Article:
Patel, V. and Buckland, N.J. orcid.org/0000-0002-3667-6438 (2021) Perceptions about meat reducers : results from two UK studies exploring personality impressions and perceived group membership. Food Quality and Preference, 93. 104289. ISSN 0950-3293

https://doi.org/10.1016/j.foodqual.2021.104289

Perceptions about Meat Reducers: Results from Two UK Studies Exploring Personality Impressions and Perceived Group Membership

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Declarations of interest: none

Abstract

Current levels of meat consumption pose a significant threat to human, animal, and planetary wellbeing, presenting an urgent need for widespread reduction in meat eating behaviour. Changing meat-rich diets is difficult. However, a growing number of individuals, termed Meat Reducers (MRs), are actively reducing their meat intake and offer a potential strategy to shift meat-rich diets using social influence. Social influence significantly affects eating behaviours, and is strongest when individuals or groups are perceived as aspirational or positive. Therefore, across two studies a free association task and vignettes were used to assess social representations, perceived personality traits, and perceived group membership about meat reducers, compared to vegetarians and habitual meat consumers. Results indicate that MRs are perceived positively and, for some traits, more positively than vegetarians and habitual meat consumers. These results confirm that MRs are an appropriate referent group for use in future social influence-based interventions aiming to reduce meat intake. This will become incrementally important as the mounting environmental and health crises add urgency to the need to reduce meat eating.

Keywords: meat reduction, flexitarian, perceptions, group membership, social influence

1 Introduction

Current levels of global meat consumption are a leading driver of multiple social (e.g. malnutrition, non-communicable disease; Richi et al., 2015) and environmental (e.g. pollution, biodiversity loss, climate change; Steinfeld et al., 2006) problems. In most Western countries, average per capita meat consumption exceeds the healthy recommendation of 100 grams per day (108 grams per day in UK adults; Public Health England, 2018). To promote human, animal, and environmental wellbeing, strategies that minimise individuals' consumption of animal-based food products must be identified (Poore & Nemecek, 2018; Willett et al., 2019). Similarly, Horgan et al. (2016) confirm that meat reduction is an achievable dietary change that will optimise health and environmental sustainability.

However, reducing meat consumption is challenging. Eating meat is an engrained social norm in many cultures and communities around the world. Approximately 3% of the UK population identify as vegetarian, and fewer are vegan (a strict vegetarian who consumes no animal food or dairy products; YouGov, 2019). However, there has been growing interest in flexitarianism, a dietary pattern that is largely plant-based but with an occasional supplement of meat. Reports estimate that 14% (YouGov, 2019) to 39% (Penny et al., 2015) of the UK population follow a flexitarian diet. This interest in flexitarianism may result from growing awareness about the environmental and health impacts of high meat intake. While these numbers still constitute a minority, the moderate, accessible, and more achievable nature of meat reduction over meat omission may be more effective at encouraging other meat eaters to reduce their meat intake.

Given the relative recent rise in reduced-meat diets, it's unclear how this group are perceived. Vegetarians and vegans have historically been perceived negatively. For example, meat eaters display a negative prejudice towards these groups (MacInnis & Hodson, 2017; McDonald, 2000). Such negativity may arise because vegetarians and vegans may force meat consumers to confront any underlying cognitive dissonance they have related to meat eating. Cognitive dissonance is psychological discomfort that occurs when individuals participate in behaviours that conflict with

their attitudes, values, or beliefs (Festinger, 1957). It is a well-documented and common phenomenon experienced by most meat consumers, and often leads them to hold negative views or express negative behaviours to the source of the dissonance (i.e. vegetarians and vegans; Loughnan et al., 2014; Rothgerber, 2016). Negative perceptions may also be attributed to the fact that vegetarians and vegans constitute a minority that deviate from social conventions related to food (Cole & Morgan, 2011; Potts & Parry, 2010) which is perceived as a moral threat to others (Minson & Monin, 2012).

Anticipated negative perceptions or stigma has also been identified as a barrier for reducing meat consumption (Lea & Worsley, 2003; Markowski & Roxburgh, 2019). Stigma describes the negative perceptions and/or the biased treatment of social groups that possess certain undesirable traits (Link & Phelan, 2001), often resulting in social and behavioural distancing from stigmatised others (e.g. Phelan et al., 2008). Stigmatisation thus offers a way for the non-stigmatised (e.g. meat eaters) to avoid stigma themselves, whilst reinforcing existing social norms as acceptable and perpetuating conformity to normative behaviours such as meat eating.

As negative perceptions have been a deterrent to altering meat eating behaviour, and meat reduction is becoming more widespread, it is important to investigate what perceptions are held towards meat reducers [MRs] given its more moderate nature compared to vegetarianism or veganism. Identifying perceptions about MRs will be useful to inform the development of future interventions based on social influence to reduce meat intake. Social influence occurs when people alter their attitudes or behaviours in response to what others do, or are perceived to do (Burger, 2001), and has been consistently found to influence eating (e.g. Cruwys et al., 2015) and pro-environmental behaviours (e.g. Farrow et al., 2017). Social influence may therefore be an effective means of altering meat eating behaviour, especially since traditional education-based interventions that disseminate information about meat's harmful impacts rarely result in behavioural change (e.g. Graham & Abrahamse, 2017; Tucker, 2018).

The degree of social influence that an individual has over another is affected by positive or negative perceptions and perceived ingroup or outgroup membership. Ingroups are social groups with which an individual identifies, and outgroups are social groups with which an individual does not identify (Tajfel & Turner, 1986). Ingroups and outgroups typically manifest in attitudes and behaviours towards others; perceived ingroup members are favoured, while perceived outgroup members are derogated (Hewstone et al., 2002). Peers who are perceived as part of an ingroup exert more social influence and encourage more behavioural uptake than those perceived as the outgroup. For example, the association of junk food with an undesirable outgroup within a college setting led to students making healthier food choices in an experimental study (Berger & Rand, 2008). Similar effects were found in a laboratory study where participants modelled their eating behaviour after a perceived ingroup member, but not after a perceived outgroup member (Cruwys et al., 2012). Such studies show that the effect of social influence on behavioural uptake is limited if that behaviour is associated with groups that are disliked or perceived as non-aspirational outgroups.

Therefore, social influence interventions must focus on a social group that is perceived positively to be effective at reducing meat intake. How MRs are perceived is currently unknown. Therefore, this paper reports two studies which aimed to compare the perceptions about MRs with those about vegetarians and habitual meat consumers. The first study used a free association task to assess spontaneous words or descriptors that participants associated with MRs, vegetarians and habitual meat consumers. The second study used an online experiment, whereby participants rated the personality trait impressions of a hypothetical person described in vignettes as either a MR, vegetarian, or habitual meat consumer.

2 Study One

Study one used a free association task to assess participants' perceptions to MRs, vegetarians, and habitual meat consumers. Free association tasks involve asking participants to spontaneously produce expressions that come to their minds upon reading a stimulus word or phrase. They are a

valid and useful method for capturing associations among groups, and have been widely used in experimental social psychology due to their ability to bypass rationality and inhibited responses. This allows researchers to capture cognitions that lie somewhere between explicit and implicit attitudes (Rozin at al., 2002).

Free association tasks are commonly used to explore the semantic content of social representations (SRs). Moscovici (2000) described SRs as socially-constructed realities based on common understandings of what is acceptable or unacceptable. These realities determine our communication within groups, help us to organise our perceptions, and guide our behaviour, practice, and interactions with the world. Further theoretical work on the structural elements of SRs distinguishes between the central core and peripheral elements. The central core is considered stable and non-negotiable; it contains a small number of important cognitions that determine the entire meaning of the SR, such that the object cannot be recognised without these cognitions (Abric, 1993; 2001). Two social representations differ if their central cores contain different associations (Keczer et al., 2016). The peripheral elements are less stable, may evolve with changing social environments, and generally constitute the largest part of the social representation. Under this structural framework, social representations may be used to assess attitudes and perceptions towards social others (e.g. Danermark et al., 2014; Linton et al., 2013),

Study one aimed to: (i) use a free association task to construct and compare social representations for MRs, vegetarians, and habitual meat consumers, and; (ii) assess differences in association valence (general positivity or negativity) between these social representations. In relation to the structure of the social representations (whether associations are part of the central core or peripheries, aim one), it was expected that a difference would exist between MRs, vegetarians and meat consumers. However, as this work is largely exploratory in nature, it was unclear how these differences would manifest in the representations. In relation to the second aim, as meat reduction does not involve the “extremist” elimination of meat (see Bryant, 2019), it was expected that the

valence of associations towards MRs would be significantly more positive compared to the valence of associations towards vegetarians.

2.1 Materials and Methods

2.1.1 Design

This study's sample size, hypotheses, and analyses were preregistered via the Open Science Framework (https://osf.io/ke7sd). This study was approved by University of Sheffield Psychology Ethics Committee, and informed consent was obtained from all participants. An online experimental, between-subjects design was used. Participants were randomly assigned to one of three conditions (MR, vegetarian, or habitual meat consumer) using the Qualtrics (Provo, UT) survey software. Data collection for this study took place in August, 2019.

