (G-power, $\alpha = .05$, 85% power for a medium effect size, with 10 predictors) indicated that a minimum sample of 131 participants were required. The study employed a cross-sectional questionnaire design. The questionnaire was hosted on Qualtrics and took approximately 15 minutes to complete. Data collection took place in May 2020. Participants were not compensated for their time. This study received ethical approval from De Montfort University Health and Life Sciences ethics committee (ref: 3605). All participants were required to read an information sheet and give their consent before being allowed to continue with the study.

2.2 Questionnaire measures

2.2.1 Demographic questions

Participants were asked their age, sex, ethnicity, height and weight. Participants were also asked about their living situation (i.e. who they live with).

2.2.2 Dietary habits

¹ Participants were recruited as part of a larger study investigating the influence of social norms on eating behaviour of a variety of foods, including meat and plant-based meals (Sharps et al, in preparation). People of all dietary lifestyles (i.e. omnivores, flexitarians, pescatarians, vegans and vegetarians) were eligible to take part, however, people who followed an exclusive plant-based diet were excluded from this element of the study as it was not possible to determine which social factors were associated with the frequency of meat and plant-based meal intake, since vegans and vegetarians only eat plant-based meals.

Participants were asked ‘Which best describes your dietary lifestyle?’ with options ‘Omnivore (a person who eats meat and plant-based food)’, ‘Pescatarian (A person who does not eat meat but does eat fish)’, ‘Flexitarian (A person who eats some meat and fish but mostly eats plant-based food)’, ‘Vegetarian (A person who does not eat meat or fish but does eat animal products such as eggs and milk)’, ‘Vegan (A person who does not eat or use animal products), and ‘Other’. People were categorised into high meat content diets (i.e. omnivores) which received a score of 2, and low meat content diets (i.e. flexitarians) which received a score of 1. A higher score on the ‘usual diet’ variable indicates a higher meat content diet.

2.2.3 Social norm questions

The questionnaire measures for actual and perceived descriptive and injunctive norms regarding meat and plant-based meal intake used in this study were based on those in Pelletier, Graham and Laska (2014) and Lally *et al* (2012). All social norm questions (below) were rated on a 5-point Likert-style scale with options ‘Never’ (a score of 1), ‘Monthly or less than monthly’ (a score of 2), ‘Weekly’ (a score of 3), ‘Several times a week’ (a score of 4), and ‘Daily or more than once per day’ (a score of 5). None of the questions were reverse scored. Participants answered questions about their own meat and plant-based meal intake and their perceptions of the meat and plant-based meal intake of people in their social environment in separate blocks. Participants answered questions about themselves first, followed by questions about the people they live with, then their wider family, then their

friends, then their significant other. Participants were asked about the perceived descriptive norms first, followed by questions about perceived injunctive norms².

Participants were also asked about fruit, vegetable, fast-food, sugar-sweetened beverage, and snack intake and approval for themselves and for the people in their social environment. These items were part of a larger study, the results of which are discussed in another paper (Sharps et al, in prep).

2.2.4 Actual intake and approval

To measure participants' frequency of meat and plant-based meal intake (actual intake), participants were asked '*How often do you eat meals containing meat?*' and '*How often do you eat plant-based meals (i.e. meals not containing meat)?*' To measure participants' opinions (actual approval), participants were asked '*How often do you think people should eat meals containing meat?*' and '*How often do you think people should eat plant-based meals?*'

2.2.5 Perceived descriptive and injunctive norms

2.2.5.1 Perceived descriptive norms

Participants were asked to estimate how often they thought that the people they live with, their wider family (people they do not live with), their friends, and their significant other ate meat and plant-based meals. Participants were asked separate questions for each social group. For example, '*How often do the people you live with eat meals containing meat?*', '*How often*

² This study was conducted during COVID-19 when lockdown was in place, so participants were asked to answer the questions in regard to their normal behaviour when they were not in lockdown.

