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Feeling morally troubled about meat, dairy, egg, and fish consumption: Dissonance reduction strategies among different dietary groups

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ABSTRACT

A largescale shift towards plant-based diets is considered a critical requirement for tackling ethical, environmental, and global health issues associated with animal food production and consumption. Although previous research has identified psychological strategies that enable meat-eaters to justify and continue meat consumption and feel less morally conflicted about it, research on the psychological strategies that enable consumers to continue dairy, egg, and fish consumption is scarce. We conducted an online survey study using an adjusted version of the Meat-Eating Justification Scale to investigate the use of psychological strategies to cope with cognitive dissonance related to meat, dairy, egg, and fish consumption in omnivores (n = 186), pescatarians (n = 106), vegetarians (n = 143), vegans (n = 203), and flexitarians (n = 63). Results indicated greater use of meat-related dissonance reduction strategies among omnivores as compared to other dietary groups, greater use of fish-related dissonance reduction strategies among fish consumers (omnivores, flexitarians and pescatarians) compared to vegetarians and vegans, and greater use of dairy and egg-related dissonance reduction strategies among dairy and egg consumers (omnivores, flexitarians, pescatarians, and vegetarians) as compared to vegans. This pattern was particularly clear for justifications used to defend animal product consumption, denial of animal suffering, and use of dichotomization when considering meat and fish consumption. These findings highlight the importance of extending the research on dissonance reduction strategies beyond meat consumption and studying the consumption of a range of animal products. This can help in identifying the psychological barriers to adopting a plant-based diet and informing interventions for behaviour change.

1. Introduction

The practice of eating animals and animal products containing meat, dairy, eggs, and fish, has received attention for the ethical and environmental concerns it raises as well as its impact upon human health and world hunger (Bouvard et al., 2015; Crowe et al., 2013; Deckers, 2016; Dhont & Hodson, 2020; Knutti, 2019; Springman et al., 2016; Willet et al., 2019; World Health Organization, 2015). Despite increased public awareness of the morally-troubling issues associated with meat consumption, most meat eaters appear reluctant to change and/or reduce their consumption (Loughnan & Davies, 2020; Piazza, 2020; Rothgerber, 2020). Paradoxically, although most meat-eaters claim to care about animals and do not want to see them harmed, they continue to eat meat; an attitude-behaviour inconsistency known as the "meat paradox" (Loughnan & Davies, 2020; Piazza, 2020). Scholars have argued that meat-eaters experience meat-related cognitive dissonance where they feel morally troubled when presented with evidence that animals are harmed for meat production and realise that their behaviour is inconsistent with their beliefs (Bastian & Loughnan, 2017; Loughnan & Davies, 2020; Piazza, 2020). Therefore, many meat-eaters use various strategies to deal with or avoid cognitive dissonance such as denying that animals are harmed for meat production (Bastian et al., 2012; Joy, 2011; Plous, 1993; Rothgerber, 2020).

Other people choose to change their behaviour and follow a vegetarian, pescatarian, or flexitarian diet, and thereby reduce or exclude meat from their diet. Besides health and environmental motives, people who choose to avoid meat are often motivated by ethical beliefs about animal suffering, and the need to limit the number of animals killed for food production (e.g., Rosenfeld & Tomiyama, 2021; Rothgerber, 2015). Scholars and animal advocates have extensively documented the ethical issues associated with animal suffering in the dairy, egg, and fish industries (Deckers, 2016; Francione, 2021; Kolbe, 2018; Taylor & Fraser,

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2019). It is plausible that meat avoiders who are motivated by animal welfare concerns but who still consume other animal products, would feel morally uncomfortable when being made aware that animals are being harmed for their diets. Consequently, they may use cognitive dissonance reduction strategies to support dairy, egg, and fish consumption akin to the use of meat-related cognitive dissonance strategies observed among meat eaters.

Little is known about the possible psychological strategies adopted to reduce or avoid dissonance related to the consumption of animal-based food products. The current research addresses this gap and considers dissonance in a range of dietary groups, namely omnivores (those who do not exclude meat, fish and other animal products such as eggs and dairy from their diet), pescatarians (those who do not eat meat but still consume fish, shellfish, and other animal products), vegetarians (those who do not eat meat, fish, and shellfish, but still consume other animal products), flexitarians (those who are mostly following a vegetarian diet, but occasionally eat meat or fish), and vegans (those who do not eat any animal products). Greater understanding of the justifying beliefs and psychological strategies used to enable animal product consumption can inform the development of interventions that encourage people to transition to plant-based diets (Graça et al., 2019; Rothgerber, 2021).

1.1. Cognitive dissonance strategies

When meat-eaters experience meat-related cognitive dissonance, they often engage in psychological strategies in order to resolve the dissonance, which enables them to continue meat consumption while considering it to be morally acceptable (Bastian et al., 2012; Loughnan & Davies, 2020; Piazza, 2020; Rothgerber, 2021). Common strategies include denying that animals have minds and are sentient (Bastian et al., 2012; Loughnan & Davies, 2020), providing justifications to defend meat consumption, and dichotomizing animal categories. Other strategies help to prevent or protect people from experiencing meat-related cognitive dissonance, for instance by dissociating meat from its animal source or avoiding being exposed to animal suffering related to meat production (Piazza, 2020; Plous, 2003; Rothgerber, 2020).

According to Loughnan et al. (2010), one of the most useful strategies to reduce dissonance is to *deny* that animals have a mind and as such do not have mental capacity to experience pain and to suffer (Bastian et al., 2012; Bilewic et al., 2011; Bratanova et al., 2011; Rothgerber, 2020). People tend to be sceptical about animal minds and downplay or misremember evidence of animal minds (Leach et al., 2023a; Leach et al., 2023b). By denying that farmed animals have minds, people can be less morally concerned about the living conditions and welfare of animals, making meat production less troublesome for them (Bastian et al., 2012; Leach et al., 2021; Loughnan et al., 2010; Rothgerber, 2021). Arguably, denying or underestimating the minds of dairy cows, layer hens, and fish may also serve as an effective strategy that makes flexitarians, pescatarians, and vegetarians feel more comfortable about the animal products they consume.

