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Research report

Meat, beyond the plate. Data-driven hypotheses for understanding consumer willingness to adopt a more plant-based diet ☆

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ABSTRACT

A shift towards reduced meat consumption and a more plant-based diet is endorsed to promote sustainability, improve public health, and minimize animal suffering. However, large segments of consumers do not seem willing to make such transition. While it may take a profound societal change to achieve significant progresses on this regard, there have been limited attempts to understand the psychosocial processes that may hinder or facilitate this shift. This study provides an in-depth exploration of how consumer representations of meat, the impact of meat, and rationales for changing or not habits relate with willingness to adopt a more plant-based diet. Multiple Correspondence Analysis was employed to examine participant responses (N = 410) to a set of open-ended questions, free word association tasks and closed questions. Three clusters with two hallmarks each were identified: (1) a pattern of disgust towards meat coupled with moral internalization; (2) a pattern of low affective connection towards meat and willingness to change habits; and (3) a pattern of attachment to meat and unwillingness to change habits. The findings raise two main propositions. The first is that an affective connection towards meat relates to the perception of the impacts of meat and to willingness to change consumption habits. The second proposition is that a set of rationales resembling moral disengagement mechanisms (e.g., pro-meat justifications; self-exonerations) arise when some consumers contemplate the consequences of meat production and consumption, and the possibility of changing habits.

Introduction

During the last century there was a massive and unprecedented increase in the frequency and amount of consumption of animal-based products, materializing in an ongoing global approach to the standards and lifestyles of industrialized western countries (Delgado, Rosegrant, Steinfeld, Ehui, & Courbois, 1999). This transition characterizes a rise in the consumption of livestock products and a shift away from grains and vegetables as societies become more affluent (Popkin, 2011). As a result, this global lifestyle change directly opposes the growing scientific consensus that plant-based diets (i.e., those diets which have the bulk of calories from plant sources while limiting or avoiding animal sources) are more sustainable (e.g., de Boer & Aiking, 2011; Pimentel & Pimentel, 2003), more healthy (e.g., American Dietetic Association, 2003; Sabaté, 2003), and alleviate animal suffering (e.g., Foer, 2010; Singer & Mason, 2006).

In spite of these benefits, large segments of consumers in western societies do not seem willing to eat a plant-based diet (Lea, Crawford, & Worsley, 2006a, 2006b) or reduce meat consumption (Latvala et al., 2012; Schösler, de Boer, & Boersema, 2012). Several scholars have been alerting that it may take a profound societal transition to achieve significant progresses on this regard (Dagevos & Voordouw, 2013; Schösler et al., 2012). However, evidence concerning the psychosocial processes which affect this shift remains sparse and insufficient relating to changes at the societal level (Cole & McCoskey, 2013; Stehfest et al., 2009). We believe that converging two recent lines of research will allow to provide new insights and improve theoretical integration of consumer motivations, thus better explaining consumer willingness and resistance to change. More specifically we refer to studies on willingness to eat plant-based diets and meat substitutes, and findings on the different contexts in which consumers expect meat as a food item. To provide an integrative framework from which to add to current knowledge, pertinent research and propositions on each of these topics are briefly summarized below.

Willingness to eat plant-based diets and meat substitutes

To our knowledge, only a pair of studies conducted in Australia has specifically addressed consumer willingness to eat plant-based diets (Lea et al., 2006a, 2006b). Although observing that some

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consumers perceived several benefits in such diets, conclusions were that the large majority of the population was not ready to move away from meat. Significant perceived barriers included lack of dietary information, lack of desire to change habits, lack of options when eating out, and health concerns. However, the majority of participants in these studies actually disagreed that these were barriers to eating a plant-based diet, even though they were not following and not willing to follow one. Lea et al. called for more research to further understand their findings, and raised the possibility that there are other barriers to consumption that were not assessed in their studies.

Although not specifically targeted at plant-based diets, another set of studies exploring consumer acceptance of environmentally sustainable meat substitutes may provide insight into this issue (Elzerman, Hoek, van Boekel, & Luning, 2011; Hoek et al., 2011, 2013; Schösler et al., 2012). For instance, individuals who did not use meat substitutes or had a "light/medium" usage (i.e., less than once per month; once per month or more, but less than once per week) failed to accept the meat substitutes as viable alternatives to meat despite acknowledging ethical and weight control advantages which may accompany higher use of meat substitutes (Hoek et al., 2011). The key barriers found to hinder meat substitute acceptance were related to the product, namely unfamiliarity and low sensory appeal compared to meat. In order to make meat substitutes more attractive to meat consumers, product developers are thus called to significantly improve the sensory quality and resemblance to meat (Hoek et al., 2011; Tucker, 2014). Likewise, the most promising pathways to encourage large-scale shifts towards more plant-based diets are likely the ones that do not challenge existing meal formats and hierarchies, in which meat occupies a central role (Schösler et al., 2012).

Indeed, meat still occupies a central position in Western food culture and is depicted as the centre of meals (Barrena & Sánchez, 2009; Fiddes, 1991; Holm & Møhl, 2000; Twigg, 1984). There is also evidence of the belief that meat is necessary and seen as an irreplaceable source of vitality, coupled with the idea that plant-based meals are nutritionally deficient (Lea & Worsley, 2001). Gender plays an important role in this issue, with studies consistently showing higher levels in frequency and amount of meat consumption among men, and higher willingness to eat plant-based meals among women (e.g., Beardsworth & Keil, 1991; Prättälä et al., 2007; Rothgerber, 2013; Ruby, 2012; Santos & Booth, 1996). Furthermore, consumers identify that meat has unique sensory properties in terms of texture and taste (Grunert, Bredahl, & Brunsø, 2004; Kenyon & Barker, 1998). Additionally, meat substitutes tend to rank lower than meat overall, but in particular the substitutes fail with regard to sensory appreciation and other attributes such as value and luxury (Hoek et al., 2011).