2.1.2 Participants

Calculations using G*Power v.3.1 with a small-to-moderate effect size f=0.175, α=0.05, and a desired power of 0.80 indicated that a sample size of 318 would be sufficient to detect significant differences between groups. Since there is no previous research in this domain to base estimates on, a conservative effect size was used. To account for an attrition rate of approximately 10%, the targeted total sample size for recruitment was 360 (120 per condition). Adults (n=371) were recruited from the United Kingdom using a combination of social media (e.g. forums and group pages; n=11) and the Prolific participant recruitment tool (www.prolific.co; n=360). The sample recruited using Prolific were representative of UK demographic distribution (age, sex, ethnicity), and were paid £0.85 upon completion. Participants recruited through other means were given the opportunity to enter a prize draw for a £50 shopping voucher. All participants were required to be aged 18 years and over; no further exclusion criteria applied to this study.

2.1.2 Free Association Task, Valence, and Rank of Associations

For the free association task, a practice trial was presented to participants prior to the measured task. The practice task contained an unrelated prompt ("people who walk to work") but was

otherwise identical to the measured free association task. The measured free association task differed according to the experimental condition. Participants in the MR condition were presented with the prompt "people who are reducing their meat consumption", participants in the vegetarian condition were presented with the prompt "people who are vegetarian", and participants in the control condition were presented with the prompt "people who eat meat". Beneath the prompt, participants were given five text boxes to list their associations. A 30 second timer was displayed to elicit spontaneous and uninhibited responses. Next, participants rated the valence of their associations on a three-point (positive – neutral – negative) scale. Self-rated valences were sought to minimise ambiguity or misinterpretation by the researcher. Finally, participants were asked to rank their associations by importance.

2.1.3 Measures

Primary measures: The two primary measures for this study were (1) the structure of the social representations for MRs, vegetarians and meat consumers, and (2) the valence of associations. These were both measured using the outputs of the free association task (see section 2.1.5).

Covariates: Participants' self-reported dietary habits were included as a covariate, as perceptions may vary depending on whether or not the hypothetical peers described in the vignettes share participants' own dietary patterns (invoking an ingroup bias). Awareness of sustainability and diet was included as a covariate as participants' level of environmental awareness may affect how they perceive those who follow low-no meat diets. Finally, sociodemographic information (e.g. age, sex, ethnicity) was collected and used as exploratory covariates (see Table A.1 for a summary of these measures; Maguire & Monsivais, 2015).

2.1.4 Procedure

After providing consent to participate, participants indicated demographic details and proceeded to complete the free association, valence, and ranking tasks. After these were completed, participants indicated their dietary habits, environmental awareness, and postcode (to indicate socioeconomic

status via the Index of Multiple Deprivation [IMD]; Ministry of Housing, Communities & Local Government, 2019). Information about participants' political inclination, employment status, household income, education, and subjective socioeconomic status (Adler & Stewart, 2007) was also collected to characterise the sample; these were asked at the end of the survey to avoid confounding or bias in responses to the primary measure. Finally, participants were thanked and debriefed.

2.1.5 Data Analysis

To construct the social representations, the qualitative association data was first cleaned by excluding associations only listed once. These associations were removed as they were considered idiosyncratic and thus inappropriate for the purpose of this research (see Madon, 1997). As this research is about social perceptions, associations that were not related to physical or psychosocial characteristics (e.g. 'vegetables', 'meat') were also removed, as were incomplete and nonsensical responses. Next, associations were categorised into constructs per the synonymy procedure outlined by Danermark et al. (2014), whereby discussion between two coders resulted in the grouping of associations deemed to be synonymous (e.g. 'eco-friendly' and 'green' were grouped). The association valence helped to determine the intended meaning of the associations. Where consensus was not reached by the coders, the associations remained separate. This process yielded 1065 total associations to be included in further analysis (from n=1483). Thirty percent of the data was coded by a third independent coder, with significantly high agreement, $\kappa = 0.843$ (95% CI 0.802, 0.884), $p < 0.001$.

To approximate the social representations, Abric's (2003) modification of Vergès' (1992) rank-frequency method was used. Frequency refers to the number of times a construct is cited within a sample, whereas rank describes the average ranked position of a construct after participants were asked to rank them according to prototypicality, or importance to the concept, *a posteriori.* The cross-tabulation of frequency and importance ranking yields a 2 x 2 table, with each of the four cells

corresponding to a distinct zone of the SR (Figure 1). Cell 1, called the central zone, contains constructs that are the most frequently mentioned and the most highly ranked, and are thus likely to constitute the central core of the SR. Cell 2, called the first periphery, contains constructs that are frequently mentioned but less highly ranked, and cell 3, called the contrasting elements, contains constructs that are highly ranked but less frequently mentioned. These zones are potentially destabilising zones that are prone to change (Vergès, 2005). Finally, cell 4, called the second periphery, constitutes unimportant and infrequent constructs.

For each condition, the overall frequency of an association was correlated with its participant-prompted rank, to produce the 2 x 2 table characteristic of this method. This table was used to indicate the position of associations within each social representation (i.e. central core, peripheries, contrasting elements; see Abric, 2003). The average values of frequency and rank within each social representation provided the threshold for sorting. For example, associations that were mentioned more frequently and ranked more highly than the average frequency and rank within a condition were classified as high frequency and high rank, and thus occupied the central zone of that table.

To investigate differences in valence between the three social objects, a composite valence for each participant was first created by averaging the self-rated valences of their associations. This composite score had a possible range of -1 (entirely negative associations) to 1 (entirely positive associations). ANOVAs were conducted using the experimental condition as the between-factor (MR, vegetarian, and habitual meat consumers). The more robust Welch statistic was used to account for instances where there was non-normality and heterogenous variance in the data (determined using Levene's and Shapiro-Wilks' tests; Delacre et al., 2019; Srivastava, 1959). Paired post-hoc Games-Howell tests were used to investigate pairwise differences. For all statistical tests in this study, the significance level was $p < 0.05$. For all measures of effect (η_p^2 or est. ω^2 for Welch analyses), 0.01 was considered small, 0.06 was considered medium, and 0.14 was considered large (Cohen, 1988).

2.2 Results

2.2.1 Participants

Removing participants who did not provide consent (n=1) and incomplete responses (n=4) left a total sample size of 366. The inclusion of participants recruited via social media did not affect the results reported. Participant characteristics are displayed in Table A.2. The respondents in the three experimental conditions did not significantly vary in sex, age, ethnicity, IMD Decile, subjective socioeconomic status, environmental awareness, or dietary type ($p > 0.15$; $\eta_p^2 < 0.02$). Therefore, randomisation to experimental condition was successful.

2.2.2 Social representations

Association categories

Consolidating the associations using the synonymy process (see Table A.3 for examples) resulted in 85 different categories (see Table 1). Overlap in these categories occurred between conditions (e.g. "healthy"-related constructs occurred across all three dietary types).

Social Representations

Social representations for MRs, vegetarians, and habitual meat consumers (see Tables 2, 3, 4) were largely distinct. However, overlap did occur between the central zones; for example, both MRs and vegetarians were considered to be 'animal lovers'; MRs, vegetarians, and habitual meat consumers were all considered to be 'healthy'. The most important associations attributed to MRs (based on frequency and rank) were 'healthy', 'animal lovers', 'eco-friendly', 'thoughtful', and 'conscious'. The central zone of vegetarians included 'healthy', 'animal-lovers', and 'ethical', and the central zone of habitual meat consumers included 'normal', 'healthy', 'unhealthy', and 'hungry'.

2.2.3 Valence of associations

There was a statistically significant difference in valence between conditions, Welch $F(2,233) = 35.40$, $p < 0.001$, est. $\omega^2 = 0.166$. This difference remained significant after controlling for age, sex, ethnicity, socioeconomic status (IMD Decile), subjective socioeconomic status, level of

environmental awareness, and participant diet, $F(2,297) = 34.45$, $p < 0.001$, $\eta_p^2 = 0.188$ (Figure 2). Paired post-hoc tests with adjusted means revealed that the valence was significantly more positive for the MR condition compared to the vegetarian ($M_{diff} = 0.3$, SE = 0.07, $p < 0.001$, 95% CI 0.13, 0.48) and habitual meat consumer conditions ($M_{diff} = 0.61$, SE = 0.07, $p < 0.001$, 95% CI 0.43, 0.78). The vegetarian condition was also significantly more positive compared to the habitual meat consumer condition ($M_{diff} = 0.3$, SE = 0.08, $p = 0.001$, 95% CI 0.12, 0.49).

2.3 Discussion

This study constructed social representations of MRs, vegetarians, and habitual meat consumers in a representative UK sample, and was the first to date to explore perceptions about MRs as a distinct social group.