133 *do your friends eat meals containing meat?’ etc. and How often do the people you live with*
134 *eat plant-based meals?’ etc.*

135

136 *2.2.5.2 Perceived injunctive norms*

137 Participants were asked to estimate how often they thought that the people they live with,
138 their wider family, their friends, and their significant other approved of eating meat and plant-
139 based meals. As above, participants were asked separate questions for each social group. For
140 example, ‘*How often do you think that the people you live with think that people should eat*
141 *meals containing meat?’* and ‘*How often do you think that the people you live with think that*
142 *people should eat plant-based meals?’*

143

144 2.3 Analysis strategy

145 *2.3.1 Social groups*

146 We examined data for three types social group; people in the home environment (i.e. their
147 partner and/ or children, family, unrelated housemates), wider family (i.e. parents and
148 siblings if they did not live with them, and grandparents, and other relatives), and friends. We
149 examined the three social groups combined and individually. In the questionnaire, people
150 were asked about the eating behaviour of the people that they lived with and their significant
151 other in separate questions, however, we decided to combine these scores to represent the
152 home environment. We did not examine data relating to significant others separately, since
153 the majority of people with a significant other lived with them (83.26%), which represented
154 the home environment, and only a small number of people had a significant other but did not
155 live with them (16.74%). Some people lived alone and therefore did not enter data for the

people they lived with, so their data could not be included in the analysis for the separate social groups, but could be included in the combined social groups analysis. In the combined social groups analysis, if people lived alone then a mean was calculated based on their answers about their wider family and their friends. If people lived with others, then their mean was calculated based on their home environment, wider family and friends.

2.3.2 Predictors of meat and plant-based meal intake

To examine whether people's own meat and plant-based meal intake was predicted by perceived descriptive and injunctive norms, four hierarchical regressions were conducted. Two hierarchical regressions examined the impact of the combined perceived descriptive and injunctive norms (i.e. home environment, wider family and friends formed one predictor for descriptive and one for injunctive norms in the analysis) on how frequently people consumed meat and plant-based meals. Two hierarchical regressions examined the impact of the individual social groups on how frequently people consumed meat and plant-based meals (i.e. home environment, wider family and friends were separate predictors in the analysis). The first step of all of the regression models contained the predictors usual diet (i.e. high meat content diet (omnivore) vs. low meat content diet (flexitarian), age, sex, and BMI. The second step contained injunctive norm predictors, and the final step contained descriptive norm predictors. Regressions were conducted separately for meat and plant-based meal intake.

3. Results

3.1 Meat intake

The overall regression model significantly predicted how frequently people ate meat, $R^2 = .66$, $F(6, 128) = 41.74$, $p < .001$, see Table 2. Both perceived descriptive and injunctive norms were positively associated with frequency of meat intake, whereby, people ate meat more frequently when they perceived people in their social environment to eat, and approve of frequent meat intake. Usual diet and BMI were also positively associated with meat intake, whereas, age was negatively associated. This indicates that a higher frequency of meat intake was associated with a higher BMI and a diet containing a higher meat content, and higher meat intake was associated with a younger age. There was no association between sex and frequency of meat intake.

When including the social groups as separate predictors in the analysis, the overall model significantly predicted people's frequency of meat intake, $R^2 = .70$, $F(10, 107) = 25.40$, $p < .001$. The home environment descriptive norm and the friend injunctive norm were positively associated with people's own frequency of meat intake; people ate meat more frequently when they perceived the people in their home environment to frequently eat meat, and when they perceived their friends to approve of frequent meat intake. Consistent with the overall results, usual diet was also significantly positively associated, and age was negatively associated with frequency of meat intake.

3.2 Plant-based meal intake

The overall regression model significantly predicted how frequently people ate plant-based meals, $R^2 = .59$, $F(6, 129) = 30.73$, $p < .001$, see Table 2. Perceived descriptive norms were positively associated with how frequently people ate plant-based meals; people ate plant-based meals more frequently when they perceived the people in their social environment to do so. Perceived injunctive norms and usual diet were negatively associated with plant-based

meal intake; people ate plant-based meals less frequently when they perceived people in their social environment to approve of frequent plant-based meal consumption, and when their usual diet contained a higher meat content (i.e. omnivores). Age, sex and BMI were not associated with how frequently people ate plant-based meals.

When including the social groups as separate predictors, the overall model significantly predicted people's frequency of plant-based meal intake, $R^2 = .65$, $F(10, 107) = 19.99$, $p < .001$. Home environment and friend descriptive norms were significantly positively associated with how frequently people ate plant-based meals; people ate plant-based meals more frequently when they perceived the people in their home environment, and their friends to frequently eat plant-based meals. Diet category was significantly negatively associated with plant-based meal intake, whereby, people whose diets contained a lower meat content reported consuming plant-based meals more frequently. Perceived injunctive norms were not significantly associated with people's frequency of plant-based meal intake.