Previous research has indicated that meat-eaters use a set of *justifications* to defend and maintain meat-eating behaviour (Graça et al., 2016, 2019; Piazza, 2020, Rothgerber, 2020; Rothgerber & Rosenfeld, 2021). These pro-meat justifications include palatability of meat, health beliefs (for example, that meat is essential to be strong and healthy), and the view that eating meat is normal and natural (Piazza et al., 2015; Rothgerber, 2013, 2020). Studies show that if people endorse meat-justifications they are less motivated to reduce their meat-eating behaviour or to stop consuming meat (Piazza et al., 2015; Rothgerber, 2020). Along these lines, we expect that those who consume dairy, egg, or fish products may use similar justifications related to their dairy, egg, and/or fish consumption.

A powerful strategy that aims to prevent meat-related dissonance is *dissociation* (Rothgerber, 2021). Dissociation refers to the separation of the meat from the animal source (Earle et al., 2019; Kunst & Hohle, 2016; Mayfield et al., 2007; Rothgerber, 2021). When food is reminiscent of an animal, people may feel disgusted, and subsequently struggle to consume it (Kubberod et al., 2002). Moreover, experimental studies have shown that when meat-eaters were presented with images of meat dishes that reminded them of the meat's animal source, their willingness to consume the meat dish declined (Earle et al., 2019; Kunst & Hohle, 2016). Mentally and visually dissociating the animal product from its animal source therefore serves to circumvent any cognitive dissonance associated with consumption. This strategy may not be limited only to meat products but also be used to prevent dissonance associated with the consumption of dairy, egg, and fish products. This has yet to be investigated.

It has also been argued that meat-eaters often *avoid* information about what happens in the meat industry that could increase their dissonance (Leach et al., 2022; Plous, 2003; Rothgerber, 2013). Supporting this idea, a survey on attitudes towards factory farming indicated that most respondents preferred not to think about animal suffering (Mayfield et al., 2007). Direct experimental evidence for this avoidance strategy comes from recent research by Leach et al. (2022) who investigated reactions to being exposed to information about the cognitive capacities of farmed animals (e.g., presented in articles and internet pop-ups). They found that participants who were more committed to eating meat, were more likely to avoid this information as compared to those that were less committed (Leach et al., 2022). Extending this idea, it is plausible that consumers of dairy, eggs, and fish prefer not to think about or be exposed to information about animal sentience and animal suffering in the dairy, egg, and fish industries.

Finally, scholars have argued that people typically distinguish between two categories of animals – the edible category (the ones we eat, such as pigs and cows) and the inedible category (the ones we do not eat, such as companion animals) in a process known as *dichotomization* (Joy, 2011; Rothgerber & Rosenfeld, 2021). This strategy allows meat eaters to care about 'inedible' animals while justifying eating the 'edible' animals. However, this edible vs. inedible dichotomization strategy seems difficult to apply to dairy cows and layer hens because of the lack of two clear distinct categories (e.g., edible vs inedible) since they are both farmed animals but are not eaten.

Taken together, an extensive body of research has investigated cognitive dissonance strategies related specifically to meat consumption, while research on psychological factors related to the consumption of other animal products such as dairy, eggs and fish is scarce (Ioannidou et al., 2023). As far as we are aware, no previously published research has investigated cognitive dissonance strategies for dairy, egg, and fish consumption.

1.2. Meat-related cognitive dissonance and gender

When studying factors related to meat consumption, it is important to consider possible gender differences. Men tend to eat meat more frequently and in greater portions than women (Gossard & York, 2003; Rosenfeld, 2018; Rothgerber & Rosenfeld, 2021; Salmen & Dhont, 2023). Compared to women, men show greater attachment to meat, are more likely to endorse pro-meat attitudes, tend to use more direct justifications to defend meat consumption, and are more likely to deny that animals feel pain (Graça et al., 2018, 2019; Piazza et al., 2015; Rothgerber, 2013; 2019). On the other hand, women are more likely to become vegetarian, tend to be more sensitive to the abuse of animals, and are more likely to disagree with the use of animals for human purposes (e.g. food, clothing, entertainment and consumption) (Kellert & Berry, 1987; Knight et al., 2004; Rothgerber, 2020; Vollum et al., 2004). There is also some evidence to suggest that women who eat meat are more likely than men to use avoidance (i.e., not thinking about the meat production process or where meat is coming from) and to dissociate the meat from its animal source (Rothgerber, 2013, 2018). These apparent gender differences could indicate that women and men deal differently with meat consumption and meat-related cognitive dissonance (Rothgerber, 2013, 2019; Rothgerber & Rosenfeld, 2021). It is

therefore important to consider whether gender differences in dissonance reduction strategies also apply in the context of dairy, egg, and fish consumption.

1.3. Present study

While past research has provided extensive insights into the use of meat-related cognitive dissonance strategies, it is currently unclear how people deal with the cognitive dissonance that may arise from the consumption of dairy, eggs, and fish. It is important to understand strategies employed to alleviate dissonance to inform effective communication and intervention to reduce demand for animal products. This research addresses this gap and investigates whether people use similar psychological strategies to reduce dissonance related to dairy, egg, and fish consumption as they appear to do when considering meat consumption (Bastian et al., 2012; Loughnan & Davies, 2020). Specifically, we investigate how individuals in different dietary groups (omnivores, pescatarians, vegetarians, vegans, and flexitarians) might use dissonance reduction strategies (denial, justifications, avoidance, dissociation, and dichotomization) when considering meat, dairy, eggs, and fish consumption. In line with previous research (e.g., Monteiro et al., 2017; Piazza et al., 2015; Rothgerber, 2013, 2015; Weber & Kollmayer, 2022), we included a range of dietary groups, including vegans. Although vegans do not consume any animal products, comparison of the use of cognitive dissonance strategies related to the consumption of meat, fish, and/or dairy/egg products between people who eat and those who do not eat these products could help in the development of interventions to assist in motivating people to reduce and/or exclude animal products from their diet. This study is also novel in that we distinguished between pescatarians, vegetarians, and vegans and in considering them as separate dietary groups to investigate any specific differences between these in terms of fish-related and dairy/egg-related cognitive dissonance strategies. Given the literature on gender differences in the use of dissonance reduction strategies in meat eaters (Rothgerber, 2013; Rothgerber & Rosenfeld, 2021), gender differences will also be investigated. We hypothesised that:

(i) meat-eaters (omnivores and flexitarians) will be more likely to use cognitive dissonance strategies related to meat consumption compared to meat-abstainers (vegans, vegetarians and pescatarians);
(ii) dairy and egg consumers (omnivores, vegetarians, pescatarians, and flexitarians) will be more likely to use cognitive dissonance strategies related to their dairy and egg consumption compared to vegans;
(iii) fish consumers (pescatarians, omnivores, and flexitarians) will be more likely to use cognitive dissonance strategies related to their fish consumption compared to fish abstainers (vegans and vegetarians).