While the central zone for habitual meat consumers contained a mixture of positive and negative traits, the central zones of MRs and vegetarians were comprised of entirely positive and aspirational traits. Generally, this indicates that both meat reducers and vegetarians generate positive first impressions. As two social representations are considered different if their central zones are semantically distinct, it is fair to conclude that the habitual meat consumer social representation is semantically different to that of MRs and vegetarians. However, the distinction between vegetarian and MR social representations is less clear, with many of the same associations occurring in their central zones. Furthermore, some of the traits that appear in the peripheries of the MR social representation are commonly associated with vegetarians (e.g. pretentious, left-wing: Minson & Monin, 2012). This level of overlap between the two social representations suggests that the concept of “meat reduction” as distinct from vegetarianism may not yet be entirely salient in the public conscience. A similar confounding effect of vegetarians and MRs has been previously identified in the self-identification of these groups, whereby MRs routinely self-identify as vegetarian (Rosenfeld et al., 2019). Such discrepancies between dietary identities and behaviours may also occur in perceptions about these diets in others, which may explain the overlap in associations.

The associations in the MR central zone were “healthy”, “eco-friendly”, “animal lovers”, “thoughtful”, and “conscious”. The appearance of “healthy” and “animal” lovers” in the MR central zone aligns with the two most commonly cited reasons for individual meat reduction or elimination (Fox & Ward, 2008). The appearance of “eco-friendly” indicates that awareness of meat reduction as an environmentally beneficial behaviour is on the rise, after historically remaining relatively low (e.g. Macdiarmid et al., 2016). This inference is supported by the fact that 48% of participants in the MR condition included a construct related to “eco-friendly” in their associations. The “conscious” and “thoughtful” associations imply a level of awareness or empathy, and have previously been associated with vegetarianism (Minson & Monin, 2012).

While the free association task and resultant social representations reveal *what* the perceptions are, the valence (or the positivity or negativity of these perceptions) indicate *how* they manifest in our ideas, attitudes, and treatment of these groups. Overall, MRs were rated to be the most positive social object, followed by vegetarians, then habitual meat consumers; even when different socio-demographic factors where accounted for. These findings suggest that MRs are an aspirational referent group, which may maximise their social influence. However, interventions using MRs as the referent group are required to confirm this effect.

A distinct advantage of the free association task is that it captures attitudes that lie in the middle of the spectrum of implicit-explicit attitudes, without suggesting specific traits. However, these perceptions were collected in response to a general label (e.g. “people who are reducing their meat consumption”). To replicate these findings within a more realistic context, and when a specific social group is provided, study two was conducted.

3 Study Two

Study two was conducted with University of Sheffield staff and students, and aimed to capture personality impressions and perceived group membership of MRs, vegetarians, and habitual meat consumers using vignettes about hypothetical peers. Vignettes are short, carefully constructed

stories or descriptions that are used to contextualise elements of a behaviour of interest. Vignettes are an established methodological tool for examining participants' attitudes, beliefs, perceptions, and interpersonal judgements, especially as they present the object of interest within realistic scenario (see Atzmüller & Steiner, 2010 for a review).

It was expected that MRs would fall between vegetarians and habitual meat consumers in the trait ratings, due to its median placement between the other two dietary patterns on the meat-eating spectrum. With regard to group membership, it was expected that the hypothetical MR would be perceived as similar in-group members by both cohorts, significantly more so than the hypothetical vegetarian, but significantly less so than the hypothetical habitual meat consumer. This was expected because MRs do not completely abstain from meat, rather they represent a dietary pattern that lies between the other two which may make them more socially relatable. Regarding sample type differences, it was expected that participants in the University student cohort would rate hypothetical MRs and vegetarians significantly less unfavourably than participants in the University staff cohort. This is because a higher proportion of students are either themselves vegetarians (e.g. compared to the Australian population [Worsley & Skrzypiec, 1998]), open to reduced meat eating patterns (Dibb & Fitzpatrick, 2014), or intending to give up meat (YouGov, 2019). As a result, it was expected that the student cohort was more likely to be exposed to social peers who have, themselves, reduced their meat intake.

3.1 Materials and Methods

3.1.1 Design

This study's sample size, hypotheses, and analyses were preregistered via the Open Science Framework (https://osf.io/2zsu7). This study was approved by University of Sheffield Psychology Ethics Committee, and informed consent was obtained from all participants.

This study comprised an experimental, between-subjects 3 (experimental conditions: MR, vegetarian, or habitual meat consumer) x 2 (participant cohort: University of Sheffield staff,

University of Sheffield students) design (see section 3.2.1 for further details). Participants were randomly assigned to experimental condition using the Qualtrics (Provo, UT) survey software.

3.2.1 Participants

Calculations using G*Power v.3.1 with a small-to-moderate effect size f=0.175, α=0.05, and a desired power of 0.80 showed that a sample size of 318 would be sufficient to detect significant differences between conditions and between groups. Since there was no previous research in this domain to base estimates on, a conservative effect size was used. To account for an attrition rate of approximately 10%, the targeted total sample size for recruitment was 360 (180 per cohort, 60 per condition).

To be eligible to participate, participants needed to be either students or non-academic staff (at paygrade 5; £28,331 annual salary or under) based at the University of Sheffield. These targeted samples were used to ensure that they belonged to a clearly defined population which forms part of their identity (e.g. university group), allowing for the assessment of perceived group membership. The rationale for recruiting staff in lower and intermediate roles was that these occupations have been associated with higher levels of meat consumption, compared to those in higher managerial or professional occupations (Clonan et al., 2016). There is a socioeconomic gradient in meat consumption, whereby those lower in all indicators of socioeconomic status (SES; i.e. household income, education, and occupation) consume more meat than those of higher SES (Maguire & Monsivais, 2015). Furthermore, those lower in subjective SES (the socioeconomic status that people perceive they have relative to others, rather than objectively measured SES) have been found to consume more meat due to the social ideas attached to it (Chan & Zlatevska, 2019). Together, these studies suggest that focussing on lower SES groups would be most beneficial in maximising the influence of socially-normative messaging to reduce meat consumption among high consumers. Therefore, only staff at pay grade 5 and below were recruited since grades ≥6 encompass academic, higher managerial, administrative and professional occupations.

The data collection for study two took place during September-November, 2019. In total, 287 staff and 208 students were recruited from voluntary study email lists. Participants were required to be aged 18 years or over, and incomplete or duplicate responses were excluded from further analysis. Upon completion of the survey, participants were given the opportunity to enter a prize draw for a £100 shopping voucher (one prize per cohort).

3.1.2 Vignette Task

The vignettes (see Table A.4), adapted from similar vignettes used by Thomas (2016) and Ruby and Heine (2011), described a typical day in the life of a fellow colleague or student. Efforts were made to standardise the vignettes so that they only differed in areas relevant to the study aims (i.e. meal choices at lunch time). The hypothetical person in the vignette was unnamed with no reference to sex, in order to prevent bias and ensure that these factors did not influence the subsequent personality evaluations (see Mooney & Lorenz, 1997).

3.1.3 Measures

Primary measures: The two primary measures for this study were (1) perceived personality attributes, and (2) perceived group membership of MRs.

Personality attributes: After reading the vignette, all participants were asked to rate the hypothetical person on a series of eleven personality attribute pairs (Table 5) on bipolar, 100-point visual analogue (VAS) scales presented in a randomised order. The trait pairs were selected based on theoretical considerations and established literature about perceived morality and masculinity of vegetarians (Ruby & Heine, 2011), impressions of healthy food eaters (e.g Fries & Croyle, 1993; Stein & Nemeroff, 1995), the relationship between food intake/choice and the 'Big Five' personality traits (Keller & Siegrist, 2015), and impressions of insect eaters (which included impressions of vegetarians as an experimental condition; Hartmann et al., 2018)

Group membership: Participants were asked to rate the extent to which they agreed to three statements on 100-point VAS (1 = Strongly Disagree, 100 = Strongly Agree). The three items were *I*

feel that this person is similar to me, I would like this person as a friend, and *I would respect this person.* Similarity is a central premise of group membership, and so was included as part of this measure. The second and third questions were adapted from Bolderdijk et al. (2018) and Monin et al. (2008). Furthermore, Vartanian et al. (2007) suggest that inquiries about a participant's desire to interact with a target are better indicators of social appeal compared to explicit personality ratings. Due to the moderate reliability of the group membership scale (Cronbach's $\alpha = 0.78$), each item was assessed independently, and as part of a composite "group membership score" per participant (obtained by averaging their responses to each item of this measure).

Covariates: The covariates used in this study and means of collecting this information was identical to those used in study one (Table A.1).

3.1.4 Procedure

This study's procedure was identical to that used in study one. However, in place of the free association task, participants completed the vignette task and associated primary measures.

3.1.5 Data Analysis

To investigate between-condition differences, two-way independent ANOVAs were conducted. The more robust Welch statistic was used to account for instances where there was non-normality and heterogenous variance in the data. To investigate pairwise differences, Games-Howell tests were used where there were heterogenous variances, and Gabriel tests were used where variances were homogenous. For all statistical tests in this study, the significance level was $p < 0.05$. For all measures of effect (η_p^2 or est. ω^2 for Welch analyses), 0.01 was considered small, 0.06 was considered medium, and 0.14 was considered large (per Cohen, 1988).

