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Masculinity and veganism: the effect of linking vegan dishes with masculinity on men's attitudes toward vegan food

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Introduction: Vegetarian or vegan diets are not yet popular with most men, though they are beneficial for both health and the environment. Men's low preference for such diets might stem from the prevalent association of meat with masculinity, and of veganism with femininity. Accordingly, linking vegan nutrition to masculinity might help to develop a favorable attitude toward plant-based diets in men. The present study examined the effects of a masculine framing of vegan dishes on men's attitudes toward vegan food and veganism, and explored whether adherence to traditional forms of masculinity might increase the effects of masculine framing.

Methods: We conducted an online experiment with a 2 (man vs. woman) x 2 (conventional vs. masculine framing) design, in which 593 adults participated. We measured participants' attitudes toward vegan dishes (dish ratings, hunger ratings) and veganism (veganism ratings, vegan scenarios ratings), the perceived suitability of the dishes for men and women as well as men's identification with new forms of masculinity.

Results: We found that a masculine framing of vegan dishes influenced the gender association of the dishes, weakening the link to femininity. However, masculine framing did not influence men's or women's attitudes toward the presented vegan dishes or veganism in general. Although the extent to which men identified with new forms of masculinity correlated positively with favorable attitudes toward veganism, new masculinity identification did - with an exception for the rating of the presented dishes - not moderate the effect of the experimental condition.

Discussion: Our findings suggest that the potency of a short-term intervention might not be sufficient to counterbalance the prevailing feminine connotations associated with veganism. Thus, we encourage further exploration of masculine framing to improve men's perception of vegan food and the vegan concept, but with stronger stimuli and/or longer intervention duration.

KEYWORDS

veganism, masculinity, gender association, gender stereotypes, framing

1. Introduction

Meat and other animal products are considered being the centerpieces of a meal in many cultures (Twigg, 1983). Due to the high demand, global production of animal products increased considerably from 2000 to 2014 (meat by 39%, milk by 38%; FAO, 2018). With an annual meat consumption of about 80 kg per capita, the amount consumed in Europe is twice as high as recommended from a health perspective (WCRF, 2007; Ritchie and Roser, 2017). Negative consequences of excessive meat consumption such as cardiovascular problems, oncological diseases, and type 2 diabetes have been shown in a number of studies (e.g., McAfee et al., 2010; Micha et al., 2010). Recent findings also argue against the widespread belief of a disadvantage of a vegetarian (renouncing meat and fish) or a vegan

(renouncing all animal products and thus meat, fish, milk, eggs, and honey) diet (Leitzmann, 2014) because both types have been shown to be associated with lower risk of chronic diseases (Appleby and Key, 2016; Dinu et al., 2017; e.g., obesity, type 2 diabetes mellitus, cardiovascular disease, and cancer). Aside from the health aspect, high consumption of meat and animal products is a burden on the environment (Leip et al., 2015). For example, globally, 83% of agricultural land is used for animal agriculture, which accounts for around 56-58% of dietary greenhouse gas emissions but only for 37% of the protein and 18% of the caloric requirements (Poore and Nemecek, 2018). However, to date, only around 5% of the German population follow a vegetarian diet and only around 1% are vegan (FORSA, 2020). In addition, a vegetarian diet is decidedly more widespread among women (6.1%) than among men (2.5%; Mensink et al., 2016), and among vegans only 19% are men (SKOPOS, 2020). The association between meat consumption and masculinity, especially in Western societies (Adams, 1990; Thomas, 2016) might explain these gender differences. Following a vegan diet, and excluding all animal products, would therefore be the strongest possible antagonist to meat eating and thus to masculinity (Greenebaum and Dexter, 2018).

Given that meat reduction can be beneficial for both environment and health, and men are underrepresented among vegetarians and, in particular, among vegans, it is important to develop favorable attitudes in men toward plant-based diets. Accordingly, the current study examines (1) whether men's attitudes toward a vegan diet can be improved through an intervention, in which vegan food is associated with masculinity, and (2) whether individual differences in masculinity moderate the effect of this intervention.

In the following section, we will first discuss gender, gender stereotypes, and their association with food. Then, we will discuss a masculine framing of vegan dishes as an intervention that might improve the attitude toward vegan dishes and veganism among men. Finally, we will discuss the role of individual differences in identification with masculinity on the effectiveness of such an intervention.

The distinction between (innate) biological sex and socially constructed gender is important. In contrast to biological sex, gender is constructed through culturally produced gender differences between men and women (Athenstaedt and Alfermann, 2011), which are internalized in the process of socialization. This means that family, school, media and others convey social norms, values and rules, leading to gender stereotypes (Steins, 2010). Gender stereotypes are therefore shared assumptions about how men and women differ from one another in their roles and characteristics (descriptive) or how they should differ (prescriptive; Eckes, 2008). These descriptive and prescriptive assumptions about men and women are consistent across many Western cultures (e.g., women are said or expected to be caring and emotionally expressive, while men are said or expected to be dominant and autonomous in their behavior; Williams et al., 1999).

Gender stereotypes also include food and food choices. For example, McPhail et al. (2012) conducted semi-structured interviews in which most Canadian adults and teenagers indicated gender associations for different types of nutrition and reported eating accordingly. Smaller servings, healthier foods, and even certain dishes (e.g., sushi, couscous, and green salad) were perceived as more appropriate for women. Food for men, in contrast, was defined by large portions, and by being hearty and filling (e.g., hamburgers, hot dogs, and pizza). Cavazza et al. (2015) confirmed that the dish itself, the portion size and the presentation of the dish play a role in gender perception and found that this perception as gender appropriate or inappropriate affects the willingness to eat specific types of food. Specifically, this meant that women preferred Caprese salad to a hamburger, rated smaller portions better than large portions, and preferred an elegant presentation of food to a messy arrangement. In addition, people who eat smaller portions are perceived to be more feminine and the consumption of larger portions is associated with masculinity (Bock and Kanarek, 1995).

In particular, meat consumption is linked to gender stereotypes of masculinity (Rozin et al., 2012), probably explaining men's lower willingness to adopt plant-based diets. Meat is associated with strength and potency, which makes meat appear more suitable for men: "men are strong, men need to be strong, thus men need meat" (Adams, 1990, p. 33). Men could identify themselves as men by eating meat, hence they consume more than women. Other studies confirm the connection between high meat consumption and a positive attitude toward meat, especially in men (Rothgerber, 2013). Men are more committed to consuming meat than women and are stronger supporters of the four arguments put forward in favor of meat consumption (Piazza et al., 2015). These are listed under the 4Ns and describe the assumption that meat consumption is natural, normal, necessary, and nice. Conversely, Adams (1990) argues that vegetables and other meat-free foods tend to be perceived as appropriate food for women, making them uninteresting and inappropriate for men. Building on Brillat-Savarin's statement from 1862 that one is what one eats (c.f. Adams, 1990, p. 36), Adams concludes: "to eat a vegetable is to become a vegetable, and by extension, to become woman-like".