Meat in context: different framings may help explain incongruences

Following a review on consumer perceptions of risk and safety issues surrounding meat, Korzen and Lassen (2010) commented on the conflict between attitudes and behaviours, and the assumption in the reviewed studies that people should be consistent in what they say and do. Likewise, several studies have been showing that although many consumers express health, environmental and animal welfare-related concerns about meat, their behaviour is often not in accordance with their concerns (Holm & Møhl, 2000; Hoogland, de Boer, & Boersema, 2005; Verbeke, Pérez-Cueto, de Barcellos, Krystallis, & Grunert, 2010). Introducing context as a methodological and analytical tool may facilitate a better understanding of consumer perceptions and make sense of some of these apparent inconsistencies (Korzen & Lassen, 2010). For example, meat in the context of everyday food practices may emerge for consumers anchored in a particular frame of reference (e.g., taste preferences, price, buying, or cooking), and exclude other framings associated with the impacts of current patterns of production and consumption (e.g., environment, health, or animal welfare). Harmonizing concerns people have and the choices people make as consumers may thus benefit from an improved understanding on how these different framings interact.

Although to our knowledge no studies have specifically addressed these interactions, recent evidence on what is called the "meat paradox" (i.e., people enjoying eating meat but disapproving of harming animals; see Loughnan, Bastian, & Haslam, 2014) does provide some insights. Specifically, overlapping the framings of meat as food and meat as animal seems to evoke dissonance in the moral domain. For instance, categorization as food was found to reduce animals' perceived capacity to suffer and restrict moral concern for animals (Bratanova, Loughnan, & Bastian, 2011). Likewise, it was observed that eating meat reduces moral concern for animals in general, the perceived moral status of animals used for meat, and the ascription of mental states necessary to experience suffering (Loughnan, Haslam, & Bastian, 2010). In contrast, having people first reflect on their own perceptions of animals' mental attributes subsequently increases feelings of disgust at the thought of eating animals (Ruby & Heine, 2012). Disgust is an emotional aversion and a critical factor in determining people's willingness to ingest a given food (Rozin & Fallon, 1987). It also plays a key role in moral judgement (Pizarro, Inbar, & Helion, 2011; Rozin, Markwith, & Stoess, 1997). Denying animals certain psychological characteristics has indeed been identified as a mechanism of moral disengagement among meat eaters (Bilewicz, Imhoff, & Drogosz, 2011).

Current study – research questions and objectives

Plant-based diets and alternatives to meat are increasingly associated with several benefits, but a high consumption of meat and a low regard for meat substitutes is still the dominant cultural pattern in most western societies. Most consumers do not seem willing to shift towards a more plant-based diet. Our general aim is to contribute to a further understanding of the psychosocial processes that hinder or facilitate this transition. We will draw on qualitative data and use multiple correspondence analysis to detect and represent underlying structures in the dataset, as a way to provide opportunities to identify key issues, raise data-driven propositions and derive hypotheses to be tested in further research. Specifically, we address three main research questions regarding the representations, impacts and rationales of diet with regard to meat consumption.

1) *How do representations of meat relate with willingness to adopt a more plant-based diet?*
   Meat's central role and special status are suggested to play a part in hindering a large-scale shift towards plant-based diets, but moving down to the level of the consumer, meat's role and status are only reflective of its appraisal by individuals within a culture. Thus, moving beyond the abstract notion of meat as the dominant food (alongside with other animal-based products), it is the core of that appraisal that must be investigated (Fiddes, 1991). Our objective is to unpack what specific thoughts, ideas and feelings about meat are associated with personal willingness to follow a more plant-based diet. Here we contemplate representations of meat framed in the context of everyday food practices.
2) *How do perceived impacts of meat relate with willingness to adopt a more plant-based diet?*
   We give sequence to the notion that putting meat in context may help in explaining consumer perceptions on its risks and impacts, and extend this proposition to the understanding of meat substitution. By addressing this question, our

objective is to explore how perceptions on the impacts of meat (to the environment, health, and animals) emerge associated with personal willingness to follow a more plant-based diet. Here we contemplate representations of meat framed in the context of its impacts.

3) *How do personal rationales for changing or not changing consumption habits relate with willingness to adopt a more plant-based diet?*
Previous studies on willingness to eat a plant-based diet and on acceptance of meat substitutes point towards several barriers among the majority of consumers (e.g., Hoek et al., 2011; Lea & Worsley, 2003), but these do not consider how consumers may react to the consequences of meat consumption when they are called upon to consider changing their habits. We intend to look at the interplay between the different frames of reference for meat consumption and discover how the rationales for eating meat emerge in response to changing consumption habits.

Methods

Participants and procedure

In an effort to include a wider range of backgrounds and geographical locations (Gosling, Vazire, Srivastava, & John, 2004), this study was conducted through an internet platform and promoted through advertisements on social media. The survey was hosted online by Qualtrics.com and advertised to Portuguese users. A brief recruitment note presented the study as "exploring people's opinions on several issues related with society and different social practices, lifestyles and consumption habits". Participation was rewarded with the option of registering in a draw to win a 9″ tablet. To minimize self-selection biases, no references were made in the advertisement and cover page to the specific goals of the study.

The survey was accessible for eight weeks between May and July 2013. During this period 1180 people clicked on the link to the survey and 410 participants (aged between 18 and 69 years, M = 30.2, SD = 10.9) completed all the measures from the questionnaire. An overview of the sample's characteristics concerning gender, age, education, occupation, place of residence, self-reported diet and eating habits is provided in Table 1. There were concerns about the low completion rate and biases in terms of gender, age and education level. These biases were in line with a trend found in previous online studies and might be consequence of having chosen an online recruitment platform (Cardoso, Lourenço, Costa, Gonçalves, & Nunes, 2013; Geeroms, Verbeke, & Van Kenhove, 2008). The low completion rate was possibly due to the nature of the survey (i.e., mostly constituted by open-ended questions and word association tasks; see description of the measures in the *Measurement* section). With respect to other variables, the present sample showed diversity in terms of employment status (i.e., employed, unemployed, student) and covered a range of occupations, including administrative/technical staff (e.g., customer support, office employees), skilled workers (e.g., teachers, computer programmers) and sales/non-qualified staff (e.g. shop clerks, cleaning staff). Table 1 demonstrates that the sample pool was diverse in terms of background and meat consumption.

We used two ways to address the four attributes of qualitative data: credibility, transferability, dependability and confirmability (Shenton, 2004). We drew upon established methods and analytic procedures to bolster the credibility of the research. However, as this is new research, in order to boost the other three we have been explicit and detailed regarding the measures and analytical procedures.

Table 1
Sample characteristics of the respondent group to the internet questionnaire (N = 410).

