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Short Communication

Gain framing increases support for measures promoting plant-based eating in university settings

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ABSTRACT

Global concerns with public health, animal suffering, and environmental problems linked to meat-centric diets have increased over the last decade. One way to help address these concerns is to implement measures that reduce meat consumption and increase plant-based eating in collective meal contexts, such as catering services in schools and universities. The present study provides insight into how consumers may react to these measures. A simple experiment (within-subjects design; N = 295) tested whether framing a set of plant-forward measures in terms of gain (i.e., measures to *promote* or *increase* the consumption of plant-based meals) or loss (i.e., measures to *curtail* or *reduce* the consumption of meals with meat) impacted consumer support for these measures in university settings. The results showed that consumer support was higher for gain-framed measures compared to loss-framed measures. Furthermore, the impact of framing was higher for measures focusing on sensory cues (e.g., make plant-based meals tastier and more appealing vs. make meals with meat less tasty and less appealing) and lower for measures focusing on behavioral constraints (e.g., serve only plant-based meals vs. do not serve meals with meat). Overall, the findings suggest that framing plant-forward measures in terms of gain can be a simple and potentially effective way to increase consumer support for food sustainability transitions.

1. Introduction

In recent years, meat-centric diets have been reported to cause harmful consequences on human health, animal welfare, and environmental sustainability (e.g., non-communicable diseases; pandemic risk; antibiotic resistance; animal suffering; biodiversity loss; greenhouse gas emissions; e.g., Willett et al., 2019). In addition, feeding a global population that is expected to rise to about 10 billion people in 2050 will require changes regarding food production and consumption patterns (Willett et al., 2019). Substantial evidence has also shown that animal-based foods (i.e., meat and dairy products) tend to require more resources and cause greater environmental impact when compared to plant-based foods (e.g., Clark & Tilman, 2017).

To address these pressing challenges and move towards more sustainable food systems, the Planetary Health Diet stresses the need to shift current food consumption patterns towards increasingly plant-based diets (Willett et al., 2019). This dietary shift will be challenging due to the numerous determinants of eating behavior and the barriers to reducing meat consumption and adopting plant-based diets. According to a systematic review by Graça and colleagues (2019), these barriers are related to the behavioral determinants of the COM-B system (i.e., capability, opportunity, and motivation; Michie et al., 2011), such as difficulty to get reliable information, social representations of meat, lack of familiarity towards plant-based meals, and meat attachment. The review also identified facilitators and interventions to enable food sustainability transitions, such as reshaping perceived social norms, informing consumers about the impact of different food options, and changing service provision in collective meal contexts (Graça et al., 2019). There have also been calls for public policies and interventions that promote increased plant-based eating in diverse contexts, including collective meal contexts (De Groeve & Bleys, 2017; Graça et al., 2020). Assessing public support for these policies and interventions is crucial to inform policy and decision-makers about the planning and the implementation of such measures (Diepeveen et al., 2013; Graça et al., 2020).

Against this backdrop, one important issue to consider is how framing can increase support for context-specific food sustainability transitions. Theory and evidence from health-relevant domains have suggested that framing messages in either negative (loss-frame) or

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positive terms (gain-frame) can have an impact on health behaviors, such as eating habits (e.g., Gallagher & Updegraff, 2012; Godinho et al., 2016). Drawing on the Prospect Theory (Kahneman & Tversky, 1979), Rothman and Solovey (1997) argued that, in the context of personal choice decisions, loss-framed and gain-framed messages have different effects depending on the type of behavior and how the behavior is construed (i.e., as risky or not risky). Loss-framed health messages are expected to be more effective to promote detection behaviors (e.g., mammogram) that can increase the risk of negative outcomes (i.e., discovering one is ill), and gain-framed health messages are expected to be more effective to promote prevention behaviors (e.g., physical activity) generally associated with positive outcomes. These predictions have been confirmed in a *meta*-analysis, where gain-framed messages were found to be more effective than loss-framed messages in promoting adherence to prevention behaviors (Gallagher & Updegraff, 2012).