As Niederle and Schubert (2020) point out, veganism can be discussed as a diet, philosophy, movement or (social) practice. As an example of gender differences regarding philosophy, one can look at the empirical finding of women having a more negative attitude toward livestock farming and being more likely to support animal welfare organizations (Eldridge and Gluck, 1996; Knight et al., 2004). Further, men in Rothgerber's (2013) study believed that caring for animals is a sign of weakness and femininity. The vegan diet, which does not contain any animal products and is, therefore, more intense than vegetarianism, is thus a strong contrast to meat consumption (Greenebaum and Dexter, 2018). This was also shown in studies that examined the perception of vegetarians and vegans by other people. Vegetarians were perceived to be less masculine than people who eat meat (Ruby and Heine, 2011). However, a recent study Thomas (2016) found this effect only for the perception of vegans but not of vegetarians, indicating that vegetarianism might become more mainstream and appropriate for men. Interestingly, Thomas' study also showed that men in particular attribute lower masculinity to other vegan men, regardless of their motivation for vegan nutrition (e.g., health, caring about animals). Bogueva et al. (2022) reported on Australian men's experience of visiting and eating at a vegan restaurant. The men's statements showed concerns linked to masculinity, dietary identity and social perception by others.

They perceived their visit to the restaurant as a discrepancy with masculinity. Further, the way they spoke about their experience, it becomes obvious that their eating behavior served the management of the impression others have of them, and that this was more important than their actual liking of the plant-based burger. Thus, (not) eating meat is a (social) practice with a symbolic value for impression management regarding gender, and what Malitska (2021) reports about organized vegetarianism in the early twentieth-century Russian Empire applies nowadays, too: food is not an end in itself. Instead, food might be best described as a social marker and can demonstrate belonging to a group, but also contribute to discrimination (De Garine, 2001). The symbolic value of a product plays an important role in consumers' decision to buy this product (Levy, 1959). For example, products may be chosen to strengthen a person's own gender identity and to make sure that others perceive us accordingly (Grubb and Grathwohl, 1967). Indeed, advertising, cookbooks and blogs have recognized this relationship and have already tried to link vegan food to masculinity. Hart (2018), for example, examined the relationship between gender and veganism in the depiction of vegan food on vegan blogs and found that masculine attributes were often used to promote vegan food as being suitable for men. Fortifying food that is easy to prepare, very filling, hearty and meat-like is particularly often used in connection with suitability for men (Rogers, 2008; Gal and Wilkie, 2010; McPhail et al., 2012; Cavazza et al., 2015; Hart, 2018; Love and Sulikowski, 2018; Sexton et al., 2019; Contois, 2020). Such framing might be beneficial since Bogueva et al. (2022) found indications of strict enforcements of vegan food to lead to perceived limited freedom and thus psychological reactance in men. The same conclusion is drawn by Szczebyło et al. (2022), who argue that changing dietary behavior at a deep level of belief is very difficult and thus the willingness for transitions in dietary behaviors needs to be facilitated, for instance with new value creation.

From an empirical perspective, framing products and behaviors as appropriate for men and women seems to work. Worth et al. (1992) conducted two experiments in which different products (beer or jeans) were presented and framed with either masculine or feminine adjectives. In line with the framing, the participants not only judged the products as being more suitable for the respective gender but also liked them better if the framing matched their own gender. In addition, studies have examined how products or behaviors that are already associated with one gender can be made more interesting for the opposite gender (e.g., Gal and Wilkie, 2010; Brough et al., 2016). Brough et al. (2016), for example, examined the willingness to behave in an environmentally friendly manner (willingness to donate to an environmental organization and attitude toward electric cars), which is associated with femininity and hence not similarly popular with men. They found that the reactions were affected by the importance of maintaining gender identity (i.e., individual factors) and the gender-related presentation of the relevant stimulus (i.e., situational factors). Men were influenced in their behavior by presenting the products in a more masculine light by using gender-appropriate colors, fonts, words, and symbols. Interestingly, the effects of the framing manipulations on women were much smaller. Gal and Wilkie (2010) conducted a similar study on food choices by presenting different dishes in a masculine or feminine way. The gender association of the dishes was manipulated by altering the ingredients, the verbal descriptions, and the names of the dishes. Concerning ingredients, the masculine dish, for example, contained gravy, while the feminine dish contained red wine sauce. With regard to verbal description, the masculine dish was described as "hearty" while the feminine dish was described as "luscious". Finally, regarding the name, the masculine dish was called "Western Salad", whereas the feminine dish was called "Nature Salad". Gal and Wilkie (2010) found that product presentation had an effect on men's food choices, with men preferring the dishes described in a masculine manner. For women, in contrast, the effect of the gender-related manipulations was again much smaller. This finding agrees with the notion that men, compared to women, face greater disadvantages for behavior that is inconsistent with their gender (Martin, 1990). Men should therefore be more receptive to gender-related information. Supporting this, White and Dahl (2006) found that products with feminine associations are more likely to be avoided by men than masculine-associated products are avoided by women.

Although gender stereotypes represent culturally shared assumptions about how men and women (should) differ from one another (Eckes, 2008), there are individual differences regarding the personal importance and identification with these stereotypes. In addition, stereotypes are open to change. Kaplan et al. (2017), for example, argue that an increasing number of men develop alternative "new" ideas of masculinity, which challenge traditional male norms. These so-called forms of new masculinity are associated with values such as authenticity, emotional expressivity, and holistic self-awareness. Accordingly, they might influence men's attitudes and behaviors in traditionally "male" and "female" contexts.

With regard to nutrition, De Backer et al. (2020) investigated whether identification with new masculinity influences attitudes, intentions and behavior toward meat. They found that the men who identified with new forms of masculinity ate less meat, had less attachment to meat, were more likely to reduce their meat consumption, and were more positive about vegetarians. Accordingly, men who identify strongly with new masculinity might need less nudging toward vegan nutrition and they might be less influenced by (traditional) masculine framings of vegan dishes.

The present study pursues three aims. First, we investigate whether vegan food, which has a strong feminine connotation, can be rendered more attractive for men through the association of vegan food with masculine attributes. Second, we examine whether any effects of such an association transfer to attitudes toward veganism in general. Third, individual differences in men are addressed by including identification with new masculinity as a moderator variable in the study, which might affect the effectiveness of pairing vegan food with (traditional) masculine attributes. The resulting hypotheses are presented below.