We further expect to find gender differences such that:

(iv) men will be more likely to use justifications and denial as strategies to reduce dissonance around meat consumption as well as dairy, egg and fish consumption while women will be more likely to use dissociation and avoidance.

Although the hypotheses were not pre-registered on the OSF, they were specified prior to data collection and analyses. The dataset and full measures can be found on the OSF project page: https://osf.io/2vjxs/

2. Method

2.1. Sample and procedure

The study was advertised through several social media platforms, including Facebook and Twitter, asking for volunteers to complete and share (i.e., snowball sampling) a survey study investigating how different dietary groups (omnivores, vegetarians, pescatarians, flexitarians and vegans) use psychological defence mechanisms regarding the consumption of meat, dairy, eggs and fish, and whether there are any gender differences. Inclusion criteria were that participants were aged 18 years or over, had no diagnosis of dementia, an eating disorder, or any mental health condition. The study received ethical approval from the Humanities, Social and Health Sciences Research Ethics Panel at the University of Bradford, prior to data collection.

We recruited 720 participants (496 women, 205 men, 10 non-binary, 6 prefer not to say and 3 other) aged 18–75 years (M_{age} = 39.6 years, SD_{age} = 12.9 years) who completed the full survey anonymously. The study was conducted using the Gorilla online survey platform. Data from incomplete surveys were not recorded. Given that the number of participants indicating their gender as non-binary, prefer not to say, or other was too small to include as separate groups for meaningful statistical analyses, these participants (n = 19) were removed prior to further analyses.

After providing informed consent, participants were asked to provide demographic information (gender, age, ethnicity) and to self-identify their dietary group (omnivore, pescatarian, vegetarian, vegan, or flexitarian). The measures tapping into dissonance reduction strategies related to meat, eggs/dairy, and fish consumption were then presented in randomized order. Upon completion of the questionnaire participants were thanked and debriefed.

2.2. Measures

2.2.1. Meat-related cognitive dissonance (Meat Eating Justification Scale – MEJ, Rothgerber, 2013)

Twenty-seven items from Rothgerber (2013) assessed meat-related cognitive dissonance strategies (see Online Supplementary Materials for all measures), completed on seven-point Likert scales anchored from 1 (*strongly disagree*) to 7 (*strongly agree*). For the purpose of the current study, we included items tapping into pro-meat and health justifications (6 items; α = 0.95), denial (3 items; α = 0.81), dichotomization (3 items; α = 0.51), dissociation (3 items; α = 0.85), avoidance (3 items; α = 0.60), and developed parallel items to measure cognitive dissonance strategies related to dairy, eggs and fish consumption (see Measure 2.2.2). Hierarchical, religious, and human/destiny fate justifications from the original MEJ scale were not included as these justifications seemed less meaningful or straightforward to apply in the context of dairy, egg, and fish consumption. A sample item was *"Animals don't really suffer when being raised and killed for meat"*. Items were averaged into single scores for meat-eating justifications, denial, dichotomization, dissociation, and avoidance, with higher scores indicating a greater use of meat-related cognitive dissonance strategies. Although the Cronbach alphas for dichotomization and avoidance were low, they are similar to the ones obtained in previous research (e.g., Grünhage & Reuter, 2021; Mertens & Oberhoff, 2023; Rothgerber, 2013).

2.2.2. Adjusted scale for dairy, egg, and fish-related cognitive dissonance (based on MEJ)

To measure cognitive dissonance strategies used for dairy, eggs, and fish consumption, we developed twenty-eight items based on the MEJ items (see Online Supplementary Materials), completed on seven-point Likert Scales (1, *strongly disagree;* 7, *strongly agree*). For dairy and eggs, we assessed four strategies: dairy/egg-eating justifications (pro-dairy/egg and health justifications; 6 items; α = 0.95), dairy/egg denial (4 items; α = 0.98), dairy/egg dissociation (4 items; α = 0.91), and dairy/egg avoidance (4 items; α = 0.75). A sample item was *"Animals don't really suffer when being used for dairy production"*. We averaged the items to produce single scores for justifications referring to dairy/eggs, dairy/egg denial, dairy/egg dissociation, and dairy/egg avoidance. We did not include dichotomization items for dairy and egg consumption because

this strategy seemed less relevant when thinking of dairy cows and layer hens which are both farmed animals especially given the lack of two clear distinct categories (e.g., edible vs inedible). For fish-related cognitive dissonance, we assessed five strategies: fish-eating justifications (pro-fish and health justifications; 3 items; α = 0.91), fish avoidance (2 items; α = 0.23), fish dissociation (2 items; α = 0.75), fish denial (2 items; α = 0.94), and fish dichotomization (1 item). A sample item was: 'I am more sensitive to the suffering of pigs and cows than of fish'. Higher scores indicated greater use of dairy/egg-related and fish-related cognitive dissonance strategies.

2.3. Design and data analysis

This study was of a comparative cross-sectional design with dietary groups (omnivores, pescatarians, vegetarians, vegans, and flexitarians) and gender as categorical factors, and with meat, dairy/eggs, and fish-related cognitive dissonance strategies as the dependent/outcome variables.

Since data were not normally distributed, generalised linear models (GLiM) with gamma (loglink) were considered appropriate to test for differences between the dietary groups and between men and women in their use of dissonance strategies for meat, dairy/eggs and fish consumption (scores on MEJ and dairy/egg and fish-related cognitive dissonance). The GLiM also enabled testing for interaction effects between dietary groups and gender. Bonferroni corrections were applied to determine appropriate significance levels given that multiple linear models were conducted. As Bonferroni corrections should be considered separately for the distinct families of tests rather than considering all comparisons together, we have corrected alpha by the number of outcome variables. For meat- and fish-related cognitive dissonance strategies (5 outcomes for each), we corrected for 5 tests, resulting in a significance threshold of $p < .010$. For dairy/egg-related cognitive dissonance strategies (4 outcomes), we corrected for 4 tests, resulting in a significance threshold of $p < .012$. IBM SPSS Statistics (Version 27) (IBM Corp, 2020)was used for data analysis.

