



## Short Communication

## Why so defensive? Negative affect and gender differences in defensiveness toward plant-based diets

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## ABSTRACT

Evidence consistently shows that men (compared to women) tend to be more attached to meat consumption, less willing to follow plant-based diets, and overall more likely to express defensiveness toward plant-based eating. This study expands knowledge on the meat-masculinity link, by examining whether negative affect toward plant-based eating helps explain *why* these gender differences occur. Young consumers ( $N = 1130$ , 40.4% male, aged 20–35 years, USA) watched a video message promoting plant-based diets and completed a survey with three relevant expressions of defensiveness toward plant-based eating, namely threat construal, psychological reactance, and moral disengagement. Exposure to the messages did not impact gender differences in defensiveness compared to a control condition. Nonetheless, male consumers scored higher than female consumers in all measures of defensiveness (irrespective of experimental manipulation), with negative affect toward plant-based eating partly or fully mediating the associations between gender and defensiveness. Overall, these findings suggest that: (a) male defensiveness toward plant-based eating may be partly explained by negative affect, which is linked to a greater tendency to perceive reduced meat consumption as a threat and a limitation to one's freedom, and an increased propensity to deploy moral disengagement strategies such as pro-meat rationalizations; but (b) exposure to communication products promoting plant-based diets does not necessarily heighten male defensiveness toward plant-based eating (i.e., this study found no evidence of a “boomerang effect”). Future research on the topic could test whether affect-focused strategies may help decrease defensiveness to plant-based eating.

## 1. Introduction

There is a growing consensus that Western and Westernized diets, which are rich in animal-sourced foods, pose global risks for the health of the people and the planet (Willett et al., 2019). Moreover, meeting an ever-increasing global demand for meat raises ethical concerns about how animals are systematically exploited by the food industry (Rothgerber, 2020). These risks and concerns have fueled calls for transitioning toward increasingly plant-based (vs. meat-centered) food systems, but animal-based products, especially meat, still have a profound significance in social practices and representations of food and meals (Graça, Godinho, et al., 2019). The question then arises as to how to promote healthier and more sustainable food systems that require

large-scale shifts toward increased plant-based eating.

Previous research on health and environmental communication has shown that interventions promoting attitudinal and behavioral change often fail to produce the desired effects (Spelt et al., 2019). Pro-health and pro-environmental efforts can sometimes even backfire and trigger the opposite reaction to what they were trying to promote – a phenomenon called the “boomerang effect” (Byrne & Hart, 2009). The boomerang effect is triggered by a defensive reaction to an appeal or a request that contradicts the recipients’ beliefs and behavior. This reaction helps avoid feelings of dissonance and upholds or reinforces the status quo. Against this backdrop, emerging evidence suggests that meat consumers react defensively to plant-based eaters and initiatives promoting plant-based eating (Rothgerber, 2020). Even though plant-

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forward movements appear to be gaining traction in many Western societies, large segments of consumers are not willing and/or ready to change their eating habits. Many people cherish their health, oppose environmental degradation, and reject animal cruelty, yet react defensively when asked to consider reducing their meat consumption (Graça et al., 2016).

## 2. Gender, affect, and defensiveness against plant-based eating

Gender is one of the variables most consistently linked with meat consumption and defensiveness against plant-based eating. Men are likely to eat more meat, eat less plant-based meals and to identify less with plant-based lifestyles, and more likely to express defensiveness toward plant-based eating (De Backer et al., 2020; Dowsett et al., 2018; Graça, Godinho, et al., 2019). Many scholars have written about the masculine value of meat as expressing power and virility, and noted that men are expected to eat meat according to traditional gender roles (Adams, 2015; Rosenfeld & Tomiyama, 2021). Recently, it has also been shown that gender differences in meat consumption can be partly explained by variables such as meat attachment and endorsement of hegemonic masculinity norms (De Backer et al., 2020; Dowsett et al., 2018). The current work adds to this line of inquiry by focusing on affect as a possible explanatory mechanism for why male consumers tend to be more defensive toward plant-based diets.