Based on the findings of previous experiments in which gender association was shifted by using gender-associated attributes (e.g., Gal and Wilkie, 2010; Brough et al., 2016) we assume that a description of vegan food with masculine attributes influences the gender-stereotypical symbolism of the vegan dish, resulting in a weakening of its feminine

connotation and a movement toward perceived suitability for men.

Hypothesis 1: An association of vegan dishes with masculine attributes weakens the association of vegan dishes with femininity.

If this holds true, then this change in the gender stereotypical symbolism of the vegan dish might have the potential to reduce the perceived inconsistency with men's gender identity. Accordingly, we expect that men are going to rate a vegan dish better when described with masculine attributes.

Hypothesis 2: Men rate vegan dishes better if they contain masculine instead of conventional attributes.

Typically, men show a strong tendency to behave according to gender roles and to avoid products and behavior associated with women. Women, on the other hand, seem less concerned about maintaining their gender identity (e.g., White and Dahl, 2006; Gal and Wilkie, 2010; Brough et al., 2016; e.g., they are more likely to choose masculine-associated products than men choosing feminine-associated products). Therefore, we do not expect the description of vegan dishes with masculine attributes to affect women's ratings of vegan food as much as men's ratings. Indeed, for women, there might not be a meaningful effect at all.

Hypothesis 3: For women, the rating of vegan food does not differ for conventional descriptions or descriptions with masculine attributes.

In addition, it is investigated whether the representation of vegan dishes with masculine attributes also affects men's general ratings of veganism. This is hypothesized because by associating a vegan dish with masculine attributes, not only the dish itself but also the underlying concept of veganism could be influenced. For reasons mentioned above for Hypothesis 3, we expected no such effect or a much weaker effect in women.

Hypothesis 4: The masculine description of vegan dishes leads to a better attitude toward veganism in men.

Hypothesis 5: The masculine description of vegan dishes does not influence the attitude toward veganism in women.

Finally, men's identification with new forms of masculinity (which are challenging traditional male norms and are associated with values such as authenticity, emotional expressivity, and holistic self-awareness; Kaplan et al., 2017) could influence the amount to which an association of vegan food with (traditional) masculinity affects men's attitude toward vegan food and veganism in general. Specifically, men who identify more strongly with new masculinity, should show weaker identification with traditional masculine stereotypes and should thus be less influenced by a masculine framing.

Hypothesis 6: Men who identify less strongly with new forms of masculinity are more positively influenced in their rating of vegan food that is described with masculine attributes than men who identify more strongly with new forms of masculinity.

Hypothesis 7: Men who identify less strongly with new forms of masculinity are more positively influenced in their attitudes toward veganism through the masculine description of vegan dishes than men who identify more strongly with new forms of masculinity.

TABLE 1 Demographics of the sample.

Variable	Final sample	Omnivores	Veg*ans
N	593	382	154
Gender (men)	157	128	16
Age in years (*SD*)	25.4 (9.6)	26.8 (11.2)	22.7 (4.0)
Education			
Secondary school certificate or lower	2.0%	2.7%	0.7%
Vocational education	2.9%	3.9%	0.0%
A levels	63.2%	60.3%	68.8%
University degree	31.9%	33.1%	30.5%
Occupation			
Pupil or apprentice	1.4%	1.0%	1.2%
University student	82.2%	78.3%	86.0%
Employee	14.0%	17.6%	6.7%
Other	2.5%	2.9%	6.0%

2. Methods

2.1. Data collection and sample

The data for the study was collected online via SoSci Survey (Leiner, 2019) in two waves, namely at the end of 2020 and at the end of 2021. The study was advertised as being about the rating of recipes. Participants learned about the study privately, through the internet (e.g., Facebook groups, Instagram, LinkedIn, SurveyCircle, SurveySwap), or through the University of Würzburg's recruiting system. There was no monetary reward, but on SurveyCircle it was indicated that 30 cents per participant would be donated to UNICEF and participants in the University's recruiting system could receive credits for course participation.

The questionnaire was completed by 631 participants. Of these, 48 participants were excluded based on the following criteria: other gender than men or women, younger than 18 years old, an incorrect answer to any of the first control questions (i.e., recognition of the name of the dish) in combination with a 50% threshold for the second control questions (i.e., recognition of main ingredients of the dish), and less time than 12s spent on any of the dish descriptions, which would indicate scanning (Brysbaert, 2019). Thus, the final sample comprised 593 participants, but hypotheses were tested only on the 382 omnivore participants (see Table 1). Of the final sample, most were in their mid-twenties, had completed A-levels, were university students, and identified as omnivores.

Given the results reported by Brough and colleagues (2016) on the effects of masculine branding on men's attitudes toward green behaviors, we expected effect sizes to be small to medium in size. A power analysis with G*power (Faul et al., 2009) indicated that a

sample of 395 participants was required to detect a small effect ($f^2 = 0.02$) in multiple regression analysis (single regression coefficients; $1\text{-}\beta = 0.80$, $\alpha = 0.05$, two-tailed test). An ethics approval was not required for this study because according to the ethical guidelines of the German Society for Psychology (DGPs) and the regulations of the Ethics Committee of the Institute for Psychology of the Faculty for Human Sciences of the Julius-Maximilians-University of Würzburg, prior review is not mandatory for research that provides signed informed consent from study participants, collects data anonymously, and has no foreseeable negative impact on participants. However, the study was reviewed *post-hoc* by the Ethics Committee of the University of Bamberg, Germany, and approval was granted.

2.2. Study design and procedure

The study represents a between-subjects design. The description of the dishes (conventional vs. masculine framing) was randomly assigned to the participants. Gender (man vs. woman) was assessed via self-report. Identification with new masculinity was assessed as a continuous covariate.

Participants were informed about the study's general structure and received information on voluntariness, anonymity, data protection, and the retention period for the anonymized data (in accordance with the European General Data Protection Regulation). Further participation in the study was only possible after consent. After that, the participants provided information about their demographics as well as information on eating behavior (diet, frequency of meat consumption, restrictions, and allergies).

In the main part of the study, the manipulated descriptions of four dishes were presented. There were two randomizations between the participants. Firstly, it was randomized whether the descriptions contained conventional or masculine attributes, resulting in two test groups. Secondly, the order of the dishes was randomized for each participant, since previous studies showed that certain dishes can already be associated with a gender (McPhail et al., 2012). The dishes were rated one after another by the participants in the following order: control questions, the rating of the dishes, the feeling of hunger, and the assignment to a gender. After the presentation of all dishes, the participants were asked what attitude they have toward veganism and how likely they would choose a vegan dish in different given situations.

In the last part of the study, some of the used stimuli were validated with a questionnaire in which adjectives were rated with regard to their masculinity/femininity. In addition, participants filled out the New Masculinity Inventory (Kaplan et al., 2017). The final questions were whether the participant knew vegetarians or vegans personally, whether they disliked a dish for a specific reason, whether there were technical or understanding difficulties, and whether there was any assumption about the purpose of the study. After having thanked the participants for taking part in the study, they were debriefed and asked to keep the study content confidential. The wording of the questions and options for answers can be found in the Supplementary Tables S1–S9.