4. Discussion

In the present study, perceived descriptive norms were associated with people's own meat and plant-based meal intake. The results showed that people ate meat and plant-based meals more frequently when they perceived people in their social environment to do so. In particular, people ate plant-based meals more frequently when they perceived people in their home environment and their friends to do so, and ate meat more frequently when they perceived people in their home environment to do so. These findings contribute to the literature investigating descriptive norms and eating behaviour (Lally, Bartle, & Wardle, 2011; Lally et al., 2012; Pelletier et al., 2014; Schenk et al., 2018; Stok et al., 2016), and

226 provide the first evidence that people in the home environment and friends may be
227 particularly important influences on meat and plant-based meal intake.

228 Descriptive norms are believed to influence behaviour due to providing a guide for how to
229 behave in a situation (Cialdini & Goldstein, 2004), with socially proximal relationships
230 having a stronger influence on behaviour than socially distant relationships (Stok et al., 2015;
231 Yun & Silk, 2011). Thus, it is likely that people in the home environment and friends are
232 considered socially proximal and may be a reliable source of information. This may
233 especially be the case for plant-based eating which is less prevalent than meat intake in the
234 UK population (Lee & Simpson, 2016). People may be unsure of how frequently to consume
235 plant-based meals, and look to similar others to determine the appropriate course of action
236 (Cialdini & Goldstein, 2004; Sharps & Robinson, 2017). However, it is also possible that the
237 association between participants' intake and the intake of people in the home environment
238 may be due to sharing the same food and meals. Approximately 84% of the participants in
239 this study lived with their family, therefore, it is likely that they would share at least some of
240 the same food and meals. We did not ask people to specify where (i.e. at home vs. out of the
241 home) and who (i.e. family, friends, alone) they consumed their meals with, therefore, it is
242 not possible to determine whether this association is due to meal sharing, or whether people
243 in the home environment may also provide an influence on eating behaviour when people are
244 out of the home or eating with others. Further research examining this would provide
245 valuable insight into this relationship and into whether this social group continues to
246 influence eating behaviour when people are outside of the home.

247 The present study also demonstrates that perceived injunctive norms were associated with
248 people's own meat and plant-based meal intake. Consistent with perceived descriptive norms,
249 the more that people perceived people in their social environment, especially friends, to
250 approve of eating meat, the more frequently people ate meat. However, perceived approval of

frequent plant-based meal intake was associated with less frequent plant-based meal intake, but this effect disappeared when analysing by social group. Injunctive norms indicate the approval of others and are believed to motivate behaviour through promising social rewards or punishments (Cialdini & Goldstein, 2004). Thus, social rewards or punishments from friends may be an especially important motivator for meat intake, and people may eat in line with their friends' approval in order to gain these social rewards, but people may rely less on the approval of others when deciding whether to eat plant-based meals. These results add to the existing literature (Schenk et al., 2018; Stok et al., 2016). However, the results are in contrast to Schenk, Rössel and Scholz (2018) who found that injunctive norms were strongly associated with meat avoidance. These two studies differ as the present study asked about meat and plant-based meal intake as part of people's normal diet, whereas Schenk, Rössel and Scholz (2018) asked specifically about a vegetarian diet, which may require a bigger lifestyle change, and social approval may be more important.

This study provides a useful insight into the social factors which affect people's meat and plant-based meal intake, and suggests that friends and people in the home environment may be particularly important social influences. Future research could investigate whether utilising social norms about friends and people in the home environment may be a way of encouraging people to reduce their intake of meat, and increase their intake of plant-based meals. However, there are some limitations. The majority of the study population are female, and females have been found to be less likely to eat meat (Lee & Simpson, 2016). Examining the meat and plant-based meal intake in a sample which includes more males would provide insight into whether the same social groups are also important for males with regards to meat and plant-based meal consumption. In this study, we distinguished between different types of social influences, including between immediate family (who participants live with) and wider family (who the participants did not live with), which enabled us to examine whether

different social influences impact meat and plant-based eating differently. However, we only examined the impact of the social influences of socially proximal groups, such as family and friends, and it is less clear what impact social groups of a distant social proximity (other UK adults in general) have on meat and plant-based meal intake. Investigating the impact of a variety of groups of varying social proximity would provide valuable information for interventions aiming to target meat and plant-based meal intake.

In conclusion, these results suggest that descriptive and injunctive norms may be particularly important influences on meat and plant-based meal intake. Furthermore, these results suggest that people in the home environment and friends may be particularly important social groups. Further research is needed to examine this in a larger group of males, and to identify whether utilising social norms about friends and people in the home environment may be a way of encouraging people to reduce their meat, and increase their plant-based meal intake.

