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Why do men choose and adhere to a meatless diet?

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ABSTRACT

The purpose of this study was to investigate influences, motives and adherence factors explaining why men choose and adhere to a meatless (vegan, vegetarian or pescetarian) diet. An online survey was distributed through social media, yielding 544 international respondents with information on sociodemographics, values, main barriers, motivation and influence towards meatless lifestyle choice. An open question gathered qualitative data on how participants overcame perceived barriers to meatless eating. The larger influencer was scientific research (19.1%) and as their main motive animal welfare (49.1%). Reported adherence factors were related to people (as family, friends, partners, community), research and recipes. Age, dietary lifestyle (vegetarian, pescatarian) are positive predictors of adherence. Living in EU, skills and hardship barriers and own perception of barriers are negatively associated to long term adherence to a meatless diet. Feeling supported by other people plays a key role in adhering to the diet over time.

1. Introduction

The global average consumption of meat is steadily increasing due to rising individual income and a growing population (Godfray et al., 2018). The impacts of animal products markedly exceed those of vegetable substitutes; 83% of the world's farmland is used for meat, aquaculture, eggs and dairy use. This contributes to 58% of food emissions, despite only providing 37% of our protein and 18% of our calories (Godfray et al., 2018). Moving towards a diet that excludes meat could resolutely have transformative potential for the environment because the land no longer required for meat production could remove an estimated 8.1 billion metric tons of CO2 from the atmosphere yearly (Godfray et al., 2018; Poore and Nemecek, 2018; Chai et al., 2019; Willett et al., 2019; Han et al., 2020).

Moreover, meat consumption is associated with colorectal cancer, cardiovascular disease and other chronic diseases, like diabetes and weight gain (Godfray et al., 2018; Wolk, 2016). High intakes of processed and red meat are associated with higher mortality compared with lower meat intake (Rohrmann et al., 2013; Arash et al., 2017; Sinha et al., 2009; Wang et al., 2016). Such evidence contributed to increased promotion of meat reduction or even meatless diets due to their beneficial public health outcomes. Vegetarians and vegans show significantly lower levels of risk for chronic diseases, such as diabetes, cancer and heart disease due to reduced levels of blood glucose, triglycerides, total cholesterol and body mass index (Dinu et al., 2017). Despite this large body of evidence, and despite the efforts to promote consumption of fruits, vegetables and pulses (Pérez-Cueto et al., 2012), many consumers still consider meat as a necessary and healthy part of their diet, overconsume it, while they under-consume foods of plant origin (Verbeke et al., 2010; Dinnella et al., 2016). The shift towards a predominantly plant-based diet at consumer level remains challenging. Consumers experience barriers in the process, such as a perceived lack of convenience of meatless meals, lack of familiarity, and a negative perception and expectation towards the taste of plant-based meals (Aschemann-Witzel et al., 2020; Reipurth et al., 2019). But at the same time, there are opportunities to further promote such products as a growing demand has been increasing availability and shifting the market favorably (Aschemann-Witzel et al., 2020).

Gender differences in food consumption have been reported extensively in reviews and consumer and nutrition studies (Perez-Cueto, 2019; Konttinen et al., 2021; Castronuovo et al., 2021; Conner, 1994; Kimura et al., 2014; Wardle et al., 2004). Women are more prone to shift towards a predominantly plant-based food consumption, while men are less so (Dorard and Mathieu, 2021). Hence, recommendations for

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changing behaviour towards healthy sustainable choices must take into account that women and men have e.g. different portion sizes, preferences, attitudes and food-related behaviours (Konttinen et al., 2021; Van der Horst, Bucher, Duncanson, Murawski & Labbe, 2019). Moreover, completion of surveys is mostly done by women (e.g. North et al., 2021), hence, little is known about males who might be at higher risk of disease and early death if not adhering and engaging in dietary changes.