2.3. Stimuli

For the stimuli (see Supplementary Graphics S1–S6), recipes from the vegan food blog *Eat this!* (https://www.eat-this.org/) were taken as inspiration and adapted for the study purpose. There were descriptions of four different dishes: salad, spaghetti carbonara, goulash, and burger. Several dishes were selected because dishes can already be associated with gender (McPhail et al., 2012). It was assumed that the salad and partly also the spaghetti carbonara have a more feminine connotation, while goulash and burgers tend to have a more masculine connotation. No photos were presented, and the colors and design were kept constant and in simple neutral colors. The text itself differed between a masculine and a conventional framing in the two conditions and was divided into a slogan at the beginning of the description, followed by a short text about the ingredients and preparation, and a short section praising the dish. Throughout the text, plenty of conventional or masculine attributes in the form of adjectives and phrases were used to create a distinctly framed dish. Examples of the wording in the conventional framing condition are "special touch", "colorful", "creative", and "delicious", and examples of the wording in the masculine framing condition are "beast", "meaty", "protein-rich", and "filling" (see Supplementary Tables S10, S11 for a full overview). Most of the attributes were taken from other studies in which they were named and/or used because of their association with masculinity. The conventional attributes were primarily taken from the Edgy Veggies Toolkit (Turnwald et al., 2020). For testing whether the attributes contribute to a conventional or masculine description, a selection of adjectives was checked for their validity at the end of the study by rating them with regard to their masculinity/femininity (see Supplementary Table S12).

2.4. Instruments

2.4.1. Gender association of the vegan dishes

After the description of each dish, participants answered whether the food was more suitable for women or for men (from 1 = *more likely for women* to 7 = *more likely for men*).

2.4.2. Attitudes toward the dishes

After the description of each dish, participants answered five questions about how they liked the dish (e.g., "I would like to eat the dish"; scroll bar from 1 = *disagree* to 101 = *agree*). The ratings on these five items were averaged per dish. The internal consistency was high ($\alpha = 0.98$). For the analysis the mean value of the four dishes was used (possible value range from 1 to 101). In addition, the feeling of hunger after every dish was collected (scroll bar from 1 = *not hungry* to 101 = *very hungry*).

2.4.3. Attitudes toward veganism

For the rating of veganism, two scales were implemented that were based on previous work of Bryant (2019), Jennings et al. (2019), and Silva Souza et al. (2020). The participants indicated their opinion on eight items that consisted of opposing word pairs to cover many different facets related to veganism (bad/good,

harmful/beneficial, unpleasant/pleasant, inedible/enjoyable, negative/positive, repulsive/appealing, boring/exciting, and awkward/comfortable) on a 7-point scale. The internal consistency was high ($\alpha = 0.95$). The answer to the eight items was averaged. In addition to that, participants indicated on 6 items how likely they would choose a vegan dish in certain situations (e.g., "when out and about with friends" or "in a restaurant") on a 5-point-scale (from 1 = *definitely not* to 5 = *definitely yes*; with an option not to answer the question). The internal consistency was high ($\alpha = 0.92$). In case of missing values, the available information was divided by the number of answers given and averaged.

2.4.4. New masculinity

The New Masculinity Inventory (NMI; Kaplan et al., 2017) was developed to record the identification with non-traditional forms of masculinity. The 17 items of the original inventory were translated to German by the authors of this paper. As in the study by De Backer et al. (2020), participants indicated on a 5-point scale to what extent they agreed with the statements (from 1 = *strongly disagree* to 5 = *fully agree*). The items were averaged to obtain a scale score. We also included an option to omit items, which differs from the original version (*I cannot judge*). In case of missing values, the available information was divided by the number of answers given and averaged. The internal consistency was high ($\alpha = 0.87$).

2.4.5. Eating behavior

Participants indicated their diet and could choose between omnivorous (meat, dairy products, and vegetables), pescatarian (no meat, but fish), vegetarian (neither meat nor fish), and vegan (neither meat, fish, eggs nor dairy products). Based on the study by De Backer et al. (2020), this study asked about the frequency of meat and fish consumption. Participants stated how often they eat meat/fish at a meal (breakfast, lunch, dinner, in-between; 5-point scale from 1 = *never* to 5 = *every day*). The distinction between the various options was made to account for the entire consumption and not just the main meals. The internal consistency was $\alpha = 0.89$. For an overview of general consumption, the mean value was used. Some additional questions were implemented to check for an influence or correlations with the rating of the dishes: whether meat consumption was restricted for various reasons (religion, health, diet, ethics, intolerance, disgust); food allergies; knowing vegetarians and/or vegans (Thomas, 2016); whether participants did not like a dish for a specific reason (because of the dish itself, the ingredients, an allergy, because it did not contain any animal products or for other reasons).

2.4.6. Validation of stimuli

At the end of the study, we checked whether the conventional and masculine attributes used for the experimental manipulation were perceived as neutral or masculine. We also included feminine items that had not been used in the study to avoid a focus on masculinity (see Supplementary Table S3). For each adjective, the participants indicated whether they perceived it to be neutral, feminine, or more masculine (from 1 = *more feminine* to 7 = *more masculine*; with an option not to answer the question).

2.4.7. Control questions

To control for attention and proper understanding two control questions followed each presented dish description. People were asked to indicate which dish they had read about, and which ingredient was not included (from a selection of four dishes or four ingredients). The final sample only considers participants who answered the question about the dishes correctly and who answered at least two of the four questions about the ingredients correctly. At the end of the study, participants were asked whether there were any difficulties in understanding or technical issues during the study (few to none) and whether there were any guesses as to what the study was about (a few participants made correct guesses).

2.5. Data analysis

Data preparation and statistical analysis were carried out with R (R Core Team, 2021; version: 4.2.2). To test the hypotheses, we used linear modeling (*lm*) provided in the *stats* package (version: 4.2.2). Categorical variables were effect-coded (gender: −1 = female; 1 = male; experimental manipulation: −1 = conventional; 1 = masculine) and the continuous moderator variable (New Masculinity Inventory) was mean centered. For pairwise comparisons, we also used the package *emmeans* (version: 1.8.4.1). All tests were conducted two-tailed and the alpha level was set to 0.05. Hypotheses were tested with omnivore participants only because we were interested in the effects on attitude change toward vegan dishes and veganism in persons who do not follow a vegan diet. Hypotheses were specified before the data were collected, and the analytic plan was pre-specified. Any data-driven analyses are clearly identified and discussed appropriately.