3.2 Results

3.2.1 Participants

Removing incomplete (n=74) and duplicate (n=1) responses left a total sample size of 420 (staff n=214, student n=206). Excluded participants did not significantly differ from included participants in age, sex, or ethnicity (all *ps* > 0.5). Included participants' characteristics are displayed in Table A.5. The respondents in the three experimental conditions did not vary significantly in sex, age, education, ethnicity, nationality, dietary type, level of environmental awareness, or subjective socioeconomic status ($p > 0.05$). Therefore, randomisation to condition was successful.

3.2.2 Personality impressions

ANOVAs conducted for each of the eleven personality traits (Table 5) revealed significant main effects of condition on the ratings for animal lover, care for the environment, health consciousness, morality, selflessness, intelligence, open-mindedness, and femininity traits. These remained significant after controlling for demographic covariates (age, sex, socioeconomic status, subjective socioeconomic status, and level of environmental awareness). Post-hoc tests showed that the hypothetical vegetarian and MR were rated to be significantly more animal loving, environmentally friendly, health conscious, open-minded ($p < 0.001$), and intelligent ($p < 0.05$) compared to the hypothetical habitual meat consumer. Furthermore, the hypothetical vegetarian was rated to be more feminine, moral, and selfless compared to the hypothetical habitual meat consumer ($p < 0.05$). There was no significant effect of condition on likeability, interest, or attractiveness. No main effect of cohort was identified on any of the traits ($p > 0.05$, $\eta_p^2 < 0.01$), indicating that staff and students did not differ in their ratings of the three hypothetical persons. There was also no significant interaction between cohort (staff or student) and condition (vegetarian, MR, habitual meat consumer) on each of the traits ($p > 0.05$, $\eta_p^2 < 0.01$).

3.2.3 Perceived group membership

No significant main effects or interactions between cohort and experimental condition were identified on the composite group membership score when demographic covariates (age, sex, ethnicity, IMD Decile) were controlled for. When analysing each of the group membership items separately (*I feel that this person is similar to me, I would like this person as a friend, and I would respect this person*), there was no significant main effect of cohort when controlling for demographic covariates. A significant main effect of condition was also identified on the respect item only ($F[2,410]=5.4$, $p = 0.05$, $\eta_p^2=0.03$) between the MR (65.79, SD=17.07) and habitual meat consumer conditions (60.24, SD=19.44); $M_{diff} = 5.86$, $p = 0.018$, 95% CI 0.75, 10.96, and the vegetarian (66.14, SD=17.4) and habitual meat consumer conditions; $M_{diff} = 6.34$, $p = 0.01$, 95% CI 1.19, 11.46 . No significant interaction effects were found between cohort and experimental condition on any of three items (perceived similarity $p = 0.64$; willingness to befriend $p = 0.78$; afforded respect $p = 0.95$).

3.3 Discussion

This study used vignettes to explore personality trait impressions and perceived group membership of hypothetical MRs, vegetarians, and habitual meat consumers among university staff and students.

The vignettes used in this study were standardised except for differences in the dietary habits of the hypothetical people, allowing for a robust, experimental comparison of personality traits. The results of this study revealed several significant effects. First, the hypothetical vegetarian and MR were rated significantly higher on animal loving, environmentally friendly, health conscious, morality, intelligence, and open-mindedness traits, compared to the hypothetical habitual meat consumer. This reflects previous literature about vegetarians being perceived as more animal loving, environmentally friendly, health conscious, and more moral or virtuous than meat eaters (Hartmann et al., 2018; Minson & Monin, 2012; Ruby & Heine, 2011), and extends these effects to MRs. There has been no previous research exploring the link between perceived intelligence and meat

consumption, however Fries and Croyle (1993) suggest that people on low-fat diets are perceived to be more intelligent than those on high-fat diets. It may be that the recognition of meat reduction and vegetarianism as relatively lower-fat lifestyles resulted in their higher perceived intelligence in this study. Intelligence may also be related to the 'conscious' and 'thoughtful' traits that were associated with MRs in study one. There has been no prior research on perceptions of open-mindedness and meat consumption, however high meat consumption has been positively associated with close-mindedness (Keller & Siegrist, 2015). The results of the present study suggest that this correlation also extends to perceptions about social others who follow different meat-eating habits.

No differences were observed in the ratings of attractiveness and likeability between MRs, vegetarians, and habitual meat consumers. Unlike the other traits explored in this study, which may be construed as personal characteristics, attractiveness and likeability are more closely related to social desirability or appeal (Vartanian et al., 2007). Indeed, no differences were observed in two of the three group membership items which focus on social appeal; perceived similarity to, and willingness to befriend MRs, vegetarians, and habitual meat consumers. Furthermore, there were no differences in the overall group membership score afforded to the three dietary types. However, MRs and vegetarians were afforded significantly more respect than habitual meat consumers. Previous evidence on these perceived traits related to diet is limited. Those with healthier diets have been perceived as more attractive but less likeable than those with unhealthy diets (Stein & Nemeroff, 1995), however this reasoning does not apply in this study as no significant differences were found in these traits. Overall, these results suggest that social desirability or willingness to interact is not influenced by diet or meat-eating status.

For the morality, selflessness, and femininity traits, the hypothetical vegetarian was rated more highly (and more feminine in the case of the femininity trait) than both the hypothetical MR and the hypothetical habitual meat consumer. Again, this aligns with previous research that suggests that vegetarians are perceived to be more feminine and moral compared to non-vegetarians (Ruby &

Heine, 2011). No prior research has explored perceptions of selfishness as they related to meat versus meatless diets, however there is evidence that those following healthy diets are perceived as more selfless compared to those following unhealthy diets (Stein & Nemeroff, 1995). Since meat reduction seems to be perceived as healthy, it seems feasible to apply this reasoning to the higher perceived selflessness observed in vegetarians in the present study.

This study focused on targeted samples (university staff and students) to standardize the social environment of both cohorts and to ensure they belonged to a comparably defined and identifiable group. As a result, this study is particularly useful as a pre-cursor to social norms interventions, as it allowed for the examination of perceptions as a function of ingroup norms. However, these results may be specific to staff and students at the University of Sheffield, which has an ambitious, embedded sustainability strategy focussed around several UN Sustainable Development Goals (Cameron et al., 2018). The University's focus on sustainability may have influenced the attitudes and behaviours of its staff and students; they may practice more eco-friendly behaviours or have a higher environmental awareness compared to staff and student bodies at other universities. This may reduce the generalisability of the results to those outside this setting, however additional research is required to determine this effect.

4 General Discussion

To date, this is the first empirical assessment of perceptions about MRs, a growing, important group representing a dietary transition towards healthier, more sustainable reduced meat diets. Across both studies, MRs were considered aspirational or otherwise positive. In study one, they were rated more positively than vegetarians and habitual meat consumers, and in study two they were rated more highly than habitual meat consumers, and similarly to vegetarians, in several favourable personality traits. The traits assigned to MRs in study two overlapped with those associated with MRs reported in study one (e.g. health conscious, eco-friendly, animal lover). Moreover, the most

important (that is, frequently mentioned and highly ranked) traits associated with MRs across both studies (e.g. healthy, eco-friendly) may be considered aspirational or otherwise positive.

Another, unexpected finding is that participants generally held favourable attitudes towards vegetarians. This is contrary to most of the previous literature that documents widespread bias, disparagement, or otherwise negative attitudes towards this group (e.g. Minson & Monin, 2012). However, it adds to a newer, emerging body of literature (e.g. Judge & Wilson, 2018) suggesting that absolute impressions of vegetarians tend towards positive.

The positive perceptions afforded to both MRs and vegetarians may be a consequence of increasing awareness about environmental issues. There has been a significant increase in media coverage of these topics in recent years (Boykoff et al., 2020). The rise of campaigns (e.g. *Veganuary* [uk.veganuary.com] and the youth climate strikes), influential figures who champion these causes (e.g. Greta Thunberg) and the successful incorporation of meat-free items in the product ranges of large food corporations (e.g. Greggs vegan sausage rolls in the UK) have also helped to bring these issues to the mainstream. In recent years, there have been large scale environmental incidents that are attributed to climate change or its attendant effects (e.g. the wildfires in the Amazon and Australia), which increase its salience and highlight the urgency for immediate preventative action.

A third finding was that perceptions towards habitual meat consumers were more mixed, and in study one, less positive than both vegetarians and MRs. Given the mixed dietary composition of participants in both samples (see Tables A.2 & A.5), this indicates that a sizeable proportion of habitual meat consumers rated peers that follow their own dietary habits less positively than MRs and vegetarians. The reasons for this are unclear, but may be attributed to the well-documented and common effect of cognitive dissonance in meat consumers (see section 1). The negative affect caused by cognitive dissonance may manifest in the disapproval of meat eating behaviour among meat consumers to resolve the discomfort, even though meat is still being consumed by this group.