Affect in response to a given stimulus is known to shape judgment and information processing, making affect a possible mediator of defensive responses (Reiss et al., 2021; Zajonc, 1980). Risk and benefit assessments are often shaped more by automatic affective reactions than by careful deliberation of pros, cons, and different perspectives (Finucane et al., 2000). Given that men tend to be more attached to meat consumption than women, we propose that negative affect toward plant-based eating may help explain why male consumers react more defensively to plant-based eating. Conceptually, the underlying rationale is that negative affect may be triggered by the possibility of letting go of a highly cherished practice (i.e., their meat-centric diet), as emotions are often tied in with goal attainment (or lack thereof).

Defensiveness in this context can be expected to be expressed through various channels. One expression of defensiveness against pro-health or pro-environmental interventions is to perceive the target behavior as a threat. Threat construal is linked to ego defense and the avoidance of emotional distress (Chugh et al., 2014; Lazarus, 1991). According to this view, the anticipation of harm or loss to self is perceived as a threat and processed as “an electrical short circuit” (Lazarus, 1991, p. 361) that automatically diverts the focus of attention to the desired alternative.

A second (albeit related) expression of defensiveness against pro-health or pro-environmental messages is psychological reactance (Spelt et al., 2019). Psychological reactance occurs when recipients of a message are motivated to restore a freedom that they perceive as being threatened. To restore this freedom, recipients of the message may (deliberately or unconsciously) think and act in direct opposition to the pro-health or pro-environment target behavior (e.g., Byrne & Hart, 2009; Spelt et al., 2019).

Lastly, another expression of defensiveness relevant for meat substitution and plant-based eating is moral disengagement. Moral disengagement is the selective deactivation of moral self-regulation mechanisms to avoid or reduce cognitive dissonance (Bandura, 1999). This allows oneself to engage in self-serving harmful behaviors, whilst neutralizing self-evaluative emotional responses such as guilt. Moral disengagement has been shown to uphold pro-meat stances when considering the harm associated with current meat consumption practices, and the possibility of altering eating habits (Graça et al., 2016).

## 3. The current study: Research problem, aim, and hypotheses

It has been shown that men tend to express more negativity toward

plant-based eating and lower support to meat reduction initiatives than women (De Backer et al., 2020; Dowsett et al., 2018; Graça, Godinho, et al., 2019). This can be an important barrier for food sustainability transitions that require large scale shifts toward increased plant-based eating, such as the Planetary Health Diet (Willett et al., 2019), as the success of these transitions largely depends not only on individual change but also on broad public support for meat curtailment policies. Previous work on the meat-masculinity link has focused on how traditional gender roles and gendered food practices push male consumers to meat-centric diets by portraying meat as a symbol of power and virility (Adams, 2015; De Backer et al., 2020). Here, we draw conceptually on the links between affect and defensiveness (Reiss et al., 2021; Zajonc, 1980) to offer an additional, incremental contribution to the understanding of why male consumers are more defensive toward plant-based eating than female consumers. We asked participants to watch a video message promoting plant-based eating and measured three conceptually related expressions of defensiveness against plant-forward initiatives, namely threat construal, psychological reactance, and moral disengagement. We anticipated that (1) male consumers would be overall more defensive (i.e., display increased threat construal, psychological reactance, and moral disengagement) toward plant-based eating than female consumers (main effect of gender); (2) exposure to the message would bolster male defensiveness toward plant-based eating (moderation effect); and that (3) negative affect toward plant-based eating would mediate the links between participants' gender and defensiveness (mediation or mediated moderation effect).

## 4. Methods

This study is part of a larger research project on theory-based messages promoting plant-based eating to young consumers. Information about the research project can be found here: <https://osf.io/kd2v6>. The aims and analyses presented in the current report are original and fall beyond the main scope of the project.

### 4.1. Participants

A total of 1132 participants from the USA (aged 20–35 years;  $M = 31.02$ ,  $SD = 3.71$ ), were recruited through Qualtrics.com panels. The inclusion criteria were age (20–35 years), not following a plant-based diet, being a US resident, and being fluent in English. Given the incremental nature and contribution of this study, we selected a US sample because evidence on the meat-masculinity link has been repeatedly observed and discussed in this cultural context (Adams, 2015; Rosenfeld & Tomiyama, 2021). The sample was relatively well distributed in terms of gender (673 participants identified as female, 59.6%; 457 identified as male, 40.4%). Two participants that identified with another gender or preferred not to answer were not included in the current analyses ( $N = 1130$ ).