Variable	Category	N	%
Gender	Male	123	30.1
	Female	285	69.9
Age	<25	171	41.7
	25–40	168	41
	>40	71	17.3
Education	Basic	10	2.5
	Secondary	133	32.6
	Higher	265	65
Employment status/ occupation	Administrative/Technical staff	69	16.8
	Skilled workers	105	25.6
	Sales/Non-qualified staff	21	5.1
	Other	21	5.2
	Unemployed	61	14.9
	Full-time student	133	32.4
Childhood residence	Rural	113	28
	Urban	291	72
Current residence	Rural	77	18.9
	Urban	330	81.1
Self-reported diet	Omnivore	354	86.3
	Veg*n	56	13.7
Red meat	Regularly	100	24.7
	Occasionally	211	52.1
	Never	94	23.2
White meat	Regularly	175	43
	Occasionally	168	41.3
	Never	64	15.7
Fish	Regularly	105	25.9
	Occasionally	240	59.3
	Never	60	14.8
Fruits and vegetables	Regularly	326	80.7
	Occasionally	72	17.8
	Never	6	1.5
Grain legumes	Regularly	156	38.7
	Occasionally	218	54.1
	Never	29	7.2
Meat substitutes	Regularly	55	13.5
	Occasionally	97	23.8
	Never	256	62.7

Measurement

Data concerning representations of meat, perceived impact, behavioural intentions, willingness to change and rationales used when facing impacts of meat were collected using a set of free word association tasks, open-ended and closed questions.

Meat representations

Participants' representations (i.e., ideas, thoughts, and feelings or emotions) about meat were retrieved by means of two word association tasks. Word association tasks have been widely used in the context of social representations but also in studies on food related thinking based upon different theoretical frameworks (e.g., Mäkiniemi, Pirttilä-Backman, & Pieri, 2011). Participants were asked to write up to eight words or concepts that came to mind with the following instructions: (1) "Meat makes me think, feel or imagine…" and (2) "If I was forced to stop eating meat I would feel…". Below each stimulus were eight lines with bullet points in which respondents could write their answers.

Perceived impact of meat

The perceived impact of meat was retrieved by means of three open-ended questions. Participants were asked to briefly indicate their opinion about how meat consumption may impact (1) nature and the environment, (2) public health and (3) animals. Below each of the topics there were three lines in which participants could write their answers.

Behavioural intentions: willingness to change and rationales used when facing impacts of meat

In the end of the questionnaire participants read a small text mentioning consequences associated with current meat production and consumption standards. Below we quote from the text.

> *In recent years several organizations, entities and scientific studies have been associating current patterns of meat production and consumption to several consequences. Among these consequences there are different impacts to:*
>
> • *Animals: for instance, deprivation of outdoor contexts and contact with natural living environments, impossibility of engaging in natural behaviours, mutilation, overcrowding and inadequate living conditions, infliction of pain and suffering, disruption of natural maternal cycles and offspring development;*
>
> • *Nature and the environment: for instance, pollution of rivers and groundwater tables, deforestation, less sustainability and higher environmental costs in comparison with nutritionally equivalent plant-based foods;*
>
> • *Public health: for instance, marked increase in heart diseases, high blood pressure and overweight, and some types of cancer.*

After reading the text, participants were asked to indicate their intentions and rationales to change or maintain habits: "Do you intend to maintain your current levels of meat consumption?" Yes/No; "Please indicate the reasons that explain your choice" open-ended with three lines in which participants could write their answers; "Are you willing to reduce your current levels of meat consumption, for example, by half?" Yes/No; "Are you willing to follow a Plant-Based Diet (i.e., in which meat is excluded/avoided or its consumption is infrequent and in small portions)?" Yes/No.

Demographic information and eating habits

Demographic information included participants' gender, age, current residence, place of birth (i.e., rural or urban) and education (i.e., basic, secondary, or higher). Eating habits included self-reported diet (i.e., omnivore, vegetarian, or vegan) and frequency of consumption of several food items – "In an ordinary week, how often do you eat: red meat (e.g., pork, beef), white meat (e.g., chicken, turkey), fish, fruits and vegetables, grain legumes (e.g., beans, chick-peas), meat substitutes (e.g., tofu, seitan)". The response scale had three levels (1 – Often/most days; 2 – Seldom/one or two times per week; 3 – Never).

Additional measures

Additionally, participants were asked in the beginning of the survey to fill out a preliminary free word association task and write as many as six short examples of good and bad practices regarding health, the environment, and animals. However, initial analyses showed that this question did not discriminate among the participants. Given the lack of discriminatory value and to reduce the complexity of the dataset this variable was not included in subsequent analysis.[1]

Data analyses

Given the diversity of measures employed in the present study, different analytical procedures were used in preparing the data for identification of patterns in the dataset.

Data retrieved in the free word association tasks (i.e., representations of meat) were converged firstly by putting words in the singular (noun) or infinitive (verb). A total of 939 words (mentioned 2530 times) were retrieved. Words with only one occurrence were then dropped. To ensure preservation of the meanings conveyed by the participants, aggregation in categories occurred in words referring to the same meaning (e.g., category "weak" aggregates "fragile" and "weak") or words from the same family (e.g., category "food" aggregates "meal" and "steak"). A total of 375 words were thus aggregated in 41 categories (mentioned 1703 times). Participants' answers were then coded in the dataset according to the presence or absence of each category (1 = mentioned; 2 = not mentioned).

Data from the open-ended questions (i.e., perceived impacts of meat and rationales used when facing impacts of meat) were thematically analysed using MAXQDA v.10 following the five steps of the procedure proposed by Braun and Clarke (2006): (1) initial data review by reading for meanings and patterns; (2) generation of initial codes using semantic criteria; (3) search for themes by code collation; (4) review and revision of the themes based on an adequate fit between the thematic map and the data set; (5) naming of the data set themes by identifying the core meaning of each theme. To ensure preservation of the original meanings conveyed by the participants, in step three the collation of codes into potential themes was done using semantic criteria (Boyatzis, 1998). A total of 42 themes (mentioned 2309 times) were thus identified in the data from the four open-ended questions. Participants' answers were coded as categories in the dataset according to the presence or absence of each theme (1 = mentioned; 2 = not mentioned).