3. Results

Tables 1 and 2 present the means and standard deviations of all measures separately for each dietary group (Table 1) and for men and women (Table 2).

Table 2
Mean and standard deviation scores of meat, dairy/egg and fish-related cognitive dissonance strategies for men and women.

Dependent Variables	Gender			
	Men (n = 205)		Women (n = 496)	
	M	*SD*	*M*	*SD*
Meat				
Denial	2.9	2.5	2.5	2.1
Dissociation	2.5	2.0	2.7	2.3
Avoidance	4.6	2.4	4.8	2.2
Justifications	2.7	2.7	3.0	2.8
Dichotomization	4.8	2.5	4.6	2.0
Dairy and eggs				
Denial	3.8	3.0	3.2	2.6
Dissociation	3.4	2.6	3.1	2.3
Avoidance	4.6	2.4	4.6	2.2
Justifications	3.8	2.8	3.4	2.5
Fish				
Denial	3.4	3.0	2.9	2.6
Dissociation	2.9	2.5	2.7	2.2
Avoidance	4.4	2.5	4.4	2.1
Justifications	3.4	2.9	3.2	2.6
Dichotomization	5.1	3.1	4.3	3.0

3.1. Meat-related cognitive dissonance strategies

We investigated dietary group differences and gender differences in meat-related dissonance reduction strategies (meat-eating justifications, denial, dissociation, dichotomization, and avoidance). Five GLiMs were performed to test meat denial, meat dissociation, meat avoidance, meat-eating justifications, and dichotomization as the dependent variables and with dietary group and gender as the independent variables.

Dietary groups differed significantly from each other in the degree to which they used cognitive dissonance strategies (Table 1). A main effect was found for meat-eating justifications (Wald χ^2 (4) = 408.07, $p < .001$), meat denial (Wald χ^2 (4) = 203.69, $p < .001$), meat dissociation (Wald χ^2 (4) = 30.06, $p < .001$), and dichotomization (Wald χ^2 (4) = 66.62, $p < .001$), but not for meat avoidance (Wald χ^2 (4) = 3.02, $p = .554$). Post hoc tests showed that omnivores used more meat-eating justifications than any other dietary group ($ps < .001$) (Fig. 1a). Omnivores, flexitarians, pescatarians, and vegetarians used significantly more denial compared to vegans ($ps < .001$), while omnivores also used more denial compared to pescatarians and vegetarians ($ps < .001$) (see Fig. 1b). Vegans tended to employ dichotomization between farmed animals or wild animals and pets significantly less than the other dietary

Table 1
Mean and standard deviation scores of meat, dairy/egg and fish-related cognitive dissonance strategies per dietary group.

Dependent Variables	Dietary groups									
	Omnivores (n = 186)		Pescatarians (n = 106)		Vegetarians (n = 143)		Vegans (n = 203)		Flexitarians (n = 63)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Meat										
Denial	3.8	2.3	2.5	2.3	2.6	2.2	1.4	1.1	2.8	2.3
Dissociation	3.1	2.3	2.7	2.3	2.7	2.3	1.9	1.6	3.0	2.7
Avoidance	4.6	2.2	4.7	2.5	5.0	2.4	4.7	2.0	5.0	2.6
Justifications	5.9	2.9	2.1	2.1	1.8	1.8	1.5	1.5	2.0	1.8
Dichotomization	4.9	2.1	4.9	2.5	5.2	2.4	3.7	1.5	5.5	2.5
Dairy and eggs										
Denial	4.6	2.5	4.2	3.1	3.8	2.9	1.6	1.4	4.3	3.1
Dissociation	3.1	2.2	3.6	2.5	3.9	2.5	2.3	1.9	3.6	2.6
Avoidance	3.8	2.2	4.8	2.4	4.8	2.4	5.1	1.7	4.7	2.5
Justifications	4.8	2.3	4.1	2.7	3.8	2.6	1.6	1.6	4.2	2.9
Fish										
Denial	4.3	2.4	3.7	3.2	2.9	2.7	1.5	1.3	3.9	3.2
Dissociation	3.0	2.2	3.3	2.6	2.8	2.4	2.2	1.9	3.2	2.7
Avoidance	3.8	2.2	4.5	2.5	4.3	2.3	5.0	1.8	4.5	2.5
Justifications	4.8	2.3	4.1	3.0	2.8	2.6	1.5	1.6	3.8	2.8
Dichotomization	4.7	2.7	5.4	3.2	5.0	3.2	3.2	5.5	5.5	3.0

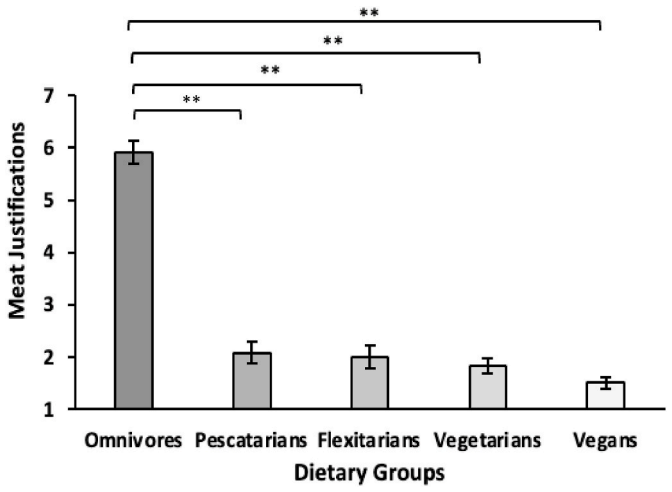

Fig. 1a. Mean of meat-eating justification by dietary groups
Note. **p < .001. Dietary groups differed significantly in the use of meat-eating justifications with omnivores scoring higher than the other dietary groups. Error bars represent ± 1 SE.