### 4.2. Study materials and procedures

The study was approved by the ethical review board of the host institution. After providing informed consent, participants were asked to fill out their sociodemographic information (e.g., age, gender, education) and measures referring to their consumption habits (e.g., frequency of meat consumption). Then, participants were asked to view a short theory-based message (i.e., video) promoting a more plant-based diet. The message (i.e., video) was developed based on the Health Action Process Approach model (HAPA; Schwarzer, 2008), the Self-Determination Theory (Ryan & Deci, 2000), and inputs from a systematic review on meat consumption and plant-based eating (Graça, Godinho, et al., 2019). Participants were randomly assigned to one of three versions of the message: one version targeted motivation variables ( $n = 283$ ; 2m33s), one targeted volitional variables ( $n = 282$ , 2m21s), and the other version combined the motivation and volitional variables into

a single message ( $n = 282$ , 4m54s). Participants in the control condition were not shown any message ( $n = 283$ ). The transcripts and links to the message are provided in the [Supplementary Materials](#) (Appendix A). Further information about the research (including the full list of measures) can be found here: <https://osf.io/kd2v6>.

### 4.3. Measures

In addition to sociodemographic variables (e.g., age and gender), this study measured constructs referring to negative affect toward plant-based eating, psychological reactance, moral disengagement, and threat construal. The full version of the measures is included in the [Supplementary Materials](#) (Appendix B).

**Negative Affect.** Negative affect toward plant-based eating was measured with five items (e.g., “Thinking about eating plant-based meals (i.e., no meat/fish) more often makes me feel... - Distressed”; adapted from the PANAS scale - Watson et al., 1988), using a 7-point Likert-type scale (1 = *very slightly or not at all* to 7 = *extremely*;  $\alpha = 0.95$ ).

**Reactance.** Psychological reactance was measured with three items (e.g., “The video tried to pressure me”) taken from a previous study on reactance and meat consumption (Spelt et al., 2019), using a 7-point Likert-type scale (1 = *strongly disagree* to 7 = *strongly agree*;  $\alpha = 0.86$ ).

**Moral Disengagement (means-ends justifications).** Moral disengagement with regard to meat consumption was measured with five items (e.g., “Eating meat keeps the balance of the food chain”) from the means-ends justifications subscale of the Moral Disengagement in Meat Questionnaire (MDMQ; Graça et al., 2016). This subscale comprises pro-meat rationalizations and ‘yes, but’ constructions that portray meat consumption as means to serve higher ends, using a 7-point Likert-type scale (1 = *strongly disagree* to 7 = *strongly agree*;  $\alpha = 0.90$ ).

**Threat Construal.** Threat Construal was measured using two items (e.g., “For me, eating plant-based meals (i.e., no meat/fish) more often is a loss for my well-being”) adapted from Chugh et al. (2014), using a 7-point Likert-type scale (1 = *not at all true to me* to 7 = *very true to me*;  $\alpha = 0.89$ ).

### 4.4. Data analyses

The data analyses to test the hypotheses were performed using IBM Statistical Product and Service Solutions (SPSS, v28). First, we conducted two-way ANOVAs to test hypotheses one (main effect of gender) and two (interaction between gender and message conditions), followed by descriptive and simple effect (post-hoc) analyses to qualify the interactions and differences between conditions on defensiveness against plant-based eating (i.e., reactance, moral disengagement, threat construal). We used a  $p$ -value of  $< .05$  as the conventional threshold for

statistical significance. Afterward, we planned to conduct mediation analyses using the Process Macro v4 (model 7 to test mediated moderations, model 4 to test simple mediations; bootstrap method with 5000 bootstrap resamples), testing negative affect toward plant-based eating as a mediator of the links between gender, conditions, and defensiveness toward plant-based eating.