In the category of meat eaters, men are the social group that consume more meat (Thomas, 2016). The reason being that meat has been considered culturally food for men; it is consumed far more by men than women and it is often used as a proof of masculinity in social contexts (Nakagawa and Hart, 2019). Men are more prone to justify the consumption of meat by either arguing that animals are lower in hierarchy than humans, or that it is human fate to eat animals (Rothgerber, 2013). Scholars have explored the gender-type food choices where meat is deeply associated with masculinity (Rothgerber, 2013; Sobal, 2005; Vartanian, 2015; Jansen and Social, 2016; Greenebaum and Dexter, 2018) while primarily plant based diets are stereotypically associated with women (Sobal, 2005; Rosenfeld, 2020). Men therefore represent a relevant group to examine, because they are less likely to adopt a meatless diet and they consume more meat which is linked to undesirable health outcomes (Nakagawa and Hart, 2019). Moreover, plant-based consumption as well as meat avoidance or reduction can be classified as a form of positive deviance (Boyle, 2011) as they constitute a desirable behaviour from health, environment and ethical perspectives. Additionally, focusing on men who have persevered as predominantly plant-based consumers may provide insights into the strategies they applied. Studying vegetarianism, veganism and pescetarianism as forms of norm violation can give an insight into a subculture with an alternative value system, and how that value system is presented to others, which could influence other men's dietary behaviour.

Therefore, the objective of this paper is to investigate the main determinants for men towards adhering to plant-based dietary choices, including pescetarianism.

2. Methods

2.1. Data collection

Data was collected through an online questionnaire in SurveyXact (see Supplementary material). Online social media platforms such as Facebook and Instagram, were used to recruit respondents by using a snowball sampling method. The survey was distributed in Facebook groups, events (see Supplementary Material Table 7) and on each researchers' personal network. It targeted English speaking men internationally that were currently engaged in consuming a meatless diet. The survey ran from 29th of March until 5th of April 2020. After handling and clearing the data, there were a total of 544 useful responses. The survey was used to collect both quantitative and qualitative data and it included a broad range of questions that were based on the literature related to motives and barriers toward reducing meat consumption and adopting meatless diets (Rosenfeld and Tomiyama, 2020; Miki et al., 2020; Cheah et al., 2020). The first section of the survey was used to describe sociodemographic characteristics (education, income, etc.) of participants as confounding variables. Later sections were used to identify explanatory variables by asking questions about influencers, motives, barriers to change diet, adherence factors to a new diet and Schwartz's values. The latter question was based on a shortened version of Schwartz's Value Survey (Lindeman and Verkasalo, 2005) where participants have to rate the importance of ten values. The question referring to influence was intended to provide information about different sources from which participants got the knowledge related to new diets and included the following options: (1) Media (social media, documentaries, news outlets, books); (2) Scientific research (scientific articles); (3) Partner/Spouse; 4) Friends (5) Family - other than partner/spouse (please specify family member) (6) Other (please specify). Motives represented the factors that most encouraged men to change their diet, pre-defined options were: (1) Environmental concerns; (2) Animal welfare (3) My own health reasons (e.g. prevention or treatment of disease, healthy weight) (4) Religious/Spiritual reasons; (5) Other was an open question (e.g. political, financial, social status, familiarity, convenience, taste, disgust or else). Years of following a meatless diet was defined as the main dependent variable, as it was considered an indicator of adherence. Age of participants (in y) and number of years of following a meatless diet were continuous variables, while other variables (Scales for barriers and Values Scale) were measured in ordinal level (as discrete variables). The qualitative data was based on an open answer to the question: How did you overcome the barriers associated with the change of your diet? (max 400 characters). The questionnaire was pretested by researchers at the Department of Food Science and the Department of Food and Resource Economics, University of Copenhagen.

2.2. Data analysis

Sociodemographic variables were summarized using descriptive statistics. Medians and interquartile ranges were used to describe continuous data, as they were not normally distributed. Frequency and percentages were used to describe categorical data. Exploratory Factor Analysis, using principal component analysis and rotated using Varimax with Kaiser normalisation, was used to identify and extract underlying factors within people's values (short Schwartz scale) and the set of barriers experienced when adhering to their new dietary lifestyle. Barrier variable "meals have no new components" was reversed for factor analysis. Scores obtained by factor analysis, were used in further modelling. Dummy variables were created for each diet lifestyle (vegan, vegetarian, pescatarian, yes = 1, no = 0) and for place of residence (EU = 1, rest = 0). A multiple linear regression was fitted using a backward procedure to retain significant variables. The dependent variable was of adherence (years of following a meatless diet) and independent variables of age, income, education, residence, dietary lifestyle dummies, and the factors of values and barriers. A p-value below .05 was considered to indicate statistical significance.