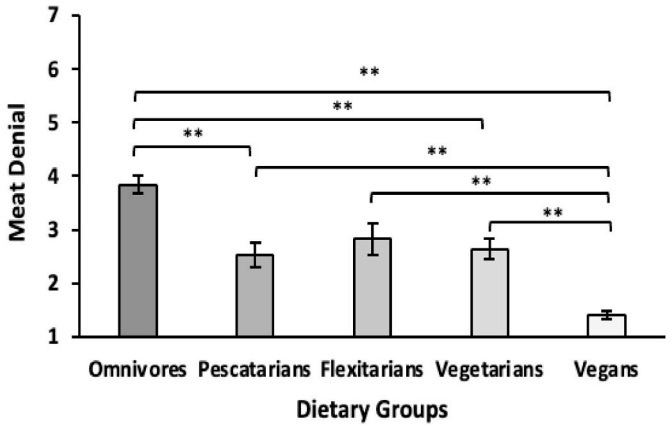

Fig. 1b. Mean of meat denial by dietary groups
Note. **p < .001. Dietary groups differed significantly in the use of meat denial. Omnivores used more denial as compared to pescatarians, vegetarians and vegans. Vegans differed from all other dietary groups. Error bars represent ± 1 SE.

groups (*ps* < .001). Meat dissociation was used by omnivores significantly more than by vegans ($p < .001$). No other significant differences in dissociation were found between dietary groups.

A main effect of gender was found, indicating that women used more meat-eating justifications than men (Wald χ^2 (1) = 11.83, $p = .001$) (see Table 2). No significant gender differences were found for the other meat-related cognitive dissonance strategies; meat denial (Wald χ^2 (1) = 5.58, $p = .018$), dichotomization (Wald χ^2 (1) = 0.96, $p = .327$), meat dissociation (Wald χ^2 (1) = 6.26, $p = .012$), or meat avoidance (Wald χ^2 (1) = 0.57, $p = .450$).

3.2. Dairy/egg-related cognitive dissonance strategies

Next, we focused on dietary group differences and gender differences in dairy/egg-related cognitive dissonance strategies (denial, dissociation, avoidance, and justifications). Specifically, four GLiMs were performed to test dairy/egg denial, dairy/egg dissociation, dairy/egg avoidance, and dairy/egg justifications (prodairy/egg and health) as the dependent variables and with dietary group and gender as the independent variables.

Dietary groups differed significantly from each other (Table 1). A main effect was found for justifications used for dairy and egg consumption (Wald χ^2 (4) = 307.99, p < .001), dairy/egg denial (Wald χ^2 (4) = 279.68, p < .001), dairy/egg avoidance (Wald χ^2 (4) = 29.59, p < .001) and dairy/egg dissociation (Wald χ^2 (4) = 50.15, p < .001). Post hoc analyses indicated that dairy/egg consumers (omnivores, flexitarians, pescatarians, vegetarians) used justifications for eating dairy/egg and used denial more compared to vegans (*ps* < .001) (see Fig. 2a and b). In terms of dairy/egg avoidance, post hoc tests indicated that omnivores used less avoidance as a dissonance strategy related to dairy/egg consumption compared to vegans ($p < .001$), vegetarians ($p = .001$) and pescatarians ($p = .002$). Post-hoc tests looking at dairy/egg dissociation indicated that vegetarians and pescatarians used dairy/egg dissociation significantly more than vegans (*ps* < .001), and vegetarians used more dairy/egg dissociation than omnivores ($p = .006$). Flexitarians did not differ significantly from the other dietary groups in dissociation related to dairy/egg consumption. No significant gender differences were found for dairy/egg justification (Wald χ^2 (1) = 1.55, $p = .213$), dairy/egg denial (Wald χ^2 (1) = 2.79, $p = .095$), dairy/egg avoidance (Wald χ^2 (1) = 0.05, $p = .820$), or dairy/egg dissociation (Wald χ^2 (1) = 0.69, $p = .407$).

3.3. Fish-related cognitive dissonance strategies

Analyses also considered dietary group and gender differences in fish-related dissonance reduction strategies (denial, dissociation, avoidance, and justifications). Specifically, five GLiMs were performed with fish denial, fish dissociation, fish avoidance, dichotomization, and fish justifications as the dependent variables, and with dietary group and gender as the independent variables.

Dietary groups differed significantly from each other (Table 1). A main effect was found for fish-eating justifications (Wald χ^2 (4) = 244.18, $p < .001$), fish denial (Wald χ^2 (4) = 234.11, $p < .001$), fish dissociation (Wald χ^2 (4) = 22.78, $p < .001$), fish avoidance (Wald χ^2 (4) = 25.10, $p < .001$) and dichotomization (Wald χ^2 (4) = 38.04, $p < .001$). Post hoc tests showed that omnivores and pescatarians used significantly more fish-eating justifications compared to vegetarians (*ps* < .004) and vegans (*ps* < .001), while flexitarians and vegetarians also used more fish-eating justifications than vegans (*ps* < .001; see Fig. 3a). Post hoc tests also indicated that omnivores scored significantly higher on fish denial compared to vegetarians (p = .001) and vegans ($p < .001$). Vegans differed from all the dietary groups (*ps* < .001) as they used fish denial the least (see Fig. 3b). Regarding fish dissociation, post hoc tests indicated that pescatarians tended to use more dissociation compared to vegans ($p = .001$). Post hoc tests also indicated that omnivores differed

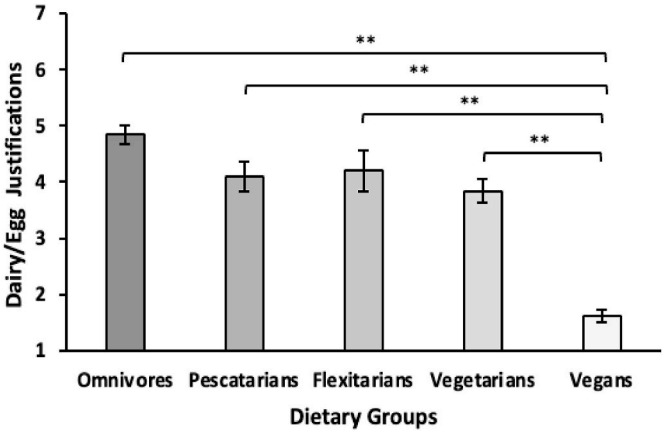

Fig. 2a. Mean of dairy/egg-eating justification by dietary groups
Note. **p < .001. Dietary groups differed significantly in dairy/egg justification with vegans scoring lower than all other groups. Error bars represent ± 1 SE.