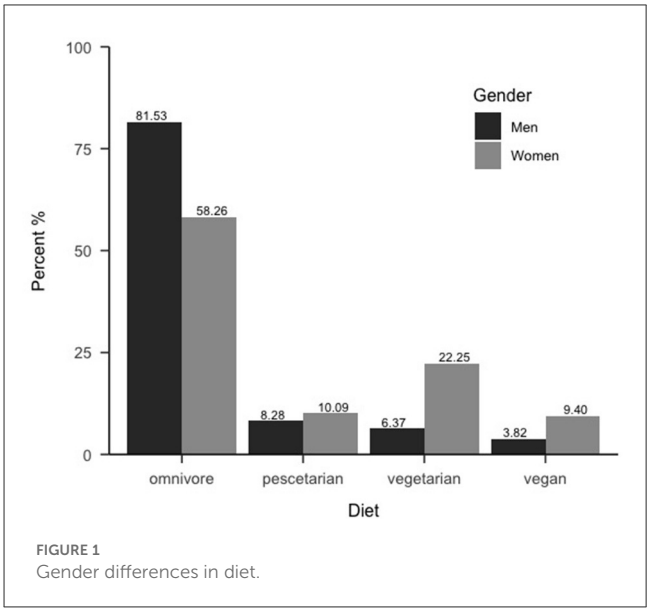

FIGURE 1
Gender differences in diet.

TABLE 2 Comparison between omnivore men and women regarding the amount of meat consumed.

Meal	Women		Men		*Estimate*	*SE*	*t*	*p*	*d*
	M	*SD*	*M*	*SD*					
Mean	2.10	0.52	2.43	0.67	0.33	0.06	5.254	< 0.001	0.57
Breakfast	1.69	0.83	1.88	1.00	0.19	0.10	1.967	0.050	0.21
Lunch	2.58	0.74	3.02	0.93	0.44	0.09	5.026	< 0.001	0.54
Snack	1.40	0.61	1.70	0.88	0.31	0.08	3.949	< 0.001	0.42
Dinner	2.72	0.77	3.10	0.89	0.38	0.09	4.345	< 0.001	0.47

Range of scale from 1 = never to 5 = every day.

3. Results

3.1. Preliminary analyses

3.1.1. Participants' eating behavior and its relation to new masculinity

Most participants had an omnivorous diet, but there were clear gender differences in the number of vegans and vegetarians compared to omnivores, with women being more likely to be vegan and vegetarian than men (see Figure 1). Omnivore men also ate more meat than omnivore women at different meals (see Table 2). Furthermore, among all participants, the major meat reduction reasons were ethics (men = 10.6%; women = 41.7%), health (8.8%; 26.0%), disgust (2.7%; 18.7%), diet (2.4%; 3.2%), intolerance (0.2%; 2.4%), and religion (0%; 1.52%). More reasons for reducing meat were associated with a better rating of the vegan dishes ($r_s = 0.22$, $p < 0.001$). In addition, among carnivores, more contact with veg*an people was associated with a better rating of the vegan dishes ($r_s = 0.17$, $p = 0.001$), with most participants (n = 284) in the sample reporting knowing both vegetarians and vegans. Food allergies did not occur often ($n = 50$ omnivore participants) and did not affect food rating significantly (allergies: $M = 68.42$, $SD = 21.56$; no allergies: $M = 71.05$, $SD = 20.22$; $B = -0.00$, $p = 0.396$). Finally, a stronger identification with new masculinity in men was associated with lower meat consumption in general ($r_s = -0.25$, $p = 0.002$), at breakfast ($r_s = -0.18$, $p = 0.028$), at lunch ($r_s = -0.19$, $p = 0.015$), and meat snacking ($r_s = -0.35$, $p < 0.001$), but not with meat consumption at dinner ($r_s = -0.11$, $p = 0.158$).

3.1.2. Validation of the stimuli

A selection of the adjectives used in the experimental versions to frame the dishes as masculine or conventional were tested for gender associations with masculinity/femininity (see Supplementary Table S3). The twelve adjectives that were intended to be perceived as masculine were significantly different from a neutral rating and rated in the masculine direction ($d = 0.21$ to 1.48). Six of the seven conventional adjectives were significantly different from a neutral rating and rated toward femininity, and one adjective did not significantly differ from a neutral rating ($d = 0.00$ to -0.84). The other five adjectives that were expected to be perceived as feminine and were used as filler items were significantly different from the mean toward femininity ($d = -0.45$ to -1.69). Thus, the ratings of the adjectives indicated that the experimental conditions (masculine vs. conventional framing) were distinguishable, with the masculine adjectives being perceived as more masculine and the conventional ones as neutral or even more on the feminine side.

3.2. Hypotheses

3.2.1. Influence of masculine attribution on the gender association of the vegan dishes

First, the perceived gender association of the vegan dishes was tested with a linear model with the between-subjects factor being the experimental condition (masculine framing vs. conventional framing; see Table 3). In the masculine framing condition, the perception of suitability for dishes shifted toward "more suitable for men", but these changes were small and never crossed the neutral threshold toward masculinity. Thus, the dishes were never rated as "more suitable for men" but were still perceived as being more suitable for women, moving closer to a neutral association, which supports Hypothesis 1.

3.2.2. Influence of masculine attribution on the rating of dishes and hunger

Linear models with the between-subjects factors gender (men vs. women) and experimental condition (masculine framing vs. conventional framing) and their interaction were used to test Hypothesis 2 (men in the masculine group rate the vegan dishes better than those in the conventional group), and Hypothesis 3 (women are not affected by the experimental manipulation). Dependent variables were the rating of the dishes and self-reported hunger after reading the description of the dishes.

As expected, women rated vegan dishes on average better than men (women: $M = 72.49$, $SD = 20.42$ vs. men: $M = 66.94$, $SD = 19.79$; $B = -8.99$, $t = -2.919$, $p = 0.004$). Masculine framing did not significantly predict dish rating across men and women (conventional: $M = 69.91$, $SD = 20.46$ vs. masculine: $M = 71.36$, $SD = 20.28$; $B = -0.92$, $t = 2.533$, $p = 0.718$) and the interaction between gender and experimental condition was not significant ($B = 6.95$, $t = 1.588$, $p = 0.113$). Simple main effects indicated that women in the two conditions did not differ significantly (conventional: $M = 72.95$, $SD = 21.23$ vs. masculine: $M = 72.04$, $SD = 19.65$; $B = 0.92$, $t = 0.360$, $p = 0.984$). The same was true for men (conventional: $M = 63.97$, $SD = 17.55$ vs. masculine: $M = 70.00$, SD

TABLE 3 Gender association of framed dishes in the conventional and masculine conditions.