To our knowledge, no studies have yet tested whether framing can be used to increase consumer support for measures promoting context-specific transitions towards increased plant-based eating. Here, we propose to provide such a test, using a different consequences framing operationalization (Rothman & Salovey, 1997), and focusing on collective meal contexts in university settings. We selected this setting because universities play an important role in promoting healthier and more sustainable practices (e.g., promoting innovation, institutionalizing change, shaping social norms; Berchin et al., 2021). Additionally, university students are usually transitioning towards becoming more self-determined consumers and can acquire habits that are more likely to remain throughout adult life (Lee & Loke, 2005). Thus, the current study tests whether framing a set of context-specific measures that promote increased plant-based eating in terms of gain (i.e., measures to *promote* or *increase* the consumption of plant-based meals) or loss (i.e., measures to *curtail* or *reduce* the consumption of meals with meat) may impact consumer support for these measures in university settings. In light of previous research on gain- and loss-framed messages (e.g., Gallagher & Updegraff, 2012), we hypothesize that a gain-frame will yield increased levels of consumer support for transitions towards increased plant-based eating when compared to a loss-frame.

2. Material and methods

2.1. Recruitment and sample size

In order to detect an effect size of Cohen's $d = 0.20$ with 80% power ($\alpha = 0.05$, two-tailed) using a paired samples *t*-test, we set a minimum of 199 participants (G*Power 3.1.9.4), but aimed to collect data from as many participants as possible within the time and resources available for this research. The sample consisted of 295 university students from 18 to 45 years old ($M = 20.8$, $SD = 2.8$), of which 74,9% were female, 24,7% were male, and 0,3% identified with a different gender. Participants were recruited via social media, targeting students in Portuguese universities, and the data were collected through an online survey hosted on Qualtrics. As an incentive, participants were eligible for a raffle to win a 50€ voucher. Participants were informed about the study (i.e., goals and expected duration) and ethical considerations (i.e., anonymity, confidentiality, and the possibility to withdraw at any moment), and provided their informed consent.

2.2. Materials

The online survey presented questions on participants' status as students, demographic information (i.e., gender and age), and a set of items measuring support for actions to increase plant-based eating in university settings (based on De Groeve & Bleys, 2017; Graça et al., 2020), using either a gain- or a loss-frame (i.e., within-subjects experiment with two conditions). We used two items to assess general support (i.e., *"What is your opinion about the implementation of measures to increase the consumption of plant-based meals in your University/Faculty?"*, *"What is your opinion about the implementation of measures to reduce the consumption of meals with meat in your University/Faculty?"*), presented in random order, and 16 "mirror items" (i.e., gain vs. loss-frame) to assess support for specific measures (e.g., *"Provide information about the benefits of eating plant-based meals"* vs. *"Provide information about the negative impacts of eating meals with meat"*), also presented in random order. Responses were measured in a 7-point Likert-type scale from 1 (totally disagree) to 7 (totally agree). The full list of "mirror items" is presented in Table 2.

2.3. Data analysis procedure

Data analysis was conducted using IBM Statistical Package for Social Sciences (SPSS), version 26. Descriptive and frequency analyses of demographic data were conducted to characterize the sample. Descriptive analyses and paired samples t-tests of the measures were performed to assess general support and support for specific measures, comparing gain-framed (i.e., increase the consumption of plant-based meals) and loss-framed measures (i.e., reduce the consumption of meals with meat).

3. Results

3.1. General support

Table 1 presents the descriptive analysis and the paired samples *t*-test to examine the general support for measures promoting increased plant-based eating. The results showed that support for the measures was higher when presented in a gain-frame (i.e., increase the consumption of plant-based meals) than a loss-frame (i.e., reduce the consumption of meals with meat). This difference was statistically significant ($t(294) = 8.44$, $p < .001$, $d = 0.49$).

3.2. Support for specific measures

Table 2 presents the descriptive analysis and the paired samples *t*-test to examine the support for specific measures. The results showed that the most supported measure was *"Make plant-based meals served in university canteens more appealing and tastier"* and the least supported measure was *"Make meals with meat served in university canteens less appealing and less tasty"*. The difference between this pair of measures is statistically significant and has the largest effect size ($t(293) = 46.45$, $p < .001$, $d = 2.71$). On the other hand, the measures with the smallest effect size where a statistically significant difference was obtained were the pair *"Serve only plant-based meals in university canteens"* vs. *"Do not serve meals with meat in university canteens"* ($t(293) = 2.51$, $p < .05$, $d = 0.14$). Consumer support was higher for almost all gain-framed measures (i.e., to increase the consumption of plant-based meals), compared to the loss-framed measures (i.e., to reduce the consumption of meals with meat) (Table 2).