Data management was done in SPSS. Spelling mistakes and uncompleted words were corrected to make the data computable. The questions with open ended options were analyzed by defining each response in categories. Responses fell into the category NA (non applicable) when answers were inapprehensible. The answers of the open question "How did you overcome the barriers associated with the change of your diet?" were analyzed using NVivo. Word frequency query was used to identify the most frequently occurring words in respondents' answers. Frequently occurring words which did not provide relevant information (I, don't, and etc.) and words such as "vegetarian", "vegan", "barriers", "never", "ever" etc. were excluded from the list because they were only used to describe the context and did not identify key adherence factors. The five most frequent words were searched in the respondents' answers to further explain their meaning. To ensure the validity of the word frequency analysis, and controlling for reflexivity bias, findings were discussed and agreed by the authors.

The Ethics Committee of the Faculties of Health and Science at the University of Copenhagen approved this study (Ref: 504-0211/20-5000).

3. Results

Table 1 shows the socio demographic characteristics of the participants. The median age of the respondents was 29 y (IQR 25-37y). They have been following their chosen diet for a median duration of 3.9 y (IQR 2-6y)).

Participants indicated that the main influence for their dietary choice was scientific research (19.1%), followed by documentaries (16.2%), friends (16%), partner/spouse (12.5%) and social media (7.2%). For a

Table 1
Sociodemographic characteristics of the participants (n = 544).

Continuous variables		
	Median	IQR
Age (y)	29	25–37
Duration of diet lifestyle (y)	3.9	2–6
Categorical variables		
	Frequency	Percent
What is your diet?		
Vegan	362	66.5
Vegetarian	132	24.3
Pescatarian	50	9.2
Nationality		
European	415	76.3
Non-EU	129	23.7
Education achievement [a]		
Lower education	150	27.6
Higher education	394	72.4
Locality of residence		
≤30.000	74	13.6
≥30.000	470	86.4
Yearly Income level		
0 – 26785 €	283	52,0
26786 – 94000€	210	38.6
Prefer not to say	51	9.4
Marital status [b]		
Single	230	42.3
Relationship	314	57.7
Living situation [c]		
Alone	106	19.5
In a household with 2 or more people	438	80.5

[a] Lower education stands for primary school and secondary school, while Higher education stands for practical degree, Bachelor's degree, Master's degree, PhD.

[b] Single stands for single, divorced and widowed, while Relationship stands for relationship, married and civil partnership.

[c] A household with two or more people included spouse, partner, children, flatmates or intergenerational housing.

large proportion of respondents, the main motive for choosing their given diet was animal welfare (49.1%), followed by environmental concerns (21%), health reasons (16%) and religious/spiritual reasons (5%). (See supplementary material).

The life values of the respondents, based on the short Schwartz values scale are presented in Table 2. Power, achievement, hedonism and stimulation loaded in the same factor that could be interpreted as self-centered or "individualistic" values. Self-direction, universalism and benevolence loaded in the same factor of more "empathic" values. Finally, tradition, conformity and security loaded together in a more "conventional" values factor. These three scores were used for further modelling. The only value that achieved statistical significance in the median test among the three diet lifestyles was "benevolence" mainly explained by the difference between vegetarians and vegans.

Table 3 shows the barriers experienced by participants in each of the lifestyle categories. Vegans experienced more negative reactions from other people (judged me negatively, treated me differently in bad way). Pescatarians experienced more personal barriers such as uncertainty of the variety and nutritional sufficiency of the regime and, missing the taste of meat. Both vegetarians and pescatarians worried about the protein content of their regimes.

The questions about barriers yielded five factors. The first was interpreted as a barrier of "*skills and hardship*" since it had high loads of variables "preparing meals took extra time & effort", "it was hard to prepare meals", "I had to find recipes", "it was hard to find options eating out", "I didn't know how to cook tasty meals", "I lacked awareness of a balanced meal". Further, this construct had good reliability (Cronbach *alpha* = 0.73).

A second factor was interpreted as "*stigma*" barrier based on the loads of variables "people judge me negatively", "people treated me differently in a bad way" and "my friends and/or family made fun of me". The reliability was very good (Cronbach *alpha* = 0.82).