## 5. Results

The descriptive statistics for all variables per gender and condition are presented in [Table 1](#). Evidence in favor of construct independence for the measures is presented in the [Supplementary Materials](#) (Appendix C). As for the main analyses, the two-way ANOVAs for each outcome variable supported the first hypothesis that male participants would be overall more defensive toward plant-based eating than female participants on all outcome variables ([Tables 1 and 2](#)). The second hypothesis that exposure to the messages would bolster male defensiveness to plant-based eating was not supported, as we found no evidence of interaction effects between gender and message condition ([Table 2](#)). There were also no main effects of message condition on defensiveness. Given the absence of moderation effects, we tested the third hypothesis - i.e., that negative affect toward plant-based eating would mediate the links between participants' gender and their defensive reactions - via mediation (instead of moderated mediation) models.

In the first model (*threat construal*), male consumers expressed greater threat construal and negative affect toward plant-based eating than female consumers (respectively:  $B = -0.58$ ,  $t(1124) = -5.02$ ,  $SE = 0.12$ ,  $p < .001$  and  $B = -0.46$ ,  $t(1124) = -4.35$ ,  $SE = 0.11$ ,  $p < .001$ ). The indirect effect of gender on threat construal via negative affect toward plant-based eating was significant ( $B = -0.34$ ,  $SE = 0.08$ , 95% CI[-0.51, -0.19]). The direct effect of gender on threat construal remained significant ( $B = -0.23$ ,  $t(1124) = -2.77$ ,  $SE = 0.08$ ,  $p = .01$ ), thus suggesting a partial mediation. In the second model (*reactance*), as expected, male consumers expressed greater psychological reactance and negative affect toward plant-based eating than female consumers (respectively:  $B = -0.36$ ,  $t(843) = -2.99$ ,  $SE = 0.12$ ,  $p < .001$  and  $B = -0.47$ ,  $t(843) = -3.83$ ,  $SE = 0.12$ ,  $p < .001$ ). The indirect effect of gender on reactance via negative affect toward plant-based eating was significant ( $B = -0.19$ ,  $SE = 0.06$ , 95% CI[-0.30, -0.09]). The direct effect of gender on reactance was no longer significant ( $B = -0.16$ ,  $t(843) = -1.50$ ,  $SE = 0.11$ ,  $p = .13$ ), thus suggesting a full mediation. Lastly, in the third model (*moral disengagement*), male consumers expressed greater levels of moral disengagement and negative affect toward plant-based eating than female consumers (respectively:  $B = -0.27$ ,  $t(1124) = -3.46$ ,  $SE = 0.08$ ,  $p < .001$  and  $B = -0.45$ ,  $t(1124) = -4.29$ ,  $SE = 0.11$ ,  $p < .001$ ). The indirect

**Table 1**  
Descriptive statistics for each measure, per gender and condition.

| Gender | Condition   | Negative affect (N = 1127) |      | Reactance (N = 847) |          | Moral disengagement (N = 1129) |      | Threat construal (N = 1129) |      |
|--------|-------------|----------------------------|------|---------------------|----------|--------------------------------|------|-----------------------------|------|
|        |             | M                          | SD   | M                   | SD       | M                              | SD   | M                           | SD   |
| Male   | Control     | 3.30                       | 1.69 | <i>a</i>            | <i>a</i> | 5.32                           | 1.02 | 3.51                        | 1.72 |
|        | Motivation  | 3.14                       | 1.90 | 4.36                | 1.74     | 5.06                           | 1.35 | 3.42                        | 2.03 |
|        | Capacity    | 3.05                       | 1.87 | 4.22                | 1.82     | 5.05                           | 1.23 | 3.56                        | 2.06 |
|        | Combination | 3.30                       | 1.92 | 4.33                | 1.92     | 5.11                           | 1.45 | 3.48                        | 2.08 |
|        | Total       | 3.20                       | 1.85 | 4.30                | 1.83     | 5.13                           | 1.29 | 3.49                        | 1.98 |
| Female | Control     | 2.82                       | 1.72 | <i>a</i>            | <i>a</i> | 4.94                           | 1.27 | 2.83                        | 1.73 |
|        | Motivation  | 2.66                       | 1.64 | 3.85                | 1.64     | 4.65                           | 1.24 | 2.87                        | 1.90 |
|        | Capacity    | 2.71                       | 1.63 | 3.81                | 1.61     | 4.97                           | 1.28 | 2.87                        | 1.81 |
|        | Combination | 2.73                       | 1.69 | 4.20                | 1.66     | 4.85                           | 1.36 | 3.08                        | 1.92 |
|        | Total       | 2.74                       | 1.67 | 3.94                | 1.64     | 4.86                           | 1.29 | 2.90                        | 1.83 |
| Total  | Control     | 2.99                       | 1.73 | <i>a</i>            | <i>a</i> | 5.07                           | 1.20 | 3.06                        | 1.75 |
|        | Motivation  | 2.86                       | 1.77 | 4.06                | 1.70     | 4.83                           | 1.30 | 3.10                        | 1.97 |
|        | Capacity    | 2.85                       | 1.73 | 3.97                | 1.70     | 5.00                           | 1.26 | 3.14                        | 1.94 |
|        | Combination | 2.99                       | 1.82 | 4.26                | 1.78     | 4.97                           | 1.41 | 3.26                        | 2.00 |
|        | Total       | 2.92                       | 1.76 | 4.10                | 1.73     | 4.97                           | 1.30 | 3.14                        | 1.92 |