These findings have important implications for behaviour change science and practitioners aiming to reduce meat eating behaviour. The harmful environmental and health impacts of current rates of meat consumption present an urgent need for norms to shift towards healthier and more sustainable reduced meat diets. The results of these studies indicate that MRs would be a useful and effective referent group in interventions aiming to use social influence to drive dietary change. Social norms and influence are important determinants of meat eating behaviour, and their effect in behaviour change interventions is maximised when the groups that practice a desirable behaviour are perceived as aspirational or positive (e.g. Berger & Rand, 2008). The positive, aspirational perceptions about MRs, as reported in these studies, provide the first necessary step towards testing the effect of social influence for reducing meat intake. Future trials evaluating the impact of social-norms based messages referring to MRs are needed. Encouraging meat reduction may also act as a gateway to healthier and sustainable diets by broadening awareness, knowledge, and skills related to meat-free lifestyles. These are factors that have been previously identified as major barriers to individual dietary change (Stoll-Kleemann & Schmidt, 2017).

A significant strength of these studies is the samples employed. Study one used a sample that was representative of the age, sex, and ethnic distribution of the UK population, and study two used university students, and staff of a lower pay grade than is typical of university staff. These samples were used to broaden the scope and applicability of results, and they extend previous social influence and diet studies (e.g. Mollen et al., 2013; Robinson et al., 2014) that have tended to focus on university students only. The low dropout rate of participants in both studies added further strength to the results and reduced the risk of compromised validity (Morton et al., 2012). Another strength is that both studies used two different means of assessing perceptions; one that captured explicit perceptions (vignettes) and one that captured more implicit perceptions (free association task). This combined approach was used to gather a more complete picture of perceptions.

There are also several methodological limitations. Across both studies, there were insufficient sample sizes of dietary types among participants to be comparable. Future research could investigate perceptions whilst accounting for individual variability, such as participant dietary status (e.g. vegetarian, meat reducer). Additionally, a within-subjects design may be useful in future studies to reduce possible individual variability that may influence perceptions towards the three social objects. However, care would need to be taken with within-subject study designs to avoid bias (e.g. demand characteristics). For study one, the results of the free association task only provide a loose indication of the underlying social representation, which should not be considered definitive. More studies are required using different methodologies to fully explore the social representation of MRs. In particular, qualitative focus groups may provide more in-depth insights. It may also be useful, in a within-subjects design, to standardise the free association prompts so that the word “vegetarian” is replaced with “no meat consumption”. For study two, university context may have influenced results. As discussed in section 3.3, the University of Sheffield has an ambitious and ongoing sustainability strategy. Therefore, further research is needed to confirm that the results reported here extend to other university and non-university populations.

Acknowledgements: The authors would like to sincerely thank Professor Helen Kennedy for her valuable insight provided at all stages of this study and drafting of this manuscript. Our thanks also go to Miss Nancy Muringai and Mr Jason Graham for their helpful comments and assistance with data coding. Finally, our sincere gratitude must go to the Grantham Centre for Sustainable Futures for funding this study.

Author contributions: V.P. conceived the study design and analysis, collected the data, performed the analysis, and wrote the manuscript. N.B. supervised all aspects of the work and provided critical feedback on the research, analysis, and manuscript.

Funding: This work was supported by the Grantham Centre for Sustainable Futures.

Declarations of interest: none

Data availability: The data that support the findings of this research will be made openly available on the Open Science Framework at https://osf.io/c2bt7/ and https://osf.io/vybj3/ upon publication.

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		Rank	
		High	**Low**
Frequency	**High**	Cell 1 – Central Zone	Cell 2 – First Periphery
	Low	Cell 3 – Contrasting Elements	Cell 4 – Second Periphery

Figure 1. Cross-tabulation analysis of frequency and rank of associations used to construct social representations (Abric, 2003).

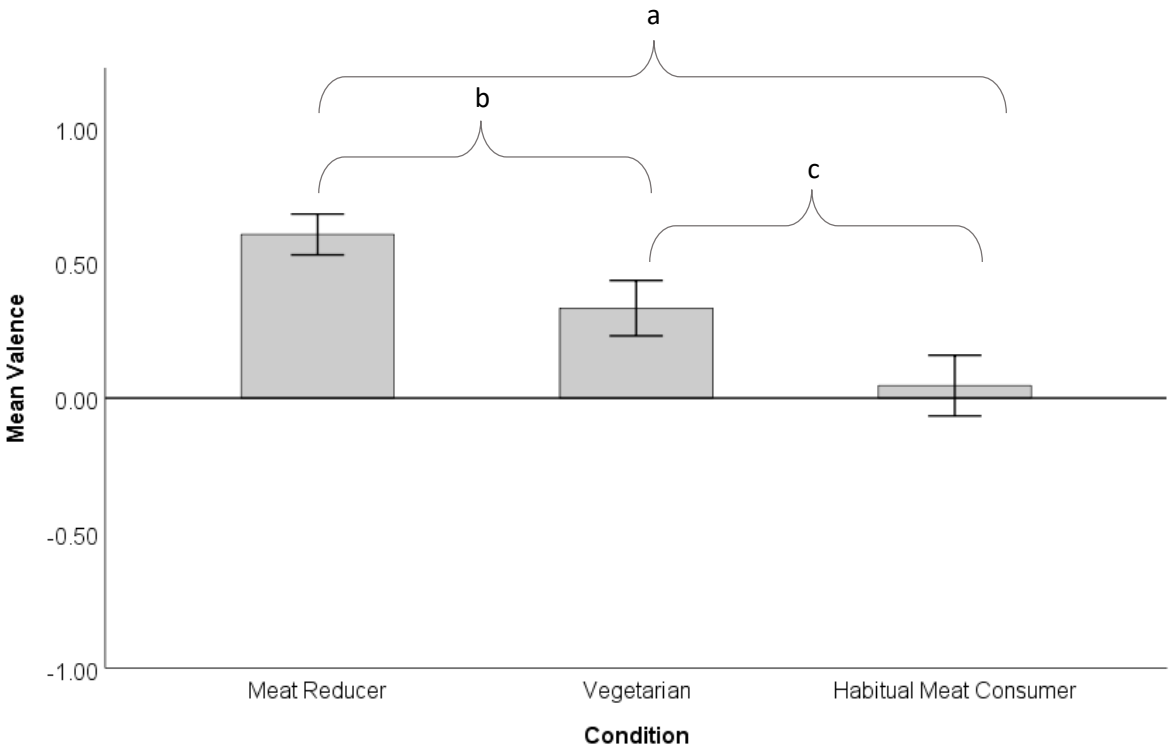

Figure 2. Valence (+/- 2 SE) of associations listed towards meat reducers, vegetarians, and habitual meat consumers. Scores ranged from 1 to -1. A higher score indicates more positive valence. Different letters denote significant differences ($p < 0.001$). Covariates appearing in the model are evaluated at the following values: Age = 44.2117, Sex = 1.5407, Ethnicity = 1.4984, Participant Diet = .9251, Environmental Awareness Score = 5.1831, Subjective Socioeconomic Status = 5.7199, IMD Decile (Low = Deprived) = 5.4202.

Table 1. Summary of category constructs expressed, and frequencies of participants who included these constructs in their association lists, per experimental condition.

Meat reducers	#	%	Vegetarians	#	%	Habitual meat consumers	#	%
1. Healthy	79	63.71	1. Healthy	69	57.02	1. Normal	36	29.75
2. Eco-friendly	60	48.39	2. Eco-friendly	36	29.75	2. Healthy	33	27.27
3. Conscious	17	13.71	3. Animal lovers	35	28.93	3. Unhealthy	27	22.31
4. Frugal	14	11.29	4. Ethical	15	12.40	4. Fat	17	14.05
5. Fit	14	11.29	5. Unhealthy	14	11.57	5. Hungry	15	12.40
6. Animal lovers	14	11.29	6. Fussy	13	10.74	6. Fit	13	10.74
7. Thoughtful	13	10.48	7. Judgemental	12	9.92	7. Masculine	12	9.92
8. Caring	12	9.68	8. Slim	12	9.92	8. Enjoyable	11	9.09
9. Happy	11	8.87	9. Pretentious	11	9.09	9. Strong	10	8.26
10. Intelligent	10	8.06	10. Boring	10	8.26	10. Balanced	10	8.26
11. Kind	9	7.26	11. Hippies	10	8.26	11. Not eco-friendly	9	7.44
12. Eco-conscious	9	7.26	12. Strange	9	7.44	12. Cruel	8	6.61
13. Good	8	6.45	13. Caring	9	7.44	13. Ignorant	8	6.61
14. Concerned	6	4.84	14. Conscious	8	6.61	14. Happy	7	5.79
15. Trendy	6	4.84	15. Fit	7	5.79	15. Inconsiderate	7	5.79
16. Health conscious	6	4.84	16. Different	6	4.96	16. Selfish	6	4.96
17. Ethical	6	4.84	17. Health conscious	6	4.96	17. Good	6	4.96
18. Slim	4	3.23	18. Kind	6	4.96	18. Bad	5	4.13
19. Fat	4	3.23	19. Religious	5	4.13	18. Ok	5	4.13
20. Trying	3	2.42	20. Happy	5	4.13	20. Old fashioned	4	3.31
21. Disciplined	3	2.42	21. Idiots	5	4.13	21. Rich	3	2.48
22. Activists	3	2.42	22. Limited	5	4.13	22. Greedy	3	2.48
23. Young	3	2.42	23. Intelligent	4	3.31	23. Immoral	3	2.48
24. Careful	3	2.42	24. Annoying	4	3.31	24. Cool	2	1.65
25. Pretentious	3	2.42	25. Awkward	4	3.31	25. Unethical	2	1.65
26. Unhealthy	3	2.42	26. Trendy	4	3.31	26. Foodie	2	1.65
27. Sensible	3	2.42	27. Thoughtful	4	3.31	27. Western	2	1.65
28. Left-wing	3	2.42	28. Young	3	2.48	28. Full	2	1.65
29. Hippies	3	2.42	29. Eco-conscious	3	2.48	29. Older	2	1.65
30. Positive	2	1.61	30. Hungry	3	2.48			
31. Ok	2	1.61	31, normal	3	2.48			
32. Proactive	2	1.61	32. Moral	3	2.48			
33. Responsible	2	1.61	33. Misunderstood	2	1.65			
34. Poor	2	1.61	34. Fad	2	1.65			
35. Crazy	2	1.61	35. Nice	2	1.65			
36. Adaptable	2	1.61	36. Conscientious	2	1.65			
37. Militant	2	1.61	37. Snob	2	1.65			
38. Moral	2	1.61	38. Committed	2	1.65			
			39. Concerned	2	1.65			
			40. Sad	2	1.65			
			41. Good	2	1.65			
			42. Sensible	2	1.65			
			43. Activists	2	1.65			
			44. Left-wing	2	1.65			