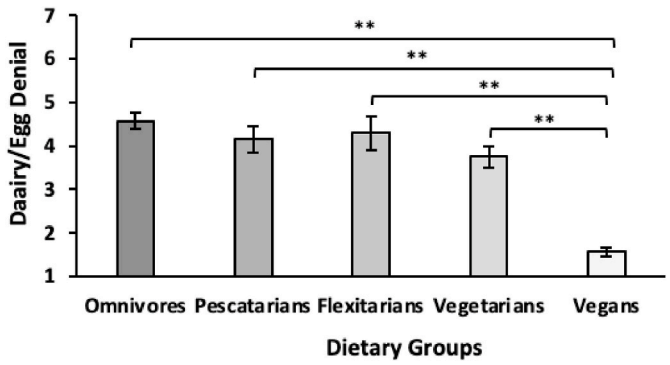

Fig. 2b. Mean of dairy/egg denial by dietary groups
Note. **p < .001. Dietary groups differed significantly in dairy/egg denial justification with vegans scoring lower than all other groups. Error bars represent ± 1 SE.

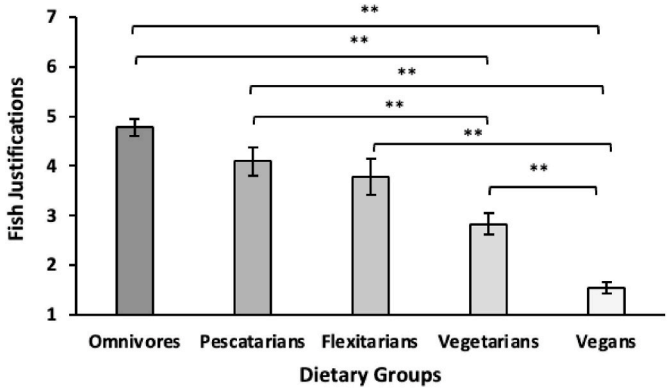

Fig. 3a. Mean of fish-eating justifications by dietary groups
Note. **$p < .001$. Dietary groups differed significantly in the use of fish justification. Error bars represent ± 1 SE.

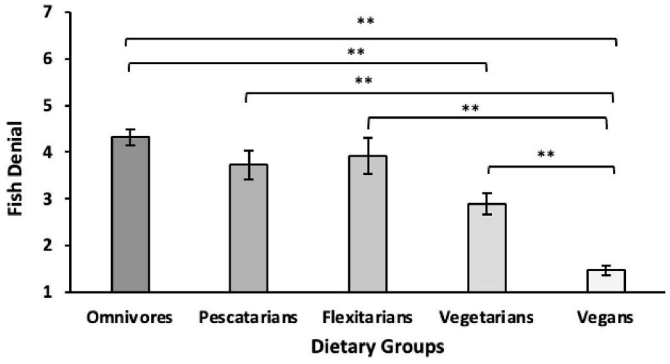

Fig. 3b. Mean of fish denial by dietary groups
Note. **$p < .001$. Dietary groups differed significantly in fish denial. Error bars represent ± 1 SE.

from pescatarians ($p = .008$) and vegans ($p < .001$) in their use of fish avoidance, with omnivores scoring lower than the other two groups. No other differences were observed between dietary groups in terms of fish avoidance. Lastly, post hoc tests showed that vegans differed from all dietary groups, showing the least use of fish dichotomization ($ps < .004$). There were no gender differences in the use of fish-eating justification (Wald χ^2 (1) = 1.20, $p = .274$), fish denial (Wald χ^2 (1) = 4.14, $p = .042$), dichotomization (Wald χ^2 (1) = 5.43, $p = .020$), fish dissociation (Wald χ^2 (1) = 0.62, $p = .432$) and fish avoidance (Wald χ^2 (1) = 0.04, $p = .838$).

4. Discussion

This study investigated the use of cognitive dissonance strategies related to meat, fish, dairy, and egg consumption among vegans, vegetarians, pescatarians, flexitarians, and omnivores. Overall, the results confirmed our expectation that the use of cognitive dissonance strategies related to animal product consumption is not restricted to meat consumption among omnivores but can also be observed for fish, dairy, and egg consumption among omnivores, flexitarians, pescatarians and vegetarians. People who consume animal-derived products tend to use certain cognitive dissonance strategies related to the consumption of those products to a greater extent than those who do not consume those products. This pattern of results was especially clear for the use of justifications to defend and maintain animal product consumption, the denial of animal suffering in the meat, dairy, egg and dairy industries, the use of edible vs. inedible dichotomization strategy when focusing on meat and fish consumption (not assessed for dairy/egg consumption), and to some extent, dissociating the animal product from the animal.

4.1. Meat-related cognitive dissonance strategies

As expected, compared to meat-abstainers (pescatarians, vegetarians, and vegans), omnivores used more meat-eating justifications and were more likely to deny that animals killed for meat suffer. This aligns with previous research showing that omnivores use various rationalizations to defend their meat consumption (Graça et al., 2019; Rothgerber, 2020; Piazza et al., 2015), and deny the suffering of animals in the meat industry and/or that animals have certain mental abilities such as the ability to experience pain (Bastian et al., 2012; Loughnan & Davies, 2020; Rothgerber, 2020). These are considered powerful strategies to help alleviate the moral discomfort that arises from eating meat and thereby to continue meat-eating behaviour (Loughnan & Davies, 2020; Piazza, 2020; Rothgerber, 2020). In terms of meat-eating justifications, flexitarians scored significantly lower than omnivores, and were more like meat-abstainers.

Omnivores were also more likely than vegans to dichotomise animals into categories as a function of their utility to humans and to dissociate meat from its animal source. Animals are thereby categorized into edible and non-edible animals (e.g., farmed versus companion animals), and greater moral value is attributed to animals that are categorized as non-edible (Rothgerber, 2020). This suggests that omnivores may consider farmed animals as food products rather than sentient beings which helps to alleviate discomfort at the thought of (or when) eating meat. At the same time, by mentally detaching meat products and dishes from the animals, these individuals also avoid being reminded that meat comes from an animal that was killed (Earle et al., 2019 ; Kunst & Hohle, 2016; Rothgerber, 2020). Interestingly, pescatarians, vegetarians, and flexitarians also showed evidence of employing the dichotomization strategy, as shown by scoring higher than vegans. Even though these groups do not eat meat (pescatarians and vegetarians) or if so, only occasionally (flexitarians), this finding may suggest that these individuals continue to categorise animals based on the animals' utility to humans.