*a* = The measure of reactance targeted specific reactions to the message (i.e., “The video tried to impose a decision to me”, “The video tried to pressure me”, “I felt limited in my freedom of choice”) and was not applicable to the control condition, where participants were not shown any stimuli.

**Table 2**

Two-way ANOVAs for gender and message condition on negative affect, psychological reactance, moral disengagement (justifications), and threat construal.

| Variables                         | Negative affect |            | Reactance |            | Moral disengagement |            | Threat construal |            |
|-----------------------------------|-----------------|------------|-----------|------------|---------------------|------------|------------------|------------|
|                                   | F               | $\eta_p^2$ | F         | $\eta_p^2$ | F                   | $\eta_p^2$ | F                | $\eta_p^2$ |
| Gender                            | 18.95***        | 0.017      | 8.57**    | 0.010      | 12.94***            | 0.011      | 25.24***         | 0.017      |
| Message condition                 | 0.66            | 0.002      | 1.55      | 0.004      | 2.04                | 0.005      | 0.51             | 0.001      |
| Gender $\times$ message condition | 0.19            | 0.001      | 0.87      | 0.002      | 0.86                | 0.002      | 0.59             | 0.002      |

\*\*  $p < .01$ , \*\*\*  $p < .001$ .

effect of gender on moral disengagement via negative affect toward plant-based eating was significant ( $B = -0.08$ ,  $SE = 0.02$ , 95% CI[-0.12, -0.04]). The direct effect of gender on moral disengagement remained significant ( $B = -0.19$ ,  $t(1124) = -2.52$ ,  $SE = 0.08$ ,  $p = .01$ ), thus suggesting a partial mediation.

## 6. Discussion

This study aimed to explain gender differences in defensiveness toward plant-based eating. We asked (male and female) meat-eaters to watch a message promoting plant-based diets and measured three relevant expressions of defensiveness against plant-based eating, namely threat construal, psychological reactance, and moral disengagement. The results confirmed higher levels of defensiveness toward plant-based eating in male participants compared to female participants. Furthermore, negative affect toward plant-based eating (partly or fully) mediated the links between gender and defensiveness across all outcome variables (i.e., threat construal, reactance, and moral disengagement).

One interpretation for these findings pertains to the pervasive influence of gender norms and gendered food practices on the meat-masculinity link. Conventional masculine gender roles can be linked with traits such as dominance, competitiveness, and an overall orientation to attend to one's own interests and needs, often at the expense of the needs of others (e.g., Waddell et al., 2020). Food practices are also known to be highly gendered, such that animal products (and meat in particular) tend to be seen as more masculine foods, whereas plant-based eating tends to be seen as more feminine (De Backer et al., 2020). Hence, it is plausible to consider that male defensiveness and negative affect toward plant-based eating are largely shaped and enabled by the social context. A related interpretation pertains to the view of male defensiveness against plant-based eating as a motivated process (Graça et al., 2016; Rothgerber, 2020). Given that men tend to be more attached to meat consumption than women (e.g., Dowsett et al., 2018; Graça, Godinho, et al., 2019), the idea of reducing meat consumption and following plant-based lifestyles may trigger motivated processes of loss aversion and dissonance reduction especially among male consumers.