Table 2. Meat reducer social representation, showing the most frequently mentioned and highly ranked constructs associated with meat reducers.

	High mean rank	**Low mean rank**
	<2.5	**>2.5**
High mean frequency	Healthy	Fit
>9.2	Eco-friendly	Frugal
	Conscious	Caring
	Animal lovers	Happy
	Thoughtful	Intelligent
Low mean frequency	Eco-conscious	Kind
<9.2	Health conscious	Good
	Ethical	Concerned
	Pretentious	Trendy
	Left-wing	Slim
	Trying	Fad
	Responsible	Disciplined
		Activists
		Young
		Careful
		Unhealthy
		Sensible
		Hippies
		Ok
		Proactive
		Poor
		Crazy
		Militant

Table 3. Vegetarian social representation, showing the most frequently mentioned and highly ranked constructs associated with vegetarians.

	High mean rank	**Low mean rank**
	<2.6	**>2.6**
High mean frequency	Healthy	Eco-friendly
>8.4	Animal lovers	Unhealthy
	Ethical	Fussy
		Judgemental
		Slim
		Pretentious
		Boring
		Hippies
		Caring
		Strange
Low mean frequency	Conscious	Fit
<8.4	Health conscious	Different
	Idiots	Kind
	Religious	Happy
	Thoughtful	Limited
	Eco-conscious	Intelligent
	Hungry	Annoying
	Normal	Awkward
	Sensible	Trendy
	Misunderstood	Young
	Fad	Moral
	Committed	Nice
	Activists	Conscientious
		Snob
		Concerned
		Sad
		Good
		Left-wing

Table 4. Habitual meat consumer social representation, showing the most frequently mentioned and highly ranked constructs associated with habitual meat consumers.

	High mean rank	**Low mean rank**
	<2.6	**>2.6**
High mean frequency	Normal	Fat
>9.8	Healthy	Fit
	Unhealthy	Enjoyable
	Hungry	Masculine
		Strong
		Balanced
Low mean frequency	Not eco-friendly	Happy
<9.8	Ignorant	Inconsiderate
	Cruel	Good
	Selfish	Bad
	Full	Ok
	Unethical	Old-fashioned
	Cool	Greedy
	Older	Rich
		Immoral
		Foodie
		Western

Table 5. Mean values, standard deviations, and ANOVA for the traits used to evaluate the hypothetical persons between conditions (study two, n = 420).

	Meat reducer (n=143)			Vegetarian (n=141)			Habitual meat consumer (n=136)			ANOVA	
	M	*SD*	*95% CI*	*M*	*SD*	*95% CI*	*M*	*SD*	*95% CI*	*F*	η_p^2
not an animal lover – an animal lover	68.54[a]	19.57	[65.3, 71.77]	73.13[a]	18.62	[70.04, 76.23]	50.34[b]	18.71	[47.16, 53.51]	55.54*	.212
does not care about the environment – does care about the environment	70.28[a]	19.97	[66.98, 73.58]	73.40[a]	17.72	[70.45, 76.51]	53.57[b]	18.49	[50.44, 56.71]	44.34*	.176
not health conscious – health conscious	72.62[a]	18.59	[69.55, 75.86]	71.49[a]	18.83	[68.35, 74.62]	52.05[b]	20.37	[48.6, 55.51]	49.33*	.192
immoral - moral	67.24[ab]	21.07	[63.76, 70.73]	71.01[a]	18.35	[67.95, 74.06]	64.43[b]	18.33	[61.33, 67.54]	4.07*	.019
not likeable – likeable	69.27	20.34	[65.9, 72.63]	72.33	17.26	[69.46, 75.21]	67.19	18.86	[63.99, 70.39]	2.56[ns]	.012
boring - interesting	57.12	20.47	[53.74, 60.5]	56.88	20.03	[53.55, 60.21]	53.17	19.90	[49.79, 56.54]	1.66[ns]	.008
selfish - selfless	60.41[ab]	19.93	[57.12, 63.71]	62.44[a]	18.94	[59.29, 65.59]	55.70[b]	17.03	[52.81, 58.59]	4.73*	.022
unintelligent – intelligent	69.15[a]	18.37	[66.12, 72.18]	70.50[a]	16.90	[67.68, 73.71]	63.71[b]	17.82	[60.68, 66.73]	5.64*	.027
close-minded – open-minded	64.40[a]	19.54	[61.17, 67.63]	65.28[a]	19.38	[62.05, 68.5]	54.67[b]	20.90	[51.12, 58.21]	11.95*	.055
masculine – feminine	52.17[ab]	18.30	[49.15, 55.2]	56.70[a]	18.67	[53.59, 59.81]	50.13[b]	17.69	[47.13, 53.12]	4.7*	.023
unattractive – attractive	54.37	17.63	[51.46, 57.28]	58.14	17.84	[55.17, 61.11]	53.68	14.99	[51.13, 56.22]	2.77[ns]	.014

*$p < 0.05$; [ns] = not significant at $p < 0.05$ level; letters denote significant differences between conditions. Mean values have been collapsed across cohort as all main effects and condition x cohort interactions were non-significant. Higher values indicate higher ratings in the given traits (possible range 1-100).

Appendices

Table A.1: Summary of measures and covariates used for studies one and two.

Measure	Items	Assessment
Awareness of sustainability and diet (5 items, adapted from de Boer, et al., 2013; Eating Better Survey, 2017)	Climate change and the degradation of the environment are very real threats to our future. *The seriousness of climate change has been exaggerated* Producing and consuming meat/livestock products has a significant negative impact on the environment (e.g. deforestation, water pollution). Producing and consuming meat/livestock products is a major cause of climate change Reducing meat consumption (i.e. choosing one or more meat-free meals every week) can make a big difference to nature and climate protection	7- point scale (1=strongly disagree, 7=strongly agree); scores averaged to create a 'composite environmental awareness' score per participant.
Participant dietary habits	Which of the following most closely describes your dietary habits? a. Vegetarian (does not eat meat or fish, but may eat cheese, butter, milk, and/or eggs) b. Vegan (does not eat meat, fish, cheese, butter, milk, eggs, or any other products derived from an animal) c. Pescetarian (does not eat meat, but eats fish) d. Meat consumer (does not fit into one of the above; eats meat, either frequently or infrequently)	Multichoice
Meat reduction status[a]	Are you currently reducing your consumption of red meat (e.g. beef, veal, pork, lamb, bacon, venison, ham)? Are you currently reducing your consumption of white meat (e.g. chicken, turkey, duck, rabbit)? Are you currently reducing your consumption of fish?	Yes/No
Age	What is your age?	*Open-ended textbox*
Sex	What is your sex?	*Male, Female, Other, Prefer not to say*
Ethnicity	What is your ethnic group?	*White, Mixed/Multiple ethnic groups, Asian or Asian British, Black or Black British, Prefer not to say, Other (please specify)*
Nationality	What is your nationality?	*Dropdown box with 225 options; Prefer not to say*
Education (The Office for National Statistics Census, 2011)	What is your highest level of education?	*No formal qualifications, 1-4 GCSEs or equivalent qualifications, 5 GCSEs or - equivalent qualifications, Apprenticeships, 2 or more A-levels or equivalent qualifications, Bachelors degree or equivalent, Doctoral or higher education, Other qualifications including foreign qualifications*
Political inclination (from The British Election Study; Fieldhouse et al., 2018)	Generally speaking, do you think of yourself as Labour, Conservative, Liberal Democrat, or other?	*Conservative, Labour, Liberal Democrat, Scottish National Party (SNP), Plaid Cymru, United Kingdom Independence Party (UKIP), Green Party, Sinn Fein, British National Party (BNP), No – none, Don't know, Prefer not to say, Other party (please specify)*
Subjective Socioeconomic Status (The MacArthur Scale of Subjective Social Status; Adler & Stewart, 2007)	Participants were given the following instruction: *Think of this ladder as representing where people stand in society.* *At the top of the ladder are the people who are best off—those who have the most money, most education and the best jobs.* *At the bottom are the people who are worst off—who have the least money, least education and the worst jobs or no job.*	An image of a ladder was presented with clickable rungs (1-10).