To favour a parsimonious solution and avoid residual categories that could be problematic when running subsequent analyses, only the categories from the word association tasks and open-ended questions that were mentioned by at least near 10% of the participants were retained, included in the analyses and considered for interpretation purposes. The category system thus comprised 38 categories that were mentioned 2531 times (Table 2). To test the reliability of this category system we randomly selected 30 units of analysis from each measure (total of 180 units of analysis) that were subsequently coded by an independent judge, enabling the determination of the inter-rater agreement (Cohen's kappa ranging from .87 to 1, $p < .001$).

After determining the inter-rater agreement value we performed a multiple correspondence analysis (MCA) and a hierarchical cluster analysis (HCA). MCA was used to explore the interrelationships between the categorical variables (Greenacre, 2007) and the HCA was performed in order to validate the MCA pattern solution (Hair, Black, Babin, & Anderson, 2010), while using MCA standardized object scores as input variables (Bernardes, Silva, Carvalho, Costa, & Pereira, 2014). The HCA was suited by a k-means algorithm (non-hierarchical clustering method). Analyses were performed using IBM SPSS Statistics (version 20).

Results

This study explored how representations of meat, perceived impacts of meat, and rationales for changing/not changing habits emerge associated with willingness to adopt a more plant-based diet (i.e., intention to change habits, willingness to reduce meat consumption, and willingness to follow a plant-based diet). We began by providing a brief description of the participants' answers in terms of frequency and semantic content, and then proceeded to the interpretation of the dimensions identified in the MCA. Finally, we presented the topological representation of the interrelationships between categories and also described the results from the HCA.

Descriptive results

Table 2 shows the most frequent categories that emerged from the participants' responses to each of the tasks in study. In the first

[1] However, to meet the criteria for trustworthiness in qualitative research, the measure is nonetheless reported in this section.

Table 2
Frequency, proportion and discrimination measures for each category.

(Task) Categories	Meaning	Dimensions[a]		
		n (%)	1	2
(Representations of meat) Meat				
Pleasure		169 (41.2)	**.285**	.000
Food		97 (23.7)	.110	.000
Animals		90 (22)	.083	.025
Death	[b]	60 (14.6)	**.184**	.001
Satiated		54 (13.2)	.090	.006
Suffering		46 (11.2)	**.278**	.048
Disgust		45 (11)	**.248**	.045
(Representations of meat) No meat				
Well		85 (20.7)	**.278**	.002
Sad		80 (19.5)	**.143**	.004
Bad		54 (13.2)	.078	.001
Missing something	[b]	49 (12)	.061	.005
Clear conscience		44 (10.7)	**.233**	.026
Indifferent		41 (10)	.000	**.078**
Would adapt		41 (10)	.001	.026
Weak		40 (9.8)	.084	.018
(Perceived impacts) Animals				
Industry	*References to mass production and artificial methods*	116 (28.3)	.054	**.059**
Poor conditions	*Animals kept in poor conditions*	101 (24.6)	**.179**	.009
Suffering	*Animals suffer in production and/or slaughter*	74 (18)	**.295**	.018
Disrespect	*Animals disrespected, instrumentalized and/or victims of injustice*	64 (15.6)	**.313**	.052
Purpose	*Livestock animals serve the purpose of meat extraction*	55 (13.4)	**.149**	.051
Abuse	*Animals victims of abuse*	51 (12.4)	**.171**	.018
If unregulated	*Impacts only if unregulated or in excess*	46 (11.2)	.025	.003
(Perceived impacts) Nature				
Pollution	*Pollutes nature and the environment*	100 (24.4)	**.185**	.018
Depletion	*Erosion, disruption and depletion of natural resources*	80 (19.5)	**.275**	.039
Industry	*References to mass production and artificial methods*	73 (17.8)	.090	.001
If unregulated	*Impacts only if unregulated or in excess*	56 (13.7)	.044	.000
No impact	*Does not impact nature and the environment*	43 (10.5)	.114	.049
(Perceived impacts) Health				
Diseases	*Diseases associated with meat*	71 (17.3)	**.167**	.021
Food unsafety	*Unsafety and lack of control from authorities*	70 (17.1)	.003	**.100**
Contamination	*Contamination with chemicals, hormones and/or additives*	70 (17.1)	.027	**.106**
Industry	*References to mass production and artificial methods*	69 (16.8)	.017	**.104**
No impact	*Does not impact health*	51 (12.4)	.127	.053
(Rationales)				
Not my fault	*Reject/deny responsibility in harm*	89 (21.7)	.061	.004
Meat necessary	*Frame meat as necessary*	62 (15.1)	**.135**	.051
Animals	*Avoid/minimize harm to animals*	55 (13.4)	**.250**	**.066**
Health	*Avoid/minimize harm to public health*	52 (12.7)	.102	**.148**
Meat pleasure	*Meat is source of pleasure*	50 (12.2)	**.136**	.051
No alternative	*Difficult/impossible to change meat consumption, alternatives are unrealistic and/or inaccessible*	38 (9.3)	.050	.002
(Behaviour)				
Intention to change				
Yes		246 (60)		
No		111 (27.1)	**.667**	**.625**
No meat[c]		51 (12.4)		
Willingness to reduce				
Yes	[b]	200 (48.8)		
No		154 (37.6)	**.531**	**.562**
No meat[c]		49 (12.4)		
Willingness to shift to a plant-based diet				
Yes		182 (44.4)	**.426**	.013
No		218 (53.2)		

[a] Values in bold are above inertia for each dimension.
[b] Self-explanatory.
[c] Participants who indicated not eating meat by the time of completion of the questionnaire.