A third factor was interpreted as a barrier of the "*own perceptions about the new diet*" as it had higher loads from the variables "I felt ashamed to tell about my diet choice", "I was unsure if my diet would have enough variety", "I missed the taste of meat", "I was worried I would not get micronutrients", "I was worried I would not get protein". This set of questions showed a reliability (Cronbach *alpha* = 0.64) slightly below the desired level of 0.65 – 0.7.

A fourth factor was interpreted as a "*financial*" barrier based on two variables "I worried the new diet would be expensive" and "I worried that my budget would suffer". The reliability was high (Cronbach *alpha* = 0.89).

Lastly a fifth factor was interpreted as a barrier due to "support, *pleasure and variety of meals*" based on the loads from three variables "my spouse/partner supported my choice", "meals don't have new components" (inverted) and "new diet provides pleasure". However, the reliability of the scale is unacceptable (Cronbach *alpha* = 0.41), and this factor was not further used in modelling.

A multiple regression was run to identify significant predictors of adherence to the participants chosen diet (number of years). Table 4 displays the final regression model after controlling for *age*, *income*, *education*, *diet lifestyle*, the *3 life value constructs* and the *4 barrier constructs* towards adhering to their chosen diet $F = 19.773$, $p < .001$, $R^2 = 0.231$.

The independent variables explain 23% of variance in the reported time of having made the dietary lifestyle change. After controlling for the effect of the other variables, age, being vegetarian, pescatarian, are positively associated to the duration of the dietary lifestyle, while living in EU, the skills & hardship and own perception barriers were negatively associated to the duration of the dietary choice. Education and conventional values are positively associated but the effect is marginally significant (p = .061 and .073 respectively).

For the open-ended question investigating the adherence, "people", "research", "recipes", "friends" and "animals" were identified as the five most frequently occurring words in respondents' answers related to adherence factors. Table 5 shows representative quotes for each of the 5 most frequently occurring words.

In the context of the answers, "People" mainly refers to the "others" that would not fully support their choices. "Research" refers to the obtained sense of self-empowerment "my own research" (using internet tools) and joining like-minded communities. "Recipes" refers to the acquisition and developing additional cooking skills through practice. The word "friends" is mainly found in these contexts, first it is about dropping non-supportive friendships and relations; second, it is about changing the friends' group, and third, it referred to friends that shared the common belief system and lifestyle choice. "Animals" mainly represents feelings regarding the exploitation, abuse and hurt those animals suffer in the food chain. It is noteworthy that references to animal welfare were absent from the answers of pescatarians.

4. Discussion

Majority of respondents had some form of higher education such as a Practical Degree, a Bachelors, a Masters or a PhD. This might explain why scientific research influenced respondents the most (Supplementary Material Table 8). This further reflects the growing attention that meat reduction has been given over the years, with the consequence that more people are opting for an alternative diet (Rohrmann et al., 2013; Arash et al., 2017; Sinha et al., 2009; Wang et al., 2016; EAT–Lancet Commission, 2019; Rust et al., 2020). Scientific research is also a secure source of information to turn to when opting to change normative behaviors that are culturally embedded in one's identity.

After scientific research, the next influencing factors are documentaries (Supplementary Material). Out of the 544 respondents, n = 153

Table 2
Life values based on the short Schwartz scale median and interquartile range (IQR) by dietary lifestyle.