Dish	Conventional		Masculine		*Estimate*	*SE*	*t*	*p*	*d*
	M	*SD*	*M*	*SD*					
Mean	3.62	0.58	3.82	0.44	0.20	0.05	3.776	< 0.001	0.39
Salad	3.52	1.24	3.57	1.10	0.05	0.12	0.397	0.691	0.04
Carbonara	3.53	0.99	3.88	0.97	0.35	0.10	3.523	< 0.001	0.36
Goulash	3.75	1.19	3.86	1.10	0.11	0.12	0.962	0.337	0.10
Burger	3.68	1.20	3.96	1.03	0.29	0.11	2.506	0.013	0.25

Rating from 1 = more likely for women to 7 = more likely for men.

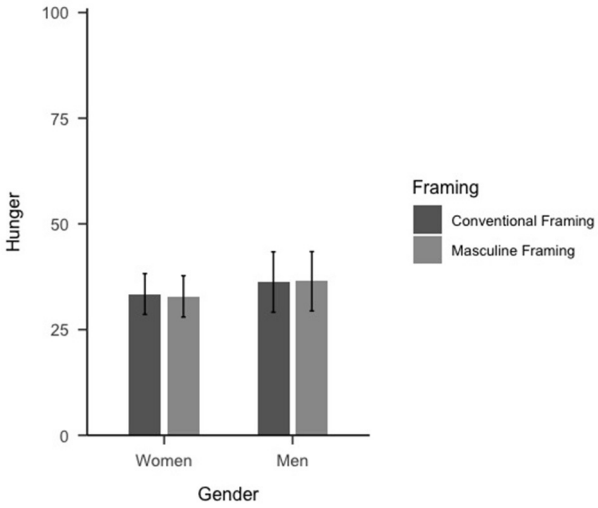

FIGURE 2
Rating of vegan dishes. Rating from 1 = disagree to 101 = agree. Error bars show 95% CI.

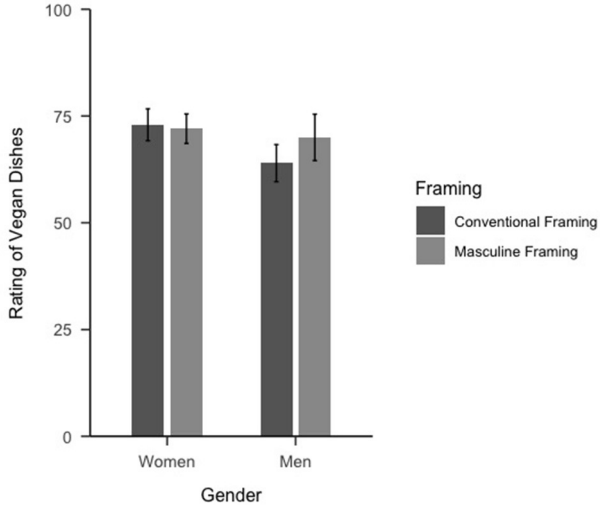

FIGURE 3
Rating of reported hunger. Rating from 1 = not hungry to 101 = very hungry. Error bars show 95% CI.

= 21.58; $B = -6.04$, $t = -1.691$, $p = 0.330$; see Figure 2). Thus, the data did not support Hypothesis 2, but it supported Hypothesis 3.

The same analysis was conducted for reported hunger after reading the recipes. Women and men reported similar hunger (women: $M = 33.13$, $SD = 27.59$ vs. men: $M = 36.34$, $SD = 28.25$; $B = 2.84$, $t = 0.668$, $p = 0.505$). Masculine framing did not significantly predict hunger (conventional: $M = 34.38$, $SD = 27.90$ vs. masculine: $M = 34.04$, $SD = 27.81$; $B = -0.56$, $t = -0.159$, $p = 0.874$) and the interaction between gender and experimental condition was not significant ($B = 0.74$, $t = 0.122$, $p = 0.903$). Simple main effects indicated that women in the two conditions did not differ significantly (conventional: $M = 33.41$, $SD = 27.48$ vs. masculine: $M = 32.86$, $SD = 27.81$; $B = 0.56$, $t = 0.159$, $p = 0.999$). The same was true for men (conventional: $M = 36.25$, $SD = 28.83$ vs. masculine: $M = 36.43$, $SD = 27.88$; $B = -0.18$, $t = -0.036$, $p = 1$; see Figure 3). Thus, again, the data did not support Hypothesis 2, but it supported Hypothesis 3.

3.2.3. Influence of masculine attribution on the rating of veganism

Linear models with the between-subjects factors gender (men vs. women) and experimental condition (masculine framing vs. neutral framing) and their interaction were used to test Hypothesis 4 (the masculine attribution of vegan dishes leads to a better attitude toward veganism in men) and Hypothesis 5 (the masculine attribution of vegan dishes does not influence attitude toward veganism in women). Dependent variables were the rating of veganism and the rating of vegan scenarios.

As expected, women rated veganism on average better than men (women: $M = 4.87$, $SD = 1.07$ vs. men: $M = 4.35$, $SD = 1.12$; $B = -0.58$, $t = -3.472$, $p = 0.001$). Masculine framing did not significantly predict the rating of veganism (conventional: $M = 4.65$, $SD = 1.11$ vs. masculine: $M = 4.74$, $SD = 1.11$; $B = 0.52$, $t = 0.383$, $p = 0.702$) and the interaction was not significant ($B = 0.10$, $t = 0.430$, $p = 0.667$). Simple main effects indicated that women in the two conditions did not differ significantly (conventional: $M = 4.85$, $SD = 1.15$ vs. masculine: $M = 4.90$, $SD = 0.99$; $B = -0.05$, $t = -0.380$, $p = 0.981$). The same was true for the men (conventional: $M = 4.27$, $SD = 0.93$ vs. masculine: $M = 4.42$, $SD = 1.28$; $B = -0.20$, $t = -1.023$, $p = 0.736$; see Figure 4). Thus, the data did not support Hypothesis 4, but it supported Hypothesis 5.

The same analysis was conducted for the rating of the vegan scenarios. As expected, women rated vegan scenarios better than men (women: $M = 3.13$, $SD = 0.78$ vs. men: $M = 2.82$, $SD = 0.80$;

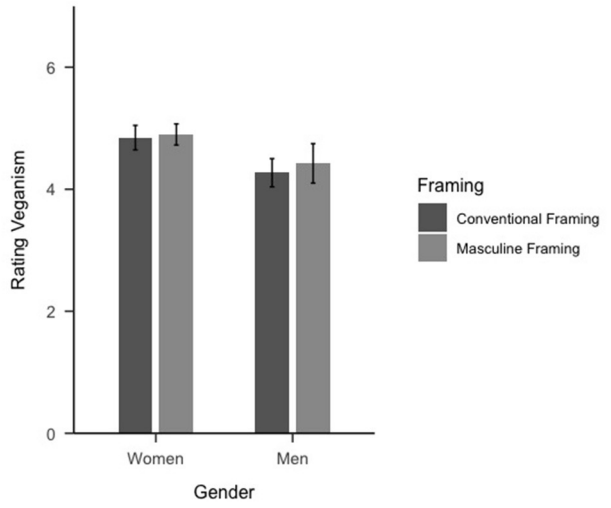

FIGURE 4
Rating of veganism. Rating from 7-point scale of opposites. Error bars show 95% CI.