task (Table 2, Representations of Meat – Meat) meat was mostly invested with hedonic feelings (i.e., Pleasure, Satiated) and emerged as a symbol of food and eating (i.e., Food). But meat was also invested with negative feelings (i.e., Suffering, Disgust) and associated with Death and Animals. In the second task (Table 2, Representations of Meat – No Meat), the perspective of not eating meat was mostly invested with negative feelings related with grief, pointing to an emotional/affective connection with meat (i.e., Sad, Bad, Missing Something), feelings of weakness (i.e., Weak), but also positive feelings and well-being (i.e., Well, Clear Conscience). There were also more neutral expressions of acceptance and indifference (i.e., Indifferent, Would Adapt). Concerning the perceptions on how meat impacts animals (Table 2, Perceived Impacts – Animals), participants often referred to mass production and artificial methods (i.e., Industry) and several negative consequences (i.e., Suffering, Disrespect, Abuse, Poor Conditions). However, some also referred to livestock animals as serving the purpose of meat extraction (i.e., Purpose) or conditionally acknowledged impacts only if production/

consumption is unregulated or in excess (i.e., If Unregulated). Regarding perceived impacts on nature and the environment (Table 2, Perceived impacts – Nature), most references concerned pollution and depletion of natural resources (i.e., Pollution, Depletion), and mass production and artificial methods (i.e., Industry). Some participants acknowledged impacts on nature and the environment only if production/consumption is unregulated or in excess (i.e., If Unregulated), while the denial of impacts was also observed (i.e., No Impact). As to perceived impacts on health (Table 2, Perceived impacts – Health), most references concerned risk for Diseases, Food Unsafety and Contamination. Again, participants also referred to mass production and artificial methods (i.e., Industry) and the denial of impacts on health was also observed (i.e., No Impact). Concerning rationales to change/not change behaviour after reading a brief paragraph quoting impacts associated with current meat production and consumption patterns (Table 2, Rationales), answers referred to pro-meat justifications (i.e., Meat Necessary, Meat Pleasure), self-exonerations (i.e., Not My Fault, No Alternative), but also references to avoiding or minimizing harm to animals and public health (i.e., Animals, Health).

In terms of content, answers provided by the participants pointed towards the existence of different patterns or profiles in relation to representations of meat, perceived impacts, rationales and behavioural intentions. This possibility was subsequently supported and revealed in the MCA.

Dimensions identified in the MCA

The MCA identified two relevant dimensions accounting for 16.5% and 6.1% of the total variance, respectively. Both dimension one and two differentiate individuals based on their relative affective connection towards meat and willingness to change. However, dimension one measures the valence of the affective connection and dimension two measures the intensity of the affective connection. Discrimination measures of each variable for the two dimensions are presented in Table 2 (see Dimensions column). When describing each dimension, values above inertia (variance mean value) were considered, which are set in boldface. The coordinates for each category were also considered in order to describe patterns of association and opposition. Although these coordinates are not shown in Table 2, they are subsequently illustrated in the topological representation provided in Fig. 1.

Dimension one seems to differentiate individuals in terms of affective connection towards meat and willingness to change. In one of the poles of the axis there is an association between categories referring to feelings of disgust and signs of negative affect towards meat, references to negative impacts and to animals as victims, willingness to change consumption habits, and also the absence of meat consumption. In opposition, in the other pole of the axis an association emerges among hedonic feelings and signs of dependency towards meat, lack of willingness to follow a PBD and to reduce meat consumption, and the intention to maintain current habits.

In turn, dimension two differentiates individuals in terms of intensity of the affective connection towards meat, intentions to change and willingness to reduce meat consumption. In one of the poles of the axis the most distinctive trait is a sign of detachment towards meat, but also an association with references to mass production systems and artificial methods, contamination and food unsafety and the intention to change consumption habits, specifically reducing meat consumption, as a way to minimize harm to animals and health. The opposite pole includes categories referring to the lack of willingness to reduce meat consumption and the intention to maintain current habits, although not as distinctive attributes of this dimension.

Topological configuration and projection of clusters

In order to identify different profiles of consumers with regard to the issues in this study, we explored the intersection between the two dimensions that differentiated participants. We used a topological display of the coordinates provided by the MCA. For purposes of clarity the results are presented side by side in different frames due to the high number of categories analysed. However, all frames refer to the same MCA. Each frame presents a set of categories. Frame one (F1) shows categories that emerged in representations of meat (i.e., "Meat makes me think, feel or imagine…" and "If I was forced to stop eating meat I would feel…"). Frame two (F2) presents categories that emerged based on the perceived impacts of meat (i.e., "Please indicate your opinion about how meat consumption may impact: nature and the environment; public health; and animals"). Frame three (F3) shows categories for the rationales and willingness to change (i.e., "Do you intend to maintain your current levels of meat consumption?"; "Please indicate the reasons that explain your choice"; "Are you willing to reduce your current levels of meat consumption, for example, by half?"; "Are you willing to follow a Plant-Based Diet (i.e., in which meat is excluded/avoided or its consumption is infrequent and in small portions)?"). Finally, frame four (F4) displays (*a posteriori*, as passive variables, thus not actively contributing to the association patterns) the coordinates from the three clusters identified in the space defined in the MCA.

While the graphic representation of Fig. 1 includes all variables, in the brief description of the results we consider the ones that contribute the most to the definition of the two dimensions (i.e. variables that have a discrimination measure greater than the inertia value for the respective dimension; and that the categories present higher contributions taking as reference the average contribution – in this case 0.012 = 1/84, one being the sum of the contributions for each dimension, and 84 the total number of categories).

Figure 1 thus shows the topological configuration of the intersection between dimension one (i.e., valence of affective connection towards meat; >0 referring to positive affect, <0 referring to negative affect) and dimension two (i.e., intensity of the affective connection; >0 referring to higher intensity, <0 referring to lower intensity). The responses were nicely bounded into three groups in three main spaces along the different frames, corresponding to the higher-right, higher-left and lower-left quadrants. The border of each group is represented by a different hash pattern. In the higher-right quadrant of each frame (i.e., positive affect and higher intensity) is group three, combining categories referring to meat attachment (F1) and the denial and legitimation of impacts (F2). This association also includes lack of willingness to reduce consumption and the intention to maintain habits, using a set of pro-meat arguments as rationale (F3). In opposition, in the higher-left quadrant of each frame (i.e., negative affect and higher intensity) is group one, combining a set of categories referring to disgust towards meat (F1), the affirmation of harm with an emphasis on animals as victims (F2), and (more distantly) the absence of meat consumption by the time of completion of the questionnaire (F3). In turn, near the lower-left quadrant but closer to the centre in the axis of dimension one (i.e., neutral to negative affect and lower intensity) is group two, combining detachment towards meat (F1) and the affirmation of impacts with reference to mass production systems, artificial methods and food unsafety (F2). This association also includes willingness to reduce meat consumption and intentions to change habits, mentioning the avoidance/minimization of harm to animals and health as rationales for change (F3).