	Total Median	IQR		Vegan Median	IQR		Vegetarian Median	IQR		Pescetarian Median	IQR		P value Median test
	N = 544	25th	75th	N = 362	25th	75th	N = 132	25th	75th	N = 50	25th	75th	*
POWER (social power, authority, wealth)	3.0	2.0	5.0	3.0	1.0	4.0	4.0	2.0	5.0	4.0	2.0	6.0	.086
ACHIEVEMENT (success, capability, ambition, influence on people and events)	5.0	4.0	7.0	5.0	4.0	6.0	6.0	4.0	7.0	5.0	4.0	7.0	.402
HEDONISM (gratification of desires, enjoyment in life, self-indulgence)	5.0	3.0	6.0	5.0	3.0	6.0	5.0	4.0	7.0	5.0	3.0	7.0	.425
STIMULATION (daring, a varied and challenging life, an exciting life)	6.0	4.0	7.0	6.0	4.0	7.0	6.0	4.0	7.0	6.0	4.0	7.0	.557
SELF-DIRECTION (creativity, freedom, curiosity, independence, choosing one's own goals)	7.0	6.0	8.0	7.0	6.0	8.0	7.0	6.0	8.0	7.0	6.0	8.0	.494
UNIVERSALISM (broad-mindedness, beauty of nature and arts, social justice, a world at peace, equality, wisdom, unity with nature, environmental protection)	7.0	6.0	8.0	7.0	6.0	8.0	7.0	5.0	8.0	7.0	5.0	8.0	.618
BENEVOLENCE (helpfulness, honesty, forgiveness, loyalty, responsibility)	7.0	6.0	8.0	7.0	6.0	8.0	7.0	6.0	8.0	7.0	6.0	8.0	.033
TRADITION (respect for tradition, humbleness, accepting one's portion in life, devotion, modesty)	3.0	1.0	5.0	3.0	1.0	5.0	3.0	2.0	5.0	4.0	2.0	5.25	.055
CONFORMITY (obedience, honoring parents and elders, self-discipline, politeness)	3.0	2.0	5.0	3.0	1.0	5.0	3.5	2.0	5.0	4.0	2.0	6.25	.257
SECURITY (national security, family security, social order, cleanliness, reciprocation of favors)	5.0	3.0	6.0	5.0	3.0	6.0	5.0	4.0	6.0	5.0	3.8	6.0	.628

reported that media persuaded their dietary choices, in particular documentaries. This underscores that the increasing presence of media influencers and targeted awareness campaigns have had an effect on men's decisions. Because scientific research is not readily available to everyone, alternative media outlets can serve as an informative and easily accessible way to gather information. The rise of semi-scientific documentary films that focus on environmental and health effects of animal production, could also mirror why the major motives were animal welfare (49.1%) and environmental concerns (21%). The spread of knowledge about the topics has become available to a larger mass of people than what research on its own has been able to deliver (Hancox, 2018). However, using social media as knowledge distribution channel is a promising nutrition intervention (Chau et al., 2018), relying on the information provided through should be carefully considered, as obfuscated consumers might end with undesirable behaviours or choices (Moorman et al., 2020).

Friends also seemed to play substantial roles as influencers (Supplementary Material) which agrees with the further explanation given by participants that found new relations that either supported their diet-related lifestyle or shared values and experiences (often meaning practical cooking skills like recipes). Humans are social beings that want to fit into their peer groups and following Nakagawa and Hart (2019) argument that men need to prove and enact their masculinity through everyday acts, could support why these influences are of importance. These influences were further highlighted in the final question where respondents were asked to state what made them adhere to their diets, and the words 'people' and 'friends' were used in the context where participants explained how learning and being inspired by others, surrounding yourself with like-minded and supportive people, being able to clearly explain your choice to others and ignore those who do not understand or accept it, were important adherence factors.

Results showed a significant association between age and years stated as having had adopted a meatless diet (see Table 4.), suggesting that as men age, they experience lesser barriers. Moreover, being vegetarian and pescatarian predicted significantly the adherence to their lifestyle. This could be due to a less restrictive dietary choice compared to vegans and to lesser experienced barriers (Corrin and Papadopoulos, 2017) and as part of a progression towards a more sustainable diet (Fresán and Sabaté, 2019). In agreement to what was reported elsewhere (Reipurth et al., 2019), the significant barriers to adherence were lack of cooking skills and finding it hard to find suitable offers (Schösler et al., 2012), as well as the perceived uncertainty regarding the sufficiency of the regime and missing the taste of meat (Corrin and Papadopoulos, 2017; Reipurth et al., 2019; North et al., 2021).

Education also showed a marginally significant association suggesting that the higher the education, the more empowered men are to facing barriers to adhere to their diets (Perez-Cueto, 2019; Van Roon et al., 2020). Conventional values were also marginally and positively associated to adherence to vegetarian and pescatarian diet lifestyles, meaning that men who had ranked high on more conventional values also adhered longer to their diet. Prioritizing stability, conformity and tradition implies resistance to change, in this case a well-established dietary lifestyle and a focus on preserving the past rather than looking for new experiences (Blawert and Wurm, 2020).