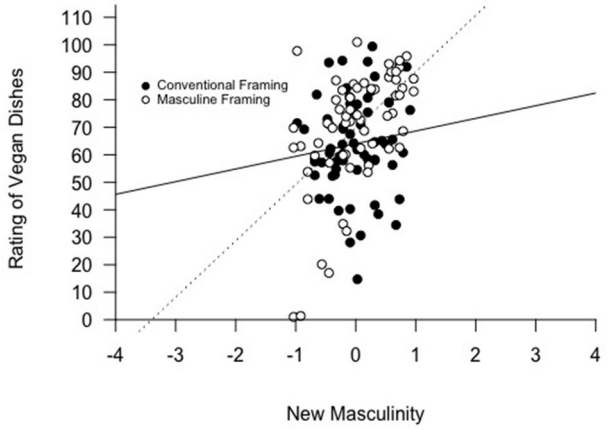

FIGURE 6
Men's rating of vegan dishes in relation to their NM identification. Rating from 1 = disagree to 101 = agree. The new masculinity scores were mean centered. The solid line represents conventional framing, the dotted line masculine framing.

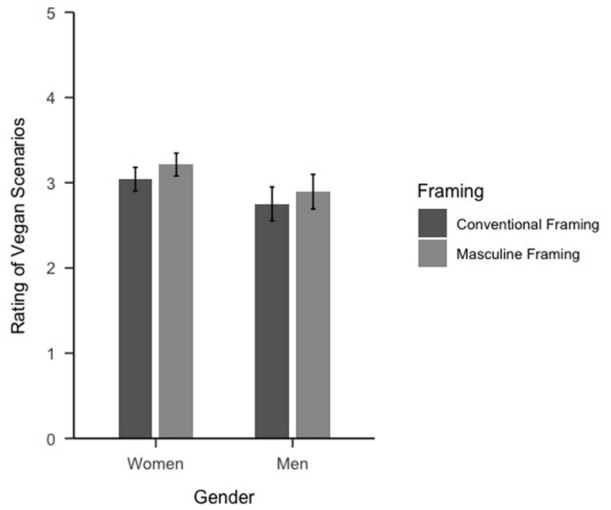

FIGURE 5
Rating of vegan scenarios. Rating from 1 = definitely not to 5 = definitely yes. Error bars show 95% CI.

$B = -0.29$, $t = -2.413$, $p = 0.016$). Masculine framing did not significantly predict the rating of vegan scenarios (conventional: $M = 2.94$, $SD = 0.81$ vs. masculine: $M = 3.11$, $SD = 0.79$; $B = 0.17$, $t = 1.736$, $p = 0.083$) and the interaction was not significant ($B = -0.03$, $t = -0.165$, $p = 0.869$). Simple main effects indicated that women in the two conditions did not differ significantly (conventional: $M = 3.04$, $SD = 0.80$ vs. masculine: $M = 3.21$, $SD = 0.76$; $B = -0.17$, $t = -1.737$, $p = 0.306$). The same was true for the men (conventional: $M = 2.75$, $SD = 0.80$ vs. masculine: $M = 3.21$, $SD = 0.76$; $B = -0.14$, $t = -1.030$, $p = 0.732$; see Figure 5). Thus, again, the data did not support Hypothesis 4, but it supported Hypothesis 5.

3.2.4. Influence of new masculinity on the relation between framing and rating of the dishes and veganism

The final hypotheses concerned a moderation effect of men's identification with new masculinity on the effect of the experimental manipulation, assuming that a stronger identification with new forms of masculinity weakens the positive effect of a masculine framing on the rating of vegan dishes by men (Hypothesis 6) and the rating of veganism by men (Hypothesis 7). To test these hypotheses, linear models with the categorical variable experimental condition (masculine vs. conventional framing) and new masculinity as (mean-centered) continuous moderator variable were calculated using only participants identifying as omnivore men.

For the rating of vegan dishes, there was no significant effect of identification with new masculinity ($B = 4.60$, $t = 0.929$, $p = 0.355$). However, the interaction between experimental conditions and new masculinity was significant ($B = 15.90$, $t = 2.492$, $p = 0.014$), but the direction was not as expected in Hypothesis 6. As can be seen in Figure 6, the positive effect of the masculine framing increased the more men identified with new masculinity.

For reported hunger, there was no significant effect of identification with new masculinity ($B = -0.91$, $t = -0.115$, $p = 0.909$) and the interaction between experimental condition and new masculinity was not significant ($B = -4.01$, $t = -0.395$, $p = 0.693$). Thus, again, the data did not support Hypothesis 6.

Concerning the attitude toward veganism, results showed that a higher identification with new masculinity significantly predicted the rating of veganism ($B = 0.850$, $t = 3.197$, $p = 0.002$). The more men identified with new masculinity, the better their attitudes toward veganism. However, there was no significant interaction effect between experimental conditions and new masculinity and thus no support for Hypothesis 7 ($B = 0.45$, $t = 1.311$, $p = 0.192$).

For the rating of vegan scenarios, there was a significant effect of identification with new masculinity ($B = 0.60$, $t = 2.818$, $p = 0.006$).

The more men identified with new masculinity, the better they rated the dishes. However, the interaction between experimental conditions and new masculinity was not significant ($B = -0.22$, $t = -0.807$, $p = 0.421$). Thus, again, the data did not support Hypothesis 7.

4. Discussion

This study investigated whether vegan food, which is typically associated with femininity, can be made more attractive for men by describing it with masculine attributes. To do so, we provided participants with a description of vegan dishes with a conventional or a masculine framing. We expected that a description of vegan food with masculine attributes affects the gender association of the vegan dishes, and thus reduce the perceived inconsistency with men's gender identity (Hypothesis 1). In line with our hypothesis, we found that the vegan dishes framed in a masculine way shifted toward a gender-neutral rating, weakening the link to femininity.

We also assumed that men like vegan dishes better when described with masculine attributes (Hypothesis 2), but this hypothesis was not supported for any of the dependent variables (rating of the dishes and reported hunger after reading the recipes). As a control, we also examined women's ratings. Here we also found no meaningful differences between the two framing conditions, which supported Hypothesis 3. We also investigated if any effects of a masculine framing generalized to men's attitudes toward veganism in general (Hypothesis 4). Again, we could not find a meaningful effect for any of the dependent variables (rating of veganism and rating of different vegan scenarios). As a control, we also examined women's ratings. As for the men, there were no differences between the experimental conditions, which aligned with Hypothesis 5.