Finally, the results of the HCA validated the MCA solution and yielded three clusters of participants matching the three groups that emerged on the MCA (F4). Cluster three included almost half of the

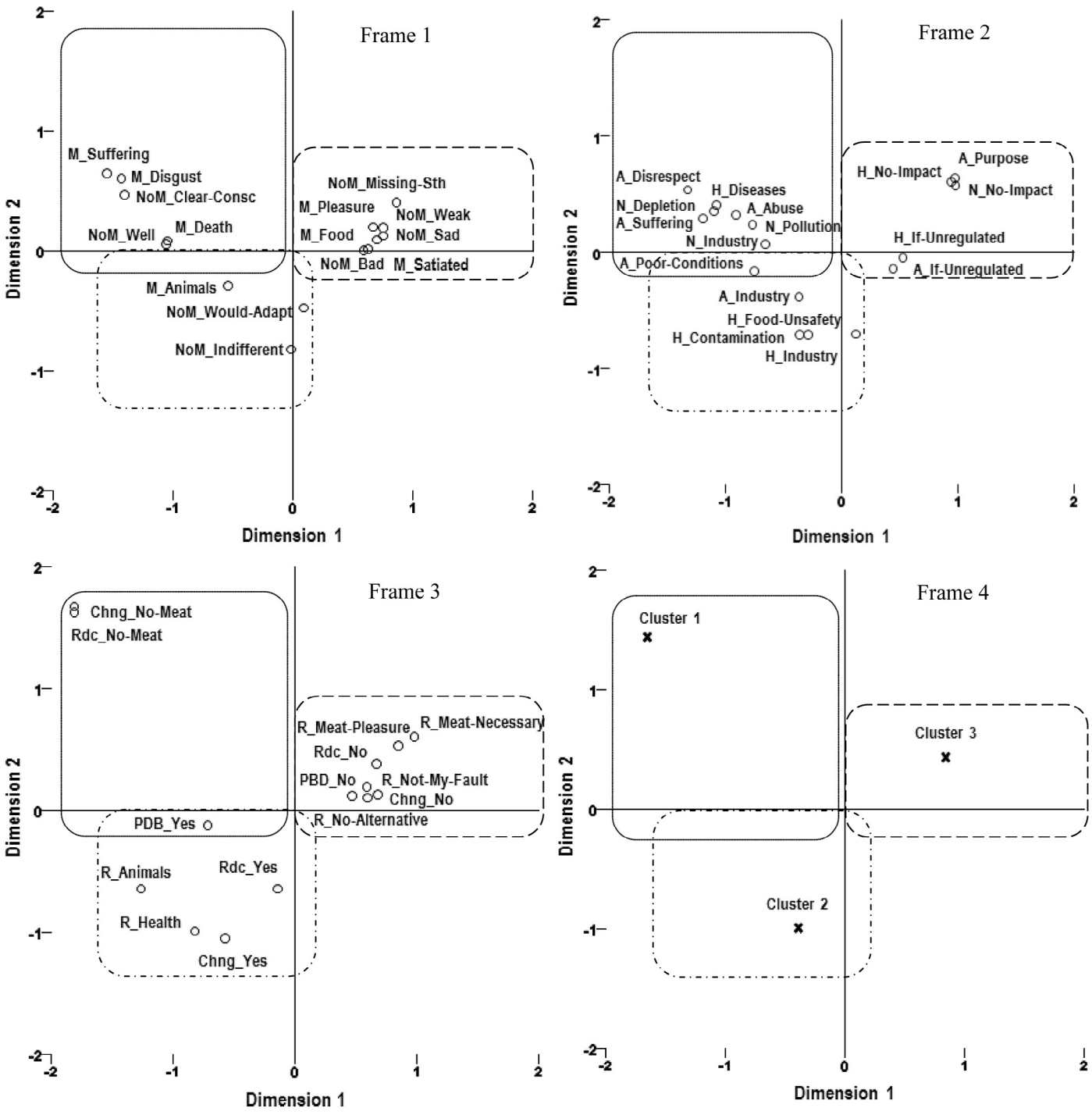

Fig. 1. Representations of meat, perceived impacts, behavioural intentions, willingness to change and rationales used when facing impacts: topological configuration and projection of clusters.
Note: M = Meat; NoM = No Meat; A = Animals; N = Nature; H = Health; PBD = Plant-Based Diet; Rdc = Reduce; Chng = Intention to change; R = Rationales.

participants and referred to the pattern of attachment to meat, unwillingness to change, and a set of rationales when considering impacts and the possibility of changing habits (group three). Cluster two included around a third of the participants, referring to the pattern of low affective connection towards meat and willingness to change habits to avoid or minimize harm for animals and health (group two). Cluster one included a minority of participants and referred to disgust towards meat and moral internalization (group one). Table 3 characterizes each of the three clusters in terms of demographic variables and eating habits. Chi-square analyses suggested significant differences between the three clusters in all variables measured except place of residence (urban vs. rural).

Conclusions

To our knowledge, this study is the first to provide an in-depth enquiry of consumer representations of meat, perceived impacts of meat, and rationales used when called upon to consider changing consumption habits after exposure to information on the impact of meat. It explores how each of these relates with each other and

Table 3
Cluster's characteristics: Chi-squares on the frequency/percentage of participants' demographic characteristics and eating habits.