The only meat-related cognitive dissonance strategy that did not significantly differ between any dietary groups was avoidance, with scores around the midpoint across all groups. This could suggest that people, irrespective of dietary group, would rather avoid being exposed to, or having to think about animal suffering. Consistent with theorizing on the meat paradox and previous findings (Loughnan & Davies, 2020; Rothgerber, 2021), meat-eaters may want to avoid being exposed to the idea that animals suffer for meat to avoid feeling morally conflicted about their meat consumption. Meat-abstainers, however, may want to avoid exposure to, or having to think about, animal suffering, largely to avoid experiencing negative emotions even though they would not feel personally responsible or guilty for this situation.

Our results showed that men and women differed only in their use of meat-related cognitive dissonance strategies, with the finding that

omnivorous women used more meat-eating justifications than omnivorous men. No other gender differences were found. This is inconsistent with previous findings that have found the opposite pattern that men were more likely to use meat-eating justifications (e.g., Rothgerber, 2013, 2019). The relatively low number of men compared to women in the current sample requires our finding to be interpreted with caution.

4.2. Dairy/egg-related cognitive dissonance strategies

This study tested a set of novel hypotheses with respect to the use of cognitive dissonance strategies for dairy and egg consumption. As expected, those who eat dairy and egg products (omnivores, flexitarians, pescatarians, vegetarians) used more dairy/egg consumption justifications and were more likely to use dairy/egg-related denial strategies than those who do not (vegans). These findings provide new evidence that similar to meat-eaters, pescatarians and vegetarians also employ cognitive dissonance strategies when it comes to animal product consumption. This means, for instance, that omnivores, vegetarians, pescatarians, and flexitarians were more likely to believe that humans need dairy products to achieve a healthy diet (health justification) and were more likely to deny that animals in the dairy and egg industry suffer.

We also found differences between dietary groups regarding the extent to which they dissociate dairy and egg products from their animal origins, although these did not align fully with our hypotheses. Interestingly, while pescatarians and vegetarians did not significantly differ from vegans in terms of meat-related dissociation (see above), these two groups scored significantly higher than vegans on dairy/egg-related dissociation. These results indicate that the use of dairy/egg-related dissociation was most pronounced in those groups where consumption of those products is a defining part of their dietary habits. This fits with previous research that has shown that concern for animal welfare constitutes one of the key reasons why vegetarians and pescatarians do not eat meat and thus, they tend to oppose the harmful practices inflicted on cows and chickens (e.g., Dhont & Ioannidou, 2021; Hopwood et al., 2020; Rosenfeld & Tomiyama, 2021). Despite the awareness of the suffering involved in animal farming and excluding meat products from their diets, vegetarians and pescatarians still eat other animal-based products. Therefore, they are arguably the ones who are the most motivated to avoid thinking of the treatment of cows and hens in the dairy and egg industry and to disconnect the products they consume from the animals themselves.

Inconsistent with the general hypothesis that dairy and egg consumers would differ from vegans in terms of dairy/egg-related dissonance strategies, these data indicate relatively high levels of avoidance around the suffering of cattle and fowl in dairy/egg-related production across all groups, with omnivores scoring even lower than meat abstainers. As with avoidance related to meat consumption, this could indicate that most people prefer not to be exposed to, or think about, animal suffering.

4.3. Fish-related cognitive dissonance strategies

Another novel focus of the current study was the investigation of fish-related cognitive dissonance strategies. Similar to the findings observed for those groups who choose to consume meat and dairy/egg, the results showed that the groups consuming fish (omnivores, pescatarians, and flexitarians) used more justifications to defend fish consumption and were more likely to deny that fish suffer, compared to fish abstainers (vegans and vegetarians). In other words, fish consumers tended to rely on similar justifications (e.g., fish consumption is necessary to be healthy) and denial strategies to deal with fish-related cognitive dissonance as the ones that are used to deal with meat-related and dairy/egg-related cognitive dissonance by the groups that consume these products.

The beliefs about fish could potentially reflect public perceptions about fish consumption and the fish industry. Following a pescatarian diet comes with several health benefits relative to a diet that includes regular meat consumption, and fish consumption is chiefly perceived as healthy (Pienak et al., 2010; Verbeke et al., 2005). At the same time, there might also be a lack of awareness about whether fish can experience pain (Brown, 2014), which might explain the greater use of fish-related denial than meat-related denial. However, we cannot be sure whether the omnivores and pescatarians in our study were denying fish the ability to suffer, or whether they were not aware of this information (Santiago Rucinque et al., 2017). This warrants further study.

Importantly, vegans scored lower than all other dietary groups, including vegetarians, in the use of fish-related justification, denial, and dichotomization of fish versus farmed animals. Along with the finding that vegans also use fewer meat-related and dairy/egg-related dissonance strategies compared to vegetarians, this highlights the importance of considering vegans as a distinct dietary group, rather than grouping them together with vegetarians as "meat-abstainers" as has been common practice in existing research (e.g., Hopwood et al., 2020; Piazza et al., 2015;Rosenfeld & Tomiyama, 2019, 2021; Rothgerber, 2015). A plausible explanation for the clear differences between vegans and all other dietary groups, is that the vast majority of vegans are likely strongly morally-motivated by animal ethics, and consistently apply those ethics to all animal products as a result of increased awareness of practices in all animal product industries (Dhont & Ioannidou, 2021). Although a substantial proportion of individuals from other dietary groups that restrict animal product consumption might also be motivated by animal ethics, these groups are likely to include a greater proportion of individuals that are motivated by other reasons such as health (Dhont & Ioannidou, 2021; Hopwood et al., 2020; Rosenfeld & Tomiyama, 2021) or who only selectively apply their animal ethics motives (Dhont & Ioannidou, 2021).

The results of the current study also showed that pescatarians used dissociation strategies related to fish consumption more than vegans. This is similar to the finding that the highest levels of dairy/egg dissociation were observed among vegetarians and pescatarians and shows again that dissociation is more likely to occur when the animal product constitutes a prominent part of the diet (fish for pescatarians). Given that the fish included in fish dishes sometimes can still resemble the actual animal, fully dissociating the fish dish from the animal may be harder to achieve, and thus the observation of fish-related dissociation among pescatarians is particularly noteworthy.