4. Discussion

To promote healthier and more sustainable food systems, it is necessary (albeit not sufficient) to shift current food consumption patterns (Willett et al., 2019). These shifts in consumption patterns require measures to promote reduced meat consumption and increased plant-

Table 1
General support for plant-based meals promotion measures.

Variable	Mean	SD	*t*	*df*	*d*
Support for measures to increase the consumption of plant-based meals.	5.64	1.43	8.44***	294	0.49
Support for measures to reduce the consumption of meals with meat.	4.98	1.80			

***$p < .001$.

Table 2
Support for specific measures.

Gain-framed Measures	Mean (SD)	Loss-framed Measures	Mean (SD)	*t*	*df*	*d*
Make plant-based meals served in university canteens more appealing and tastier.	6.21 (1.09)	Make meals with meat served in university canteens less appealing and less tasty.	1.87 (1.25)	46.45***	293	2.71
Increase the offer of plant-based products in university vending machines.	6.05 (1.00)	Decrease the offer of animal products in university vending machines.	4.52 (1.81)	15.26***	293	0.89
Increase the number of plant-based meal options in university canteens.	5.88 (1.30)	Decrease the number of meat (meal) options in university canteens.	4.16 (1.86)	16.73***	293	0.98
Provide information about the benefits of eating plant-based meals.	5.81 (1.26)	Provide information about the negative impacts of eating meals with meat.	5.24 (1.65)	7.98***	294	0.46
Reduce the price of plant-based meals in university canteens.	5.19 (1.80)	Increase the price of meals with meat in university canteens.	2.48 (1.58)	23.76***	294	1.38
Establish one day a week in which university canteens only serve plant-based meals.	4.34 (2.09)	Establish one day a week in which university canteens do not serve meals with meat.	4.54 (2.11)	−2.56*	294	0.15
Serve only plant-based meals four days a week in university canteens.	2.73 (1.64)	Limit to one day a week the serving of meals with meat in university canteens.	2.81 (1.77)	-0.88	294	0.05
Serve only plant-based meals in university canteens.	2.15 (1.42)	Do not serve meals with meat in university canteens.	2.00 (1.35)	2.51*	293	0.14

*$p < .05$, ** $p < .01$, *** $p < .001$.

based eating in diverse contexts (De Groeve & Bleys, 2017; Graça et al., 2020). To help inform efforts on this matter, the present study tested whether framing a set of measures promoting increased plant-based eating in terms of gain (i.e., *promote* or *increase* the consumption of plant-based meals) or loss (i.e., *curtail* or *reduce* the consumption of meals with meat) impacted consumer support for these measures in university settings.

Overall, as expected, consumer support was higher for measures that used a gain-frame when compared to a loss-frame. These findings are consistent with the Prospect Theory (Kahneman & Tversky, 1979), according to which people tend to perceive losses as more impactful than gains (loss aversion; e.g., the experience of losing an amount of money is greater than that of winning the same amount of money). These findings are also meaningful in light of the Psychological Reactance Theory (Brehm & Brehm, 1981), which proposes that people tend to react defensively whenever they perceive their sense of choice and freedom is reduced (or threatened with reduction). If meat-eaters are wired to react negatively to measures that aim to *curtail* or *reduce* meat consumption in collective meal contexts, perhaps one way to minimize this resistance is to *promote* or *increase* the consumption of plant-based meals instead. Indeed, previous research has shown that public policies and behavioral interventions that trigger a sense of loss (vs. gain) can be seen as intrusive and restrictive, and be met with public resistance (e.g., Diepeveen et al., 2013). Recent evidence has also suggested that positive frames (i.e., gain and non-loss messages) tend to be more effective than negative frames (i.e., non-gain and loss messages) to promote reduced meat consumption (Carfora et al., 2021).