Measure	Items	Assessment
	The higher up you are on this ladder, the closer you are to people at the very top and the lower you are, the closer you are to the bottom. *Please click on the rung where you think you would stand at this point in your life, relative to other people in the United Kingdom.*	
Income[b]	What the total annual income of your household (before tax and deductions)?	*Below £10,000, £10,001-£20,000, £20,001-£30,000. £30,001-£40,000, Above £40,000, Prefer not to say*
Employment Status	What is your current employment status?	*Full time (40 or more hours per week), Part time (up to 39 hours per week), Unemployed, Student, Retired, Homemaker, Unable to work, Other (please specify), Prefer not to say*
Index of Multiple Deprivation (Ministry of Housing, Communities & Local Government, 2015)	Which postcode do you live in? (Please use capital letters and add a space between the outward code and inward code, e.g. write S3 7EQ rather than S37EQ or s37eq)	*UK postal code content textbox* postcodes were used to identify participants' socioeconomic status using the Index of Multiple Deprivation

[a] appeared only to participants that had indicated they were a meat consumer in the previous question about dietary habits. [b] appeared to all participants in study one, but only to participants in the staff cohort of study two.

Table A.2: Participant characteristics (study one, n=366).

	Total Sample (n=366)	**Meat Reducer Condition (n=124)**	**Vegetarian Condition (n=121)**	**Habitual Meat Consumer Condition (n=121)**
Sex, n (%)				
Female	189 (51.6)	67 (54)	58 (47.9)	64 (52.9)
Male	173 (47.3)	56 (45.2)	62 (51.2)	55 (45.5)
Other	2 (0.6)	1 (0.8)		1 (0.8)
Prefer not to say	2 (0.6)		1 (0.8)	1 (0.8)
Age (years), mean (SD)	44.19 (15.16)	44.3 (14.16)	45.6 (15.34)	42.65 (15.94)
95% CI	[42.64, 45.74]	[41.81, 46.8]	[42.86, 48.33]	[42.64, 45.74]
Nationality, n (%) British	318 (86.9)	109 (87.9)	105 (86.8)	104 (86)
Ethnicity, n (%)				
White	288 (78.7)	97 (78.2)	95 (78.5)	96 (79.3)
Asian	30 (8.2)	13 (10.5)	10 (8.3)	7 (5.8)
Black	21 (5.7)	8 (6.5)	7 (5.8)	7 (5.8)
Mixed	18 (4.9)	4 (3.2)	7 (5.8)	6 (5)
Other	6 (1.6)	2 (1.6)	1 (0.8)	3 (2.5)
Prefer not to say	3 (0.8)		1 (0.8)	2 (1.7)
Political Alignment, n (%)				
Labour	93 (25.4)	35 (28.2)	28 (23.1)	30 (24.8)
Conservative	66 (18)	19 (15.3)	22 (18.2)	25 (20.7)
Liberal Democrat	55 (15)	16 (12.9)	23 (19)	16 (13.2)
Green	46 (12.6)	24 (19.4)	8 (6.6)	14 (11.6)
Other	34 (9.3)	8 (6.5)	14 (11.6)	12 (9.9)
None	23 (6.3)	6 (4.8)	8 (6.6)	9 (7.4)
Don't know	34 (9.3)	12 (9.7)	13 (10.7)	9 (7.4)
Prefer not to say	15 (4.1)	4 (3.2)	5 (4.1)	6 (5)
Employment Status, n (%)				
Full Time	145 (39.7)	56 (45.2)	42 (35)	47 (38.8)
Part Time	74 (20.3)	24 (19.4)	29 (24.2)	21 (17.4)
Student	28 (7.7)	7 (5.7)	7 (5.8)	14 (11.6)
Retired	49 (13.4)	15 (12.1)	16 (13.3)	18 (14.9)
Unemployed	22 (6)	6 (4.8)	6 (5)	10 (8.3)
Other	47 (12.9)	16 (12.9)	20 (16.7)	11 (9.1)
Income, n (%)				
Below £10,000	34 (9.3)	6 (4.8)	14 (11.6)	14 (11.6)
£10,001-£20,000	74 (20.2)	22 (17.7)	33 (27.3)	19 (15.7)
£20,001-£30,000	61 (16.7)	21 (16.9)	22 (18.2)	18 (14.9)
£30,001-£40,000	62 (16.9)	23 (18.6)	20 (16.5)	19 (15.7)
Above £40,000	109 (29.8)	42 (33.9)	26 (21.5)	41 (33.9)
Prefer not to say	26 (7.1)	10 (8.1)	6 (5)	10 (8.3)
Education, n (%)				
1-5 GSCSEs or equivalent	63 (17.2)	22 (17.7)	21 (17.4)	20 (16.5)
A-levels	77 (21)	25 (20.2)	24 (19.8)	28 (23.1)
Apprenticeship	13 (3.6)	5 (4)	5 (4.1)	3 (2.5)
Bachelors level	152 (41.5)	51 (41.1)	50 (41.3)	51 (42.2)
Higher education	47 (12.8)	18 (14.5)	17 (14.1)	12 (9.9)

	Total Sample (n=366)	Meat Reducer Condition (n=124)	Vegetarian Condition (n=121)	Habitual Meat Consumer Condition (n=121)
Other	10 (2.7)	2 (1.6)	3 (2.5)	5 (4.1)
None	4 (1.1)	1 (0.8)	1 (0.8)	2 (1.7)
Socioeconomic Status (IMD Decile)[a], mean (SD)	5.41 (2.73)	5.5 (2.63)	5.44 (2.98)	5.29 (2.56)
Subjective Socioeconomic Status[b], mean (SD)	5.72 (1.69)	5.69 (1.63)	5.89 (1.73)	5.59 (1.69)
Diet, n (%)				
Meat consumer (no reduction)	148 (40.4)	47 (37.9)	55 (45.5)	46 (38)
Meat reducer	146 (39.9)	54 (43.6)	45 (37.2)	47 (38.8)
Pescetarian	26 (7.1)	8 (6.5)	11 (9.1)	7 (5.8)
Vegetarian	34 (9.3)	12 (9.7)	7 (5.8)	15 (12.4)
Vegan	12 (3.3)	3 (2.4)	3 (2.5)	6 (5)
Environmental awareness score[c], mean (SD)	5.16 (1.11)	5.22 (1.04)	5.04 (1.14)	5.24 (1.15)
95% CI	[5.05, 5.28]	[5.03, 5.4]	[4.83, 5.24]	[5.04, 5.44]

[a] Index of Multiple Deprivation Decile possible range: 1=most deprived, 10= least deprived.

[b] Subjective socioeconomic status possible range: 1=least well off, 10=most well off.

[c] Environmental awareness possible range 1 = lowest environmental awareness, 7 = highest environmental awareness.

Table A.3: Examples of synonyms that were grouped together in each category construct (study one, n=366).

Category	**Common words**
healthy	healthy, health, healthier, wellbeing, reduce diseases
eco-friendly	green, environmental, environmentally friendly, eco, sustainable
animal lovers	Animal lovers, care about animals, animal rights, animal welfare, animal friendly
unhealthy	Unhealthy, pale, cholesterol, protein deficient, bowel cancer
normal	Normal, average, traditional, mainstream, majority
fit	Fit, muscle, gym, active, athletes
conscious	Aware, conscious, mindful, forward thinking, informed
happy	Happy, satisfied, pleased, content, cheerful
ethical	Ethical, virtuous, principled
caring	Caring, considerate, empathic, altruistic

Table A.4: Vignettes used per condition (study two, n=420). Square brackets indicate differences between staff and student participant cohorts [staff/student].