Men could change their diets in the direction of a plant-based dietary pattern to reduce global environmental impact (Godfray et al., 2018) and reduce their cardiovascular disease risk (Rohrmann et al., 2013; Arash et al., 2017; Sinha et al., 2009; Wang et al., 2016). Still the social pressure for meat consumption cannot be underestimated as strong barrier for sustained adherence to plant-based diets together with the lay belief that unhealthy is tasty (Briers et al., 2020).

Lastly, if prevention of chronic disease through dietary shift (Godfray et al., 2018; Wolk, 2016) are to be promoted among men and if a gesture to change the environmental damage that comes with meat consumption, public health campaigns could use these findings to better target their desired audience. Future interventions could stress how to overcome barriers, by improving cooking skills, providing more accurate and evidence based information about sufficiency of plant-based diets as

Table 3
Barriers experienced by participants.

	Total Median	IQR		Vegan Median	IQR		Vegetarian Median	IQR		Pescetarian Median	IQR		P value Median test
	N = 544	25th	75th	N = 362	25th	75th	N = 132	25th	75th	N = 50	25th	75th	*
People judged me negatively	**3.0**	**2.0**	**4.0**	**3.0**	**2.0**	**4.0**	**2.0**	**2.0**	**3.0**	**2.0**	**2.0**	**3.0**	**<.001**
People treated me differently in a bad way	**2.0**	**2.0**	**3.0**	**3.0**	**2.0**	**4.0**	**2.0**	**1.0**	**3.0**	**2.0**	**1.0**	**3.0**	**<.001**
I felt ashamed or embarrassed to tell someone about my diet choice	1.0	1.0	3.0	1.0	1.0	3.0	2.0	1.0	3.0	1.0	1.0	2.0	.717
My friends and/or family made fun of me	3.0	2.0	4.0	3.0	2.0	4.0	3.0	2.0	4.0	2.0	1.0	4.0	.064
My partner/spouse supported my choice	4.0	3.0	5.0	5.0	3.0	5.0	4.0	3.0	5.0	4.0	3.0	5.0	.105
I was unsure if my diet will have enough variety	**2.0**	**1.0**	**3.0**	**2.0**	**1.0**	**3.0**	**2.0**	**1.0**	**3.0**	**2.5**	**1.8**	**3.3**	**<.001**
I missed the taste of meat	**1.0**	**1.0**	**3.0**	**1.0**	**1.0**	**2.3**	**2.0**	**1.0**	**3.8**	**3.0**	**1.0**	**4.0**	**<.001**
Meals have no new components	**2.0**	**1.0**	**2.0**	**1.0**	**1.0**	**2.0**	**1.0**	**1.0**	**2.0**	**2.0**	**1.0**	**3.0**	**.026**
My new diet meals provide eating pleasure	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	4.0	3.0	5.0	
I was worried that my new diet would be more expensive	2.0	1.0	3.0	2.0	1.0	3.0	2.0	1.0	3.0	2.0	1.0	3.0	.214
I was worried that my budget would suffer	2.0	1.0	3.0	2.0	1.0	3.0	2.0	1.0	2.0	2.0	1.0	3.0	.370
Preparing meals took extra time and effort	2.0	1.0	3.0	2.0	1.0	3.0	2.0	1.0	4.0	2.50	1.0	4.0	.613
It was hard to prepare meals	**2.0**	**1.0**	**2.0**	**2.0**	**1.0**	**2.0**	**2.0**	**1.0**	**3.0**	**2.0**	**1.0**	**3.0**	**<.001**
I had to find recipes for preparing my meals	3.0	2.0	4.0	3.0	2.0	4.0	4.0	2.0	4.0	3.0	2.0	4.0	.542
It was hard to find options that fit my diet when eating out (e.g. at restaurants, canteens, etc.)	4.0	3.0	4.0	4.0	3.0	4.0	4.0	2.0	4.0	3.0	2.0	4.0	.358
I lacked awareness of what makes a well-balanced vegan/ vegetarian/pescetarian meal	2.0	1.0	3.0	2.0	1.0	3.0	2.0	2.0	3.75	2.0	1.0	4.0	.374
I didn't know how to cook a tasty vegan/vegetarian/pescetarien meal	2.0	1.0	3.0	2.0	1.0	3.0	2.0	1.0	3.0	2.0	1.0	2.25	.226
I was worried I wouldn't get all the micro-nutrients I need (vitamins B12, D, Omega-3 fatty acids, calcium, etc)	2.0	1.0	4.0	2.0	1.0	4.0	2.0	1.0	4.0	3.0	2.0	3.0	.904
I was worried I wouldn't get enough protein	**2.0**	**1.0**	**3.0**	**1.0**	**1.0**	**2.0**	**2.0**	**1.0**	**3.0**	**2.0**	**1.0**	**3.0**	**<.001**

Table 4
Regression model predicting time of adherence to diet lifestyle choice [a].