According to these findings, it worked to influence the gender association of vegan dishes by describing the dishes in a masculine way. This underlines that gender associations of products and behaviors are susceptible to influences (Martin et al., 1990; Worth et al., 1992). However, the masculine framing did not meaningfully affect men's attitudes toward vegan dishes or toward veganism in general. This was unexpected given that Gal and Wilkie (2010) found that describing dishes with masculine or feminine attributes affected men's preferences for the dishes. An explanation for this finding might be that the effects of masculine framing on gender associations were too small to affect the attitudes toward vegan dishes and veganism, which men typically strongly associate with femininity and perceive as appropriate for women (Thomas, 2016). Indeed, even in the masculine framing condition, none of the dishes was rated as "more suitable for men" and the perceptions shifted only slightly toward a neutral rating. For the two dishes with a significant change in gender association (carbonara and burger), we replicated the reported analyses separately, but the results were similar to the analysis, in which all dishes were included. It must be noted that the validation of adjectives used for the experimental manipulation indicated that some of the attributes used in the masculine framing condition were only moderately associated with masculinity. Therefore, it is quite possible that attributes, which are more strongly associated with masculinity, will have stronger effects on gender associations and on attitudes toward vegan dishes and veganism. Future studies could explore whether some words might be more suitable for a masculine framing than others, and whether words perceived as more masculine might lead to findings hypothesized in the present study, as was the case in other interventions (e.g., electric car in Brough et al., 2016). Additionally, other framing interventions could prove successful. Szczebyło et al. (2022) found a strong attachment to meat due to hedonistic reasons among Polish millennials, and taste-focused labeling could be used to encourage healthier eating (e.g., Turnwald et al., 2020). Furthermore, masculine framings could be tried on other diets for a better understanding of potential effects (e.g., the Mediterranean diet which is characterized by a focus on local food and the sustainability of ecosystems and landscapes; Medina, 2019). Another complementary explanation for the non-significant findings in this study might be that veganism is too strongly associated with femininity for a short-term intervention to have any effects on attitudes toward vegan dishes and veganism in general. Indeed, for many men masculinity is associated with meat consumption (Adams, 1990; Rothgerber, 2013), so eating meat can even stand as a metaphor for masculinity (Rozin et al., 2012). In contrast, eating only plant-based nutrition (i.e., being vegan) is associated with femininity (Adams, 1990), with men perceiving other vegan men as less masculine (Thomas, 2016). Therefore, long-term interventions might be needed to successfully change attitudes toward vegan dishes and particularly veganism in general, and we encourage future studies to explore such long-term interventions (for instance in field settings such as a cafeteria). Furthermore, we examined whether identification with new masculinity (Kaplan et al., 2017) moderates the effects of a masculine framing of vegan dishes. We expected that men who identify more strongly with new forms of masculinity are influenced less by a masculine framing. As expected, higher identification with new masculinity correlated with more favorable attitudes toward veganism. There was a small to medium relationship between men's new masculinity identification and lower meat consumption. This agrees with De Backer et al.'s (2020) finding that men who identified with new forms of masculinity ate less meat, had less attachment to meat, were more likely to reduce their meat consumption, and were more positive about vegetarians. However, with one exception, new masculinity did not moderate the effect of the experimental manipulation. This exception was the rating of the dishes, in which men identifying more strongly with new masculinity were even more affected by masculine framing. This disagrees with our hypothesis and implies that the relationship between masculine identity and masculine framing might be less straightforward than assumed. Importantly, it has to be noted that most men in our study seemed to strongly identify with new masculinity, which restricts any conclusions on men who have a stronger traditional male identification.

4.1. Limitations

As in any study, some limitations of the present study have to be noted. A limitation is that the stimuli used for the experimental conditions were not piloted but taken from previous studies. Although we obtained ratings for a selection of the attributes, which

confirmed that the masculine and the conventional conditions did differ in the intended direction, this led to the use of attributes in the masculine framing condition, which showed only moderate masculinity ratings. Consistently using attributes that are more strongly associated with masculinity could potentially have increased the effects of the experimental manipulation. Another limitation is that some scales used in the present study were adapted and partly self-developed due to a lack of suitable measures. Although the internal consistencies were good and we used two dependent variables per hypothesis, the scales might not have been particularly suitable to capture the effects of a short intervention. For example, the feeling of hunger as a dependent variable contains only one statement that might not vary as a consequence of the short exposure to different dishes.

5. Conclusion

In this study, we have examined the effects of manipulating vegan dishes with masculine attributes on gender perception and attitudes toward veganism. The results highlight the intriguing possibility of successful alteration of gender associations with vegan dishes through a brief masculine framing intervention. However, while this shift in perception was observed, it did not lead to significant changes in men's broader attitudes toward vegan dishes or veganism in general. Our findings suggest that the potency of a short-term intervention might not be sufficient to counterbalance the prevailing feminine connotations associated with veganism. Despite the modest impact on gender appropriateness ratings for men, it is imperative to acknowledge the gender-neutral response exhibited by women, indicating that the intervention did not negatively affect their perception. Thus, we encourage further exploration of masculine framing to improve men's perception of vegan food and the vegan concept, but with stronger stimuli and/or longer intervention duration. Furthermore, it is prudent to delve deeper into the factors that may modulate the effectiveness of such interventions. Our initial exploration into new forms of masculinity in this context underscores the need for a comprehensive understanding of the intricate interplay between gender identity and dietary preferences. Finally, research on veganism is relatively new compared to vegetarianism. Given the relevance of this diet to health and environmental issues, further empirical research is worthwhile to develop targeted interventions that could foster a reduction in meat consumption and engender a more appealing perception of vegan cuisine, particularly among men.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: https://osf.io/3mdbq/?view_only=dba6ef50f0f941dfb4940695e68eaba6.

Ethics statement

The studies involving humans ethics approval was not required for this study because according to the ethics guidelines of the German Society for Psychology (DGPs) and the regulations of the Ethics Committee of the Institute for Psychology of the Faculty for Human Sciences of the Julius-Maximilians-University of Würzburg, prior review is not mandatory for research that provides signed informed consent from study participants, collects data anonymously, and has no foreseeable negative impact on participants. However, the study was reviewed *post-hoc* by the Ethics Committee of the University of Bamberg, Germany, and approval was granted. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AES contributed to the conception of the study, performed the statistical analysis, and wrote the first draft of the manuscript. AES and JL contributed to the design of the study and organized the database. All authors contributed to the manuscript revision, read, and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomm.2023.1244471/full#supplementary-material

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