		Cluster 1		Cluster 2		Cluster 3		χ^2
		N	%	N	%	N	%	
Participants	N	58	14.1	150	36.6	202	49.3	–
Gender	Male	15	25.9	27	18	81	40.5	21.195*
	Female	43	74.1	123	82	119	59.5	
Age	<25	9	15.5	58	38.7	104	51.5	23.313*
	25–40	33	56.9	64	42.7	71	35.1	
	>40	16	27.6	28	18.7	27	13.4	
Education	Basic	2	3.4	6	4	2	1	21.288*
	Secondary	13	22.4	34	22.7	86	43	
	Higher	43	74.1	110	73.3	112	56	
Childhood residence	Rural	12	21.4	48	32.4	53	26.5	2.867
	Urban	44	78.6	147	67.6	291	72.0	
Current residence	Rural	12	21.1	30	20.1	35	17.4	.610
	Urban	45	78.9	119	79.9	166	82.6	
Self-reported diet	Omnivore	12	20.7	140	93.3	202	100	250.154*
	Veg*n	46	79.3	10	6.7	0	0	
Red meat	Regularly	0	0	28	19	72	35.8	217.629*
	Occasionally	2	3.5	90	61.2	119	59.2	
	Never	55	96.5	29	19.7	10	5	
White meat	Regularly	0	0	61	41.2	114	56.4	307.333*
	Occasionally	4	7	77	52	87	43.1	
	Never	53	91.4	10	6.8	1	0.5	
Fish	Regularly	2	3.5	51	34.9	52	25.7	178.223*
	Occasionally	14	24.6	84	57.5	142	70.3	
	Never	41	71.9	11	7.5	8	4.0	
Fruits and vegetables	Regularly	57	98.3	126	86.3	143	71.5	25.597*
	Occasionally	1	1.7	19	13	52	26	
	Never	0	0	1	0.7	5	2.5	
Beans	Regularly	46	79.3	61	42.1	49	24.5	58.262*
	Occasionally	11	19	75	51.7	132	54.1	
	Never	1	1.7	9	6.2	19	9.5	
Meat substitutes	Regularly	34	58.6	15	10.1	6	3	151.028*
	Occasionally	21	36.2	39	26.4	37	18.3	
	Never	3	5.2	94	63.5	159	78.7	

* $p < .001$.

with willingness to follow a more plant-based diet. The findings raise two main propositions, once concerning an affective connection and the other the rationales of meat consumption.

The first proposition is that an affective connection towards meat relates to how impacts of meat are perceived and to willingness to change consumption habits. In this regard, three different clusters of consumers were identified, referring to a pattern of attachment to meat (positive valence and higher affective intensity), a pattern of disgust (negative valence and higher affective intensity), and a pattern of avoidance (neutral to negative valence and lower affective intensity). A simplified graphic illustration depicting the interplay between the variables and the positions of the clusters along the axes of valence and intensity of affective connection is provided in Fig. 2.

The existence of an affective connection towards meat has been previously established, namely a pattern of disgust (e.g., Rozin et al., 1997). Results from the present study add to this knowledge suggesting that affective connection towards meat may actually be a continuum in which one end refers to disgust (i.e., negative affect and repulsion, related with moral internalization), while the other shows an attachment pattern (i.e., positive affect and dependency, related with feelings of sadness and deprivation when considering abstaining from meat consumption) that may prevent a change in consumption habits.

The identification of three distinct profiles along the axes of intensity and valence of affective connection to meat provides insights for increased understanding of the psychology of meat consumption and meat substitution. Likewise, it points towards the importance of designing tailored initiatives when encouraging a shift towards a more plant-based diet. For instance, consumers holding a pattern referred to as meat avoidance may be the segment of most interest, since it apparently is the most open to information on the impacts of meat and the benefits of changing habits. Targeted communication for this segment may include information on the issues surrounding industrial production framed by health and animal concerns, since these emerged as motivators to adopt a more plant-based diet. It is known, however, that changing eating behaviours requires more than simply formulating intentions (e.g., Godinho, Alvarez, Lima, & Schwarzer, 2014). The identification of this segment of consumers framed in the axes of affective connection is merely a starting point. It calls for further studies to explore the intersections among recent trends towards eating less meat that are being observed and labelled under different terms in the literature (e.g., meat avoidance, Beardsworth & Keil, 1991; meat-reduced diet, Hayley, Zinkiewicz, & Hardiman, 2015; flexitarianism, Raphaely & Marinova, 2014; conscious omnivorism, Rothgerber, 2015). Likewise, it calls for more research to learn how to empower these consumers to effectively make sustained and lasting changes in their habits.

As for consumers holding a pattern of attachment to meat, the results raise the hypothesis that mere exposure to information on the impacts of current patterns of production and consumption may not to be sufficient to elicit willingness to change. Instead, as Rothgerber (2014) suggests, it is possible that some initiatives to encourage reducing meat-eating may actually increase entrenchment in meat-eating justifications, and it may be the case that this is particularly true among more attached consumers. If so, it would be expected that trying to reach these consumers without triggering defence or loss-aversion mechanisms should benefit from more indirect approaches, such as facilitating structural changes that make plant-based meals more accessible and increasingly mainstream (Vinnari & Vinnari, 2014). On this note, it is worth recalling that large-scale transitions in food consumption patterns usually happen by way of substitution with a food that can take over the function of the foodstuff that fell away (Montanari, 1994). It has been established that besides meeting basic needs for energy and nutrition, food habits play numerous other roles in people's lives (Fieldhouse, 1995). Likewise, choices and preferences are often anchored in values, meanings and shared conventions going beyond the biological

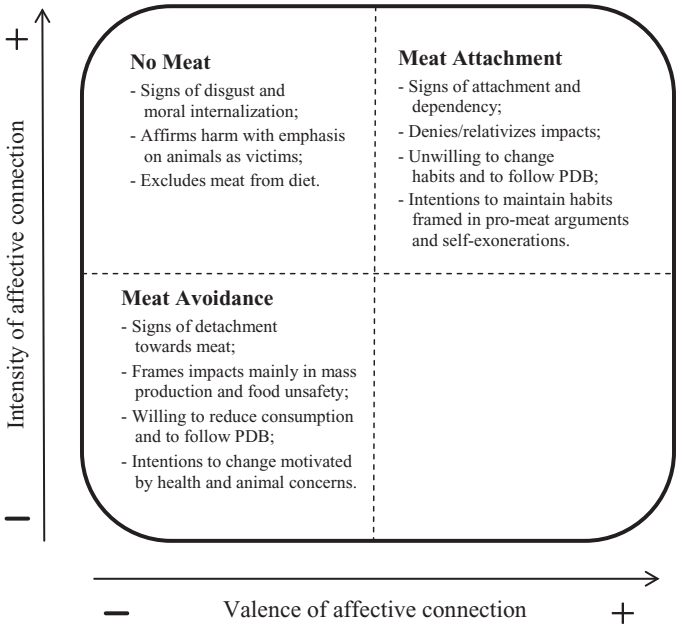

Fig. 2. Simplified depiction of the interplay between representations of meat, perceived impacts, behavioural intentions and rationales for change.

function they ensure (Beardsworth & Keil, 2002). In terms of product development, if meat does play an affective role to some consumers, one of the key challenges may be in creating alternatives that are also invested with a special role beyond nutrition. For instance, when developing and launching meat substitutes, it may be of relevance to pay special attention not only to physical attributes such as taste and texture (Hoek et al., 2011; Tucker, 2014), but also on how these products are marketed, positioned and distributed. Taking this hypothesis one step ahead, perhaps for consumers exhibiting high attachment to meat, instead of challenging the centrality of meat it may be a more fruitful first step to try to expand the concept of meat in order to encompass also non-animal based substitutes (i.e., a small portion of meat as a central protein source, surrounded by plant-based proteins). More research is needed to expand on these possibilities and increase understanding on these consumers' perspectives about meat consumption, and the issues underpinning a transition towards a more plant-based diet. Drawing from recent findings, these may include volitional factors such as perceived behavioural control, changing deep-rooted habits and beliefs about potential health benefits and challenges (e.g., Zur & Klöckner, 2014), but also ideological concerns such as dominance ideologies and resistance to cultural change (e.g., Dhont & Hodson, 2014).