Notwithstanding these propositions, and contrary to our expectations, we found no evidence that exposure to a video message promoting plant-based diets increased male defensiveness toward plant-based eating. This challenges a situated view of negative affect and defensiveness as being triggered in response to a specific stimulus (i.e., the video). Rather than being triggered by specific stimuli, it may also be that general negative affect towards plant-based eating (which is linked with gender) can be viewed conceptually as a predictor of defensiveness, here measured as threat construal, reactance, and moral disengagement. Yet another possibility is that these two processes may cooccur. Indeed, one possible interpretation for the absence of moderation effects in this study is that the overall positive, inclusive, and supportive tone of the videos may have successfully lowered the risk for backlash upon exposure to the message. As the scope and the design of the current study were not equipped to systematically rule out these competing explanations, there is a need for more theory and research to advance a nomological network and systematic assessment of gender differences in defensiveness toward plant-based eating.

As immediate next steps, communication products (e.g., videos,

images, texts, conversation systems) promoting plant-based eating to male consumers may test whether male defensiveness can be bypassed via affective conditioning, in addition to (or instead of) deliberate thought processes on why or how to shift to plant-based eating. A potentially promising avenue for future research could be to examine how positive feelings linked with food consumption orientations embedded in conventional diets (e.g., pleasure, convenience, social image) could be transferred to plant-based meals and lifestyles (e.g., Graça, Truninger et al., 2019). Another idea to investigate and try to reduce affect-driven defensiveness is to explore how communication products targeting male consumers may portray the social context as more supportive of plant-based eating. For instance, this could be tested by providing information on plant-forward dynamic norms (Sparkman & Walton, 2017) or priming the social endorsement of traits such as cooperation, compassion, and "other-oriented" values, which conventionally tend to be linked with female gender roles. Another priority to strengthen confidence in the current findings and possible interpretations is to test whether these results are replicated with different target groups in addition to young consumers, samples from diverse cultural contexts, and upon exposure to different communication products (e.g., videos; images; texts; conversation systems). The scope of this work should also be expanded in future research by incorporating variables pertaining to gender norms and gender identity vis-à-vis the role of positive and negative affect on both meat consumption and plant-based eating – and exploring how different cultural contexts may shape these associations.

To conclude, transitions toward healthier and more sustainable food systems require large-scale shifts to reduced meat consumption, but the meat-masculinity link has been identified as a barrier to these changes. The current study suggests that male defensiveness toward plant-based eating may be partly explained by negative affect, which is linked to a greater tendency to perceive reduced meat consumption as a threat and a limitation to one's freedom, and an increased propensity to deploy moral disengagement strategies such as pro-meat rationalizations. Nevertheless, the study found no evidence of a "boomerang effect" when participants watched an inclusive and supportive video promoting plant-based diets. In other words, there were no signs of backlash, as gender differences in defensiveness toward plant-based eating were not heightened upon exposure to a theory-based message that challenged meat's central place on the menu. Future research and applications on the topic could test whether affect-focused strategies (e.g., positive affective conditioning, buffering automatic negative affective reactions) can help decrease defensiveness to plant-based eating – in addition to other (e.g., arguments-based, norms-focused) approaches.

## CRedit authorship contribution statement

**Kim Hinrichs:** Writing – original draft, Conceptualization, Formal analysis, Investigation. **John Hoeks:** Writing – review & editing, Conceptualization, Methodology, Investigation. **Lúcia Campos:** Writing – review & editing, Formal analysis, Investigation. **David Guedes:** Writing – review & editing, Investigation. **Cristina Godinho:** Writing – review & editing, Conceptualization, Methodology, Investigation. **Marta Matos:** Writing – review & editing, Methodology, Investigation. **João Graça:** Writing – original draft, Writing – review & editing, Conceptualization, Methodology, Formal analysis, Investigation,



Supervision.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

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