Model	B	95% CI for B		P-Value
		Lower	Upper	
Constant	−5.19	−8.67	−1.68	.004
Age (y)	.26	.20	.33	<.001
Education achievement	1.00	-.05	2.05	.061
Vegetarian (yes/no)	4.45	3.08	5.82	<.001
Pescatarian (yes/no)	2.07	.0.7	4.06	.042
Living in EU (yes/no)	−1.62	−2.99	-.24	.022
Conventional Values	.52	-.05	1.10	.073
Skills and hardship barriers	-.72	−1.28	-.16	.016
Own perception about the diet barriers	−1.10	−1.67	-.52	<.001

[a] Controlled for age, income, education, values, barriers, diet lifestyle and living situation. Only significant explanatory variables were retained by the backward procedure.

tools to effectively influence and change men's dietary habits.

The main intention of this paper was to explore commonalities among men who persevered in their choice for a meatless diet regardless of their current location. Many studies on consumers find easier to reach women (Faber et al., 2020), as women are more involved with healthier eating (Micha et al., 2015; Wardle et al., 2004) and often choose products from the vegetables and pulses categories (Melendrez-Ruiz et al., 2019). We have included men from different countries, social backgrounds, lifestyle preferences, etc. using a snowball convenience sampling procedure, the non-probabilistic technique of choice when a specific segment or unattainable population group is sought (Ghaljaie et al., 2017). The main reasons for this decision were a) current consumers are global and connected in ways that have been reported as narrowing cultural differences in attitudes, values and behaviour (Fox et al., 2018; McKeown and Dunn, 2021) particularly food consumption (Naska et al., 2006); we have further controlled for the effect of being in EU or outside EU on the time of adherence to the dietary choice; b) males adhering to a plant-based diet are not yet mainstream consumers (McKeown and Dunn, 2021), hence, we considered them as positive deviants, which is the originality of this paper, and subsequently chose to reach them via referrals of other respondents within interest social media groups (Tenny et al., 2021). In the case of this study the target group of men who have chosen a meatless diet involves those who defined themselves as vegan, vegetarian and pescatarian; such cases that are considered as outstanding successes expected to provide valuable information about their experience with a transition to a predominantly plant-based dietary lifestyle (Teddlie and Yu, 2007). Furthermore, it is a relatively homogeneous group hence with low risk of bias (Teddlie and Yu, 2007, Faber et al., 2020).

The principal limitations of this study are the sampling methodology, as it is not random and not representative of the countries from which it was drawn. However, as mentioned earlier, the aim was to understand barriers towards dietary shift among males, and where qualitative data

Table 5
Representative quotes for the most frequently occurring words by diet lifestyle.