The second main proposition that this study raises is that different consumers hold on to different rationales when contemplating the consequences of current meat production and consumption patterns, and the possibility of changing habits. Previous evidence provides support for the role of dissonance reduction in facilitating the practice of meat eating (Loughnan et al., 2014). In this study, when the framing of meat as food overlaps with the framing of meat as impacting animals, the environment and public health, participants resolved the tension by two different paths. Specifically, individuals holding a negative to neutral pattern of affective connection towards meat (i.e., the cluster referred to as meat avoidance) appeared to resolve eventual dissonance by expressing willingness to reduce consumption and to adopt a PBD. In contrast, consumers with a pattern of attachment towards meat appeared to resolve this dissonance by resorting to pro-meat justifications and self-exonerations resembling a process of moral disengagement.

Moral disengagement theory proposes that individuals will be particularly motivated to resort to disengagement mechanisms when adopting or maintaining harmful behaviours that are valued and desired (i.e., self-serving) (Bandura, 1999, 2002). In line with the results from the present study, a considerable amount of evidence on the centrality of meat in conventional (western) diets suggests that it is often invested with a higher status in comparison to other food products (Fiddes, 1991; Schösler et al., 2012). Assuming that individuals will be particularly motivated to use disengagement mechanisms when adopting or maintaining harmful but cherished behaviours, moral disengagement may indeed play a role when considering the damage currently associated with meat in light of the possibility of changing personal habits.

Reflecting on the "meat paradox", Loughnan et al. (2014) note that most people find animal suffering emotionally disturbing and do not want to see animals harmed, but engage in a diet that requires them to be killed and usually to suffer (Herzog, 2010; Joy, 2010; Singer, 1975). Moral disengagement (as a process of preventing or reducing dissonance in the moral domain) may thus create conditions for current patterns of meat consumption to endure even among people who subscribe to concerns about animal suffering, but also to the environment and/or public health. If this is the case, pro-meat justifications (i.e., "Meat is necessary", "Meat is pleasure") may serve as cognitive reframing in which the ends justify the means, and self-exonerations (i.e., "Not my fault", "No alternative") may discard and displace personal responsibility concerning harm and the possibility of changing habits. In addition, failing to acknowledge consequences (i.e., "No impact") and excluding farm animals from the scope of moral concern (i.e., "It's their purpose") may also operate to prevent or reduce dissonance in the moral domain. Future research could thus explore the relationship between an affective connection towards meat (i.e., disgust vs. attachment) and the morality of meat (i.e., moral internalization vs. moral disengagement). This research would add to the knowledge of the role of self-consistency motives and dissonance reduction in meat consumption and willingness to follow a plant-based diet (Bastian, Loughnan, Haslam, & Radke, 2012; Prunty & Apple, 2013; Rothgerber, 2014).

In this study we drew on qualitative data as a way to provide opportunities to identify key issues, raise data-driven propositions and derive hypotheses to increase understanding on the psychology of meat consumption and substitution. Beyond the main propositions advanced, results echoed additional findings from previous studies exploring this issue.

For instance, meat is often portrayed as a symbol of virility (Rothgerber, 2013; Ruby & Heine, 2011) and tends to be depicted as a typical male food, in contrast with fruits and vegetables, which are typically considered more feminine (O'Doherty & Holm, 1999). Likewise, there is evidence suggesting that vegetarian men may be subjected to efforts in reconciling their gender identity with their dietary identity (Beardsworth & Keil, 1992; Rothgerber, 2013; Ruby & Heine, 2011). In this study, the clusters of participants mostly associated with willingness to avoid/reduce meat consumption and follow a plant-based diet consisted almost solely of women, while the cluster associated with unwillingness to change was more balanced in terms of participants' gender. The notion that meat and meat substitution are not gender neutral thus found additional support in the present results. Moreover, while our findings reinforce the view that meat's special status may play a role in hindering a large-scale shift towards a more plant-based diet, they also suggest that this status is possibly being challenged in emerging clusters of consumers expressing higher awareness on the impact of meat and willingness to move towards less animal-based diets (Schösler et al., 2012).

Given the exploratory nature of this work, it is important to highlight that all propositions are tentative. Likewise, it is clear that much more research is needed to keep advancing in the understanding of the psychosocial processes that may hinder or engage a shift towards a more plant-based diet. Even so, one main limitation of this work should be discussed from the outset, which is the bias in terms of participants' gender, age and education. On the one hand, in generating data-driven propositions our primary interest was to observe data structures, and there is no strong reason to believe that the associations observed between the categorical variables may have been compromised by this bias. Some of the smaller proportions of participants (e.g., males) are nonetheless represented by considerable absolute numbers, and the identification of three well-delineated segments with clearly distinguished patterns of response is an indication of discriminatory value. Likewise, the current sample did show considerable diversity in other variables, including meat consumption habits, and the skew towards female, young, and higher educated participants was also observed in a previous online study taken as indicative of the food preferences and patterns of the Portuguese population (Cardoso et al., 2013). On the other hand, information on the clusters' dimension and demographic characteristics would be different if a representative sample had been used (e.g., considering the pattern of results, the third cluster might be constituted mostly by men). Accordingly, a description of the dimension and demographic characteristics was provided in the results but no inferences were made in that regard. Still, the descriptive information must be read with special prudence and future studies in this topic should strive to ensure the recruitment of more balanced samples. As for the hypotheses advanced in this

work, they open up several possibilities for further research and ought to be tested in the near future.

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