Condition	Vignette
Meat Reducer	*Imagine a fellow* [colleague/student] *at the University of Sheffield. On a typical day, this* [person goes to work/student attends classes] *and either eats a packed lunch or picks something up from a café at the Student Union. Once a week they have lunch with friends, and try to suggest a cheap bar or café with a variety of options. At these lunches, they prefer vegetarian options like a veggie burger or a grilled veggie wrap, if they are available. This is because they have recently begun to reduce their meat intake. At the end of each day, they eat dinner at home, and might go for a walk in the park if the weather is nice. They spend the rest of the night either* [browsing the internet or watching TV with family/catching up with friends, watching TV, browsing the internet, or working on assignments].
Vegetarian	*Imagine a fellow* [colleague/student] *at the University of Sheffield. On a typical day, this* [person goes to work/student attends classes] *and either eats a packed lunch or picks something up from a café at the Student Union. Once a week they have lunch with friends, and try to suggest a cheap bar or café with a variety of options. At these lunches, they prefer options like a veggie burger or a grilled veggie wrap. This is because they have recently become a vegetarian. At the end of each day, they eat dinner at home, and might go for a walk in the park if the weather is nice. They spend the rest of the night either* [browsing the internet or watching TV with family/catching up with friends, watching TV, browsing the internet, or working on assignments].
Habitual Meat Consumer	*Imagine a fellow* [colleague/student] *at the University of Sheffield. On a typical day, this* [person goes to work/student attends classes] *and either eats a packed lunch or picks something up from a café at the Student Union. Once a week they have lunch with friends, and try to suggest a cheap bar or café with a variety of options. At these lunches, they prefer* options like a beef burger or grilled chicken wrap. *At the end of each day, they eat dinner at home, and might go for a walk in the park if the weather is nice. They spend the rest of the night either* [browsing the internet or watching TV with family/catching up with friends, watching TV, browsing the internet, or working on assignments].

Table A.5: Participant characteristics (study two, n=420).

		Staff (n=214)			Students (n=206)		
	Total Sample (n=420)	**Meat Reducer Condition (n=72)**	**Vegetarian Condition (n=73)**	**Habitual Meat Consumer Condition (n=69)**	**Meat Reducer Condition (n=71)**	**Vegetarian Condition (n=68)**	**Habitual Meat Consumer Condition (n=67)**
Sex, n (%)							
Female	304 (72.4)	54 (75)	50 (68.5)	52 (75.4)	43 (60.6)	52 (76.5)	53 (79.1)
Male	108 (25.7)	15 (20.8)	22 (30.1)	1, (23.2)	26 (36.6)	16 (23.5)	13 (19.4)
Other	5 (1.2)	3 (4.2)	1 (1.4)		1 (1.4)		
Prefer not to say	3 (0.7)			1 (1.4)	1 (1.4)		1 (1.5)
Age, mean (SD)	30.8 (12.14)	37.25 (11.57)	39.1 (11.83)	37.8 (11.06)	24.72 (7.97)	22.04 (5.93)	22.71 (7.16)
95% CI	[29.64, 31.96]	[34.58, 39.92]	36.38, 41.81]	[35.19, 40.41]	[22.86, 26.57]	[20.63, 23.45]	[20.98, 24.44]
Nationality, n (%) British	323 (76.9)	64 (88.9)	69 (94.5)	62 (89.9)	44 (62)	44 (64.7)	40 (59.7)
Ethnicity, n (%)							
White	346 (82.4)	65 (90.3)	71 (97.3)	63 (91.3)	49 (69)	50 (73.5)	48 (71.6)
Asian	42 (10)	3 (4.2)	2 (2.7)	1 (1.5)	15 (21.1)	11 (16.2)	10 (14.9)
Black	5 (1.2)			1 (1.4)	1 (1.4)	2 (2.9)	1 (1.5)
Mixed	15 (3.6)	1 (1.4)		2 (2.9)	5 (7)	3 (4.4)	4 (6)
Other	9 (2.1)	1 (1.4)		1 (1.5)	1 (1.4)	2 (2.9)	4 (6)
Prefer not to say	3 (0.7)	2 (2.8)		1 (1.5)			
Political Alignment, n (%)							
Labour	151 (36.2)	24 (33.3)	30 (41.1)	30 (43.5)	19 (27.5)	26 (38.2)	22 (33.3)
Conservative	20 (4.8)	7 (9.7)	3 (4.1)	3 (4.4)	2 (2.9)	2 (2.9)	3 (4.6)
Liberal Democrat	50 (12)	8 (11.1)	9 (12.3)	5 (7.3)	13 (18.8)	5 (7.4)	10 (15.2)
Green	55 (13.2)	17 (23.6)	5 (6.9)	13 (18.8)	8 (11.6)	7 (10.3)	5 (7.6)
Other	16 (3.8)	4 (5.6)	1 (1.4)	2 (2.9)	3 (4.4)	4 (5.9)	2 (3)
None	56 (13.4)	5 (6.9)	13 (17.8)	10 (14.5)	7 (10.1)	10 (14.7)	11 (16.7)
Don't know	52 (12.5)	6 (8.3)	7 (9.6)	4 (5.8)	14 (20.3)	11 (16.2)	10 (15.2)
Prefer not to say	17 (4.1)	1 (1.4)	5 (6.9)	2 (2.9)	3 (4.4)	3 (4.4)	3 (4.6)
Employment Status, n (%)							

		Staff (n=214)			Students (n=206)		
	Total Sample (n=420)	**Meat Reducer Condition (n=72)**	**Vegetarian Condition (n=73)**	**Habitual Meat Consumer Condition (n=69)**	**Meat Reducer Condition (n=71)**	**Vegetarian Condition (n=68)**	**Habitual Meat Consumer Condition (n=67)**
Full Time	125 (30.1)	40 (55.6)	37 (51.4)	40 (58)	1 (1.5)	2 (3)	5 (7.6)
Part Time	102 (24.6)	29 (40.3)	31 (43.1)	24 (34.8)	5 (7.3)	7 (10.5)	6 (9.1)
Student	168 (40.5)				61 (88.4)	56 (83.6)	51 (77.3)
Other	17 (4.1)	3 (4.2)	4 (5.6)	4 (5.8)	2 (2.9)	2 (3)	2 (3)
Unemployed	2 (0.5)						2 (3)
Income, n (%)							
Below £10,000		1 (1.4)					
£10,001-£20,000		14 (19.4)	10 (13.9)	10 (14.5)			
£20,001-£30,000		20 (27.8)	19 (26.4)	19 (27.5)			
£30,001-£40,000		14 (19.4)	10 (13.9)	9 (13)			
Above £40,000		20 (27.8)	27 (37.5)	27 (39.1)			
Prefer not to say		3 (4.2)	6 (8.3)	4 (5.8)			
Education, n (%)							
1-5 GSCSEs or equivalent	25 (6)	5 (6.9)	10 (13.9)	9 (13)			1 (1.5)
≥2 A-levels	138 (33.3)	13 (18.1)	8 (11)	8 (11.6)	32 (46.4)	42 (61.8)	35 (53)
Apprenticeship	4 (1)	3 (4.2)	1 (1.4)				
Bachelors level	173 (41.7)	34 (47.2)	41 (56.9)	34 (49.3)	27 (39.1)	15 (22.4)	22 (33.3)
Higher education	58 (14)	16 (22.2)	8 (11.1)	15 (21.7)	8 (11.6)	5 (7.5)	6 (9.1)
Other	14 (3.4)		3 (4.2)	2 (2.9)	2 (2.9)	5 (7.5)	2 (3)
None	2 (0.5)	1 (1.4)	1 (1.4)				
Prefer not to say	1 (0.2)			1 (1.5)			
Socioeconomic Status (IMD Decile[a]), mean (SD)	6.24 (2.8)	6 (1.8)	5.7 (1.43)	5.67 (1.53)	4.94 (1.54)	5.03 (1.61)	5.11 (1.74)
Subjective Socioeconomic Status[b], mean (SD)	5.42 (1.7)	5.58 (2.98)	5.85 (2.54)	6.24 (2.7)	6.83 (2.73)	6.72 (2.75)	6.3 (2.87)
Diet, n (%)							

		Staff (n=214)			Students (n=206)		
	Total Sample (n=420)	**Meat Reducer Condition (n=72)**	**Vegetarian Condition (n=73)**	**Habitual Meat Consumer Condition (n=69)**	**Meat Reducer Condition (n=71)**	**Vegetarian Condition (n=68)**	**Habitual Meat Consumer Condition (n=67)**
Meat consumer (no reduction)	126 (30)	21 (29.2)	21 (28.8)	20 (29)	20 (28.2)	21 (30.9)	23 (34.3)
Meat reducer	190 (45.2)	33 (45.8)	31 (42.5)	35 (50.7)	31 (43.7)	29 (42.7)	31 (46.3)
Pescetarian	25 (6)	1 (1.4)	10 (13.7)	7 (10.1)	1 (1.4)	3 (4.4)	3 (4.5)
Vegetarian	54 (12.9)	8 (11.1)	8 (11)	5 (7.3)	16 (22.5)	9 (13.2)	8 (11.9)
Vegan	25 (6)	9 (12.5)	3 (4.1)	2 (2.9)	3 (4.2)	6 (8.8)	2 (3)
Environmental awareness score[c], mean (SD)	5.62 (1.03)	5.68 (0.84)	5.58 (1.13)	5.7 (1.03)	5.69 (0.98)	5.69 (1.04)	5.41 (1.12)
95% CI	[5.53, 5.72]	[5.48, 5.87]	[5.33, 5.84]	[5.46, 5.94]	[5.46, 5.92]	[5.44, 5.93]	[5.13, 5.68]

[a] Index of Multiple Deprivation Decile possible range: 1=most deprived, 10= least deprived.

[b] Subjective socioeconomic status possible range: 1=least well off, 10=most well off.

[c] Environmental awareness possible range 1 = lowest environmental awareness, 7 = highest environmental awareness.