Word	Vegans	Vegetarians	Pescatarians
People	"Practising stoicism in order to don't take other people opinions so seriously", 20 y/o, 2y Vegan. "I stopped caring about what people will think" 31 y/o, 2y Vegan	"I just had to come to terms with my choices and not be affected about what people thought" 25 y/o, 4 y Vegetarian "My biggest concern is the negative attitude from my co-workers." 33 y/o, 2y Vegetarian	"I just didn't care about how people perceived me, and lucky enough to be financially well-off." 25 y/o, 2 y Pescatarian
Research	"Doing research, getting information from internet and other sources", 30 y/o 4y Vegan. "Through own research and conversations with people being vegan", 20 y/o 2y, Vegan	"Research. Trial and error in cooking." 28 y/o, 1,5 y Vegetarian	"Research, practical preparation and commitment." 28 y/o, 3 y Pescatarian
Recipes	"Researched a lot of new recipes/ ingredients and experimented with them." 25 y/o, 1y Vegan "Together with my wife I tried out new recipes, consulted other vegans and online sources for recipes and ways to maintain a healthy diet … when I switched from a vegetarian diet to vegan, the dining out options decreased significantly. Yet, we took this an opportunity to dine at home more often and save some money." 33 y/o, Vegan 2y	"Looking up recipes, getting inspiration from others, going to other restaurants etc." 26 y/o, 5 y Vegetarian	"Got inspired by recepies online and used alternative meat options and just ordered takeout from different places" 28 y/o, 0.5 y Pescatarian
Friends	"Dropped the friends who didn't get it." 38 y/o, 3y Vegan. "With a little help from my friends" 39 y/o, 25y Vegan.	"I didn't force others (friends) to have my opinion, but showed respect for their choice to stay with meat. That gave them the opportunity to also treat my decision with respect." 24 y/o, 3 y Vegetarian	"By reading up on information related to it, and talking to friends who follows a similar diet." 30y/o, 10y Pescatarian.
Animals	"I felt a strong reassurance that my diet was important to avoid hurting animals, and I came to feel a bit disgusted by meat/dairy." 25 y/o, 6 y Vegan	"The barriers were perhaps mainly habits, and they were overcome by being motivated by reasons "bigger than myself", concerning the environment and the suffering and exploitation of non-human animals" 28 y/o, 3y Vegetarian. "When I ate meat I thought I'd never be able to give it up. Being a vegetarian now is easier than I imagined. Realising that I was eating dead animals was enough of a turn off for me." 25 y/o, 2 y Vegetarian	

aimed at saturation of information. We believe that the current sample provides robust information from the participants. Moreover, the potential regional bias has been taken into consideration during the analysis. The strength of this study is its large sample size that allowed for regression modelling and for saturation of qualitative data. Therefore, the sample methodology seemed adequate to further extract the experiences of men who have adopted a plant-based dietary lifestyle.

For influences, motives, and barriers, closed ended questions or Likert scales were used that also limited respondents' answers and therefore the scope of responses. The sample also presented an information bias in the way that some respondents that had a given diet for several years stated that they had a hard time recalling when they changed their diets, so they were not able to be precise with years of following a meatless diet. The study ran for 3½ months, which set a limit to data handling especially using the open-ended question about adherence factors. Coding of adherence factors was made initially by one person (ES), however, and to control for reflexivity bias, codes were constantly reviewed by other co-authors and agreed upon their meaning.

5. Conclusion

The reasons why men had chosen a meatless diet were information from scientific research, followed by documentaries and the persuasion of friends. The major motives for changing their dietary lifestyles were animal welfare followed by environmental concerns. Positive predictors of long-term adherence to a meatless diet were age, being vegetarian or pescatarian. Negative predictors of long-term adherence were experienced barriers (lack of skills, cognition about balanced eating, perceived hardships such as finding meal offers eating out, finding recipes as well as the perceptions of the inadequacy and tastelessness of a diet without meat). The importance of being surrounded and supported by other people, such as friends, partners, or family, was highlighted as a key factor when overcoming the barriers related to their dietary choices.

Implications for gastronomy

Introducing fruits and vegetables in the diet of populations remains a challenge. The society, however, is demanding a more active role from the food sector in general, and the foodservice in particular in the provision of tasty meals that are also sustainable and healthy. This paper takes as point of departure the idea that mainstream consumers can learn from early adopters, in particular, the strategies they have implemented for a successful change in dietary habits.

For gastronomy, such knowledge is relevant to address a growing demand for sustainable options in the sector. It also addresses how the key elements of successful adherence can be used as cues for food choices. Translating scientific research into concepts of sustainable healthy meals, or, translating animal welfare into the meal concepts will facilitate the conversation with growing plant-based consumer segments. Taste remains a key player as facilitator to dietary shift.

Although this might be for the moment a niche market, aligning with a more plant-rich diet, within the planetary boundaries, as preconized by EAT-Lancet, will remain the challenge for the sector in the coming decade.

Authors contributions

AB, CS, IdL, AM, ES & FPC designed the study. AB, CS, IdL, AM, ES designed and tested the questionnaire, collected data and analyzed it. All contributed to the initial draft of the manuscript. FPC revised and edited it critically for important intellectual content. All authors agreed with the final manuscript.

Declaration of competing interest

No financial conflicts of interest to declare by any of the authors.

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Appendix A. Supplementary data

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