With respect to the use of avoidance strategies, the pattern was similar to the patterns observed for dairy/egg-related and meat-related avoidance, with relatively high avoidance levels across all groups, but with somewhat lower levels for omnivores (only significantly different from pescatarians and vegans for fish-related avoidance). Thus, we can assume that people from all dietary groups are inclined to avoid thinking about what happens in fishing or being exposed to the fishing industry. Taken together, fish-related dissonance strategies are used by the dietary groups who mostly consume fish, enabling them to continue eating fish while feeling less morally troubled.

4.4. Theoretical and practical implications

Although research on the meat paradox (e.g., Loughnan & Davies, 2020) and meat-related cognitive dissonance (e.g., Rothgerber, 2020) has contributed greatly to the psychological understanding of human behaviour towards farmed animals, the explicit focus on meat (as also emphasized in the names of the theories themselves) could give the impression that moral conflicts arising from consumption behaviour that is linked to harming animals, is a unique phenomenon associated with meat consumption. The current research shows that this is not the case and extends the theoretical scope of previous work by showing that, across a wide range of dietary groups, people use psychological strategies to deal with cognitive dissonance related to dairy, egg, and fish consumption as well as meat consumption. This was seen clearly for the use of justifications, the denial of animal suffering, and dichotomization.

The differences in the use of dissociation were less pronounced, yet compared to vegans, people who consumed animal derived foods also used dissociation more if the product was a defining part of their diet, for example greater use of fish-related dissociation among pescatarians but not among omnivores, compared to vegans. Overall, the findings call for broadening the theorizing on cognitive dissonance in those who include animal products in their diet and in applying these concepts to intervention to reduce consumption.

The use of similar cognitive dissonance strategies across dietary groups and animal products suggests that an all-encompassing approach to reducing animal product consumption might be possible. Although changing people's actual behaviour through education is considered challenging (e.g., Bianchi et al., 2018), meta-analytic research has indicated that interventions appealing to animal welfare might be particularly promising to increase intentions to reduce meat consumption (Mathur et al., 2021). Therefore, interventions aimed toward countering peoples' dissonance reduction strategies and raising awareness about the suffering of animals in the dairy, egg, and fish industries might be similarly effective across different dietary groups. However, there is a general lack of experimental research evaluating the long-term effects of interventions on animal product consumption (Bianchi et al., 2018; Mathur et al., 2021).

4.5. Limitations and future directions

The current research provides a novel set of findings by identifying differences and similarities between dietary groups in the use of cognitive dissonance strategies related to meat, dairy, egg, and fish consumption. Owing to the cross-sectional nature of the study, however, our findings cannot speak to the assumed causal processes underlying cognitive dissonance associated with animal product consumption (Loughnan & Davies, 2020; Rothgerber, 2020). It is assumed that cognitive dissonance strategies are used to reduce the moral conflict people experience between eating and thereby harming animals (or in our study, by eating animal products), and at the same time, caring about animals. Experimental studies are needed to evoke moral conflict (e.g., guilt) to trigger the application of cognitive dissonance strategies (e.g., Earle et al., 2019 ; Kunst & Hohle, 2016).

Our data were collected online through convenience and snowball sampling, asking for volunteers to participate in a study on differences between dietary groups and the consumption of meat, dairy, eggs, and fish. Even though this procedure resulted in relatively large subsamples of each dietary group, the advert could well have attracted participants that are inherently interested in these topics. It is unclear how well the sub-samples of meat abstainers reflect the profiles of these dietary minority groups in the general population. For instance, we recruited a larger number of women than men, rendering the sample less suitable to test for gender differences. It would be valuable to replicate the current findings in a representative sample.

Another potential limitation is that although we obtained high internal consistency estimates (i.e., Cronbach's alphas), for the measures, the internal consistency of a few scales was low (e.g., fish-related avoidance and dissociation; see also Grünhage & Reuter, 2021; Mertens & Oberhoff, 2023; Rothgerber, 2013), possibly pointing to reliability issues with these scales (e.g., items might measure different constructs). The low estimates could be attributed at least partly to the low number of items comprising the scales. The items were still positively correlated, and largely met or exceeded conventional standards for very short scales in psychological research (e.g., Gosling et al., 2003) and when looking within dietary groups (Table S1 in the online supplement). Nevertheless, future research that uses a larger set of items for each construct is needed to establish the robustness of the findings.

4.6. Summary and conclusion

This research uniquely adds to the growing literature on the use of cognitive dissonance strategies in food choice by demonstrating that similar strategies are employed in relation to meat, dairy, eggs, and fish consumption by different dietary groups (omnivores, pescatarians, flexitarians, vegetarians, and vegans). Theoretically, the findings suggest that these psychological strategies decrease the moral discomfort associated with meat, dairy, egg, and fish products, which helps to justify continued consumption of these products despite knowing the harm being done to animals. Our study highlights the importance of extending the dominant research scope in this area beyond meat consumption, and to focus on a range of animal products in order to have a better understanding of the cognitive barriers to adopting a plant-based diet (see also Ioannidou et al., 2023). This will help inform interventions for behaviour change, education, and a global shift away from animal agriculture to a more sustainable and ethical diet.

Ethics statement

The study received ethical approval by the Chair of the Humanities, Social and Health Sciences Research Ethics Panel at the University of Bradford (Ethics ID: E811). For this study participants gave informed consent before taking part in the study.

Author contributions

MI contributed to all aspects of this study and prepared the manuscript. MI contributed to participant recruitment. MI and KF, contributed to data processing, data analysis and interpretation. All authors contributed to manuscript revision, read, and approved the submitted version.

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Data availability

Please note that we include links to our OSF project containing all anonymised data and study materials in the paper here: (https://osf.io/2vjxs/?view_only=bee6cc3ee7124a35b9609c6c52c39d3b).

Declaration of competing interest

None.

Data availability

Please note that we include links to our OSF project containing all anonymised data and study materials in the paper here: (https://osf.io/2vjxs/?view_only=bee6cc3ee7124a35b9609c6c52c39d3b).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.appet.2023.107024.

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