Statements

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Table 1. Demographic characteristics of omnivores and flexitarians

Demographics	Usual diet	
	Omnivore (n = 108)	Flexitarian (n = 29)
Mean Age (SD)	39.73 years (12.87 years)	38.66 (13.47 years)
Age range	19 - 66 years	20 – 62 years
Sex	85F, 22M, 1 undisclosed	25F 4M
Mean BMI (SD)	26.12 (5.48)	24.17 (4.48)
Ethnicity	85.7% White British/ European	89.7% White British/ European
	2.5% Black or Black British- African or Caribbean	3.4% Black or Black British- African or Caribbean
	0.8% Asian or British Asian Indian	
	0.8% Chinese	6.8% undisclosed
	10.1% undisclosed	
Living situation	83.4% with family (spouse and/or children or parents and siblings)	79.3% with family
	12% live alone	13.8% live alone
	4.6% with unrelated housemates	6.9% with unrelated housemates

Table 2. Associations with reported meat and plant-based meal intake

		Model 1 standardised B, CI	Model 2 standardised B, CI	Model 3 Standardised B, CI
<u>Overall analysis</u>				
Meat intake (n = 134)	Usual diet	.64 (1.17, 1.74)**	.53 (.94, 1.46)**	.50 (.90, 1.39)**
	Age	-.20 (-.02, -.01)*	-.16 (-.02, -.004)*	-.12 (-.02, -.001)*
	Sex	.06 (-.15, .44)	.07 (-.08, .42)	.09 (-.04, .44)
	BMI	.17 (.01, .05)*	.14 (.01, .04)*	.12 (.002, .04)*
	Perceived injunctive norms		.39 (.34, .62)**	.22 (.09, .44)*
	Perceived descriptive norms			.27 (.16, .53)**
Plant-based meal intake (n = 135)	Usual diet	-.57 (-1.88, -1.14)**	-.54 (-1.81, -1.08)**	-.42 (-1.44, -.82)**
	Age	.08 (-.01, .02)	.11 (-.003, .02)	.03 (-.01, .01)
	Sex	.05 (-.23, .50)	.08 (-.15, .57)	.01 (-.28, .33)
	BMI	-.13 (-.06, .002)	-.11 (-.05, .01)	-.05 (-.03, .02)
	Perceived injunctive norms		.20 (.09, .46)*	-.18 (-.44, -.03)*
	Perceived descriptive norms			.60 (.54, .92)**
<u>Analysis by peer type</u>				
Meat intake (n = 117)	Usual diet	.64 (1.13, 1.74)**	.51 (.83, 1.44)**	.43 (.66, 1.25)**
	Age	-.25 (-.03, -.01)*	-.19 (-.02, -.01)*	-.17 (-.02, -.004)*
	Sex	.08 (-.13, .50)	.07 (-.10, .45)	.06 (-.13, .39)
	BMI	.15 (.001, .05)*	.13 (.001, .04)*	.11 (.000, .04)
	Perceived injunctive norms home environment		.24 (.08, .32)*	.10 (-.05, .21)
	Perceived injunctive norms wider family		.18 (.04, .25)*	.05 (-.09, .18)
	Perceived injunctive norms friends		.15 (.03, .28)*	.18 (.05, .30)*
	Perceived descriptive norms home environment			.30 (.12, .35)**

	Perceived descriptive norms wider family			.08 (-.07, .22)
	Perceived descriptive norms friends			.03 (-.11, .17)
Plant-based meal intake (n = 117)	Usual diet	-.53 (-1.86, -1.03)**	-.49 (-1.73, -.91)**	-.31 (-1.16, -.45)**
	Age	.07 (-.01, .02)	.09 (-.01, .02)	.02 (-.01, .01)
	Sex	.08 (-.21, .63)	.14 (-.05, .80)	.10 (-.06, .62)
	BMI	-.12 (-.06, .01)	-.05 (-.04, .02)	.03 (-.02, .03)
	Perceived injunctive norms home environment		.21 (.03, .36)*	-.01 (-.14, .13)
	Perceived injunctive norms wider family		.09 (-.08, .27)	-.10 (-.27, .06)
	Perceived injunctive norms friends		.03 (-.16, .22)	-.06 (-.23, .11)
	Perceived descriptive norms home environment			.50 (.31, .61)**
	Perceived descriptive norms wider family			.11 (-.06, .25)
	Perceived descriptive norms friends			.24 (.09, .41)*

* $p < .05$

** $p < .001$