Notably, the measure that received the highest level of consumer support in the current study was to *"Make plant-based meals served in university canteens more appealing and tastier"*, whereas the measure that received the lowest level of support was to *"Make meals with meat served in university canteens less appealing and less tasty"*. These results may be related to the fact that food sensory cues, such as appearance and taste, are important determinants of eating behavior (e.g., Forde, 2018). Visual cues can trigger learned beliefs about the anticipated taste and satiating properties of a given meal, thus influencing food choice. Additionally, taste plays an important role in the evaluation of meals and satiety after food consumption (McCrickerd & Forde, 2016). In line with these results, emerging evidence suggests that interventions in food environments in relation to the availability, visibility, and/or sensory aspects of plant-based meals can promote increased plant-based eating and reduced meat consumption in collective meal contexts (Graça et al., 2019; Kwasny et al., 2021; Sullivan et al., 2021).

The current findings also revealed that the framing effect was stronger for the pair of mirror measures *"Make plant-based meals served in university canteens more appealing and tastier"* vs. *"Make meals with meat served in university canteens less appealing and less tasty"*, and weaker for the pair of mirror measures *"Serve only plant-based meals in university canteens"* vs. *"Do not serve meals with meat in university canteens"*. A possible explanation could be that, in the first pair of mirror measures, two meal options trigger opposite sensory perceptions (i.e., appealing and tasty plant-based meal vs. unappealing and tasteless meal with meat) that may encourage students to choose the plant-based meal. Conversely, in the second pair of measures, although the gain-framed measure focuses on serving plant-based meals only and the loss-framed measure focuses on not serving meals with meat, both measures restrict consumers' choice (Diepeveen et al., 2013).

The present study provides information about the impact of message framing on consumer support for context-specific transitions towards increased plant-based eating. One practical implication of the results is that measures framed in terms of gain are likely to have a more positive impact on consumer support. Because gain-framed measures (as operationalized in this study) focus mostly on enabling choices instead of constraining behaviors, it is plausible that this type of framing is more effective in nudging consumers in the direction of increased plant-based eating. This is relevant to inform policy and decision-makers about the planning and implementation of measures to promote sustainability transitions in collective meal settings, such as university canteens or cafeterias.

Some limitations of the present study need to be addressed in future research, namely the non-probability sampling method and the lack of balance in the sample in terms of gender. Although male participants were under-represented in our sample, evidence repeatedly shows that gender plays an important role in shifting food consumption patterns towards increasingly plant-based diets. For example, recent research has shown that men (compared to women) tend to consume more meat and to be less open to vegetarianism, which can be partly explained by links between meat consumption and masculinity (Rosenfeld & Tomiyama, 2021). Future research with more balanced samples can examine the role of gender in support for (or resistance to) food sustainability

transitions in general, and measures to promote increased plant-based eating in particular. It seems plausible to expect that men can be particularly responsive to gain-loss frame manipulations on this focal topic, given that they tend to display increased defensiveness to plant-based eating (in comparison to women). Lastly, although the current study contributes to increased knowledge on consumer support for measures promoting increased plant-based eating, it does not assess whether the measures that obtained the highest support would be effective when implemented. It is necessary to test the effectiveness of these measures in field experiments, also with a view to inform interventions tailored to different target populations and contexts.

5. Conclusion

The present study tested whether framing a set of measures promoting plant-based eating in terms of gain (i.e., measures to *promote* or *increase* the consumption of plant-based meals) or loss (i.e., measures to *curtail* or *reduce* the consumption of meals with meat) may impact consumer support for these measures in university settings. The findings showed that consumer support was higher for gain-framed measures compared to loss-framed measures. Consumers who feel entitled to eat meat may be motivated to react negatively when they perceive threats to their freedom of choice (i.e., loss aversion; psychological reactance); hence, communicating plant-forward measures in terms of gains may help bypass loss aversion mechanisms. This suggests that using gain frames can be a simple and potentially effective way to help increase consumer support for food sustainability transitions.

CRediT authorship contribution statement

Ana Sofia Marques Carvalho: Writing – original draft, Conceptualization, Methodology, Formal analysis, Investigation. **Cristina Isabel Albuquerque Godinho:** Writing – review & editing, Conceptualization, Methodology, Formal analysis, Investigation, Supervision. **João Graça:** 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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