Cognitive Dissonance and the Meat Paradox

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Abstract

The fact that people feel compassion for animals but still consume meat can create feelings of dissonance among meat-eaters. According to the Meat-Related Cognitive Dissonance framework, consumers of meat often adopt meat-eating justifications as a means of coping with this dissonance (Rothgerber, 2020). The framework does not explicitly address the potential outcomes of a certain justification for eating meat being refuted or threatened. Therefore, we aimed to identify strategies people use when common justifications for eating meat (i.e., eating meat is 'necessary', 'natural', 'normal', or 'nice') are targeted and tested whether this leads participants to increase their adoption of other justifications for eating meat. We conducted a study with 151 students at Tilburg University, and measured participants' meat-eating justifications before and after an intervention. Participants were randomly assigned to one of four conditions in which they were exposed to an intervention that targeted one of the four aforementioned meat-eating justifications. The study results revealed that the target intervention significantly decreased the adoption of the targeted justifications. In addition, we found that the target intervention did not significantly increase the adoption of the non-targeted justifications. We even found a significant effect in the opposite direction. For participants high in preference for consistency this opposite effect was even stronger. With these results, we could not confirm that participants attempt to reduce inconsistency in their beliefs and behaviour by attaching more value to other meat-eating justification. Implications and recommendations for future research on this topic are discussed.

Keywords: meat-paradox, cognitive dissonance, meat-eating justification

Cognitive Dissonance and the Meat Paradox

Most individuals have loving and caring feelings towards animals; people generally feel compassion for them and disapprove of their suffering (Cornish et al., 2016). However, many people frequently consume meat. For example, in 2019, the total consumption of meat in the Netherlands was 77.8 kg per capita (Dagevos et al., 2020). This contradiction has been termed the meat paradox in reference to the disconnection between loving and caring about animals while killing them for food (Loughnan et al., 2010).

Cognitive Dissonance

The meat paradox is known to be an instance of cognitive dissonance specific to the issue of meat consumption. Cognitive dissonance – a theory introduced by Leon Festinger – refers to the uncomfortable tension that someone experiences when attitudes, behaviours or ideas are in conflict (Festinger, 1957). The theory is often associated with the famous experiment of Festinger and Carlsmith (1959), who found that after performing an unpleasant task, participants who received a smaller compensation (in comparison to a larger compensation) changed their attitudes to favour the behaviour. Cognitive dissonance theory has been one of the most enduring and popular theories in the social sciences (Cooper, 2019). In the 21st century, the literature on cognitive dissonance theory has shown a rising trend towards application in real-world problems in research on management (Hinojosa et al., 2017) and consumer behaviour (Cummings & Venkatesan, 1976).

Meat-Related Cognitive Dissonance

Rothgerber (2020) introduced a framework aimed at explaining how people resolve meat-related cognitive dissonance (MRCD). The MRCD framework enables one to understand how individuals attempt to prevent dissonance form occurring. According to this framework, there are various strategies people can adopt to avoid or reduce dissonance. MRCD is often triggered by situational factors (e.g., seeing farm animals suffer and

information about animal welfare). According to the framework, individuals often initially try to avoid or ignore these triggers to maintain their meat-eating behaviour. If this is unsuccessful, the person can experience dissonance and transition to a dissonance-reducing mechanism. Consequently, people may change their behaviour by reducing the amount of meat they consume or omitting it from their diet. Another strategy that individuals may adopt is to strategically distort perceptions to reduce guilt. In this case, they adopt rationalisations or justifications and compensate for inconsistent behaviour. This is called a perceptual strategy. For example, one may deny that an animal possesses a mind as a means of rationalising their meat consumption (Bastian et al., 2012). Similarly, individuals often withdraw from moral concern for animals by denying their capacity to suffer (Loughnan et al., 2010).

Another dissonance-reducing strategy is to create pro-meat justifications. These justifications are common rationalisations that people use to defend their regular meat consumption. According to Joy (2020), there are three justifications that individuals regularly use to defend their meat consumption.

The first justification – ‘natural’ – is associated with the idea that meat consumption is an important part of human nature. Joy (2020) proposed that through socialisation, people come to believe that humans are natural carnivores and that meat consumption is a part of human biology, as humans have been consuming meat for millions of years. Thus, individuals justify their meat consumption by arguing that humans are ‘meant’ to eat meat.

The second justification – ‘necessary’ – is closely related to the belief that eating meat is a necessity. People argue that eating animals is necessary for humans to be healthy. Meat is thought to be an essential component of a healthy and balanced diet, as it contains essential nutrients. By arguing that it would be unhealthy to deprive the human body of nutrients obtained from meat, people justify their meat consumption.

The third justification – ‘normal’ – relies on the belief that eating meat has become a tradition and social norm. Norms are reflected in everyday behaviour, customs and traditions. Those who use this justification believe that eating meat is traditional and what most people in civilised society do. Joy (2020) proposed that since eating meat is known to be customary behaviour, it is less likely to be questioned, making it easier to justify.

There is an important fourth justification that is not captured in the three justifications proposed by Joy (2020). Lea and Worsley (2003) found that the enjoyment people derive from eating meat is an important barrier to them when considering adopting a vegetarian diet. Therefore, a fourth justification was added. This final justification – ‘nice’ – is associated with the pleasure that people experience while eating meat. When meat-eaters justify their meat consumption, they often address the taste and pleasure they experience while consuming it.

Piazza et al. (2015) proposed that meat-eaters justify their meat consumption by believing that eating meat is natural, normal, necessary, and nice. They investigated whether the four justifications would account for the vast majority of justifications that meat-eaters offer in defence of eating meat. They asked students to explain why it is acceptable to eat meat. The study results showed that 80% of the open-ended responses to the question ‘why do you eat meat?’ included the four justifications.

According to Rothgerber (2020), individuals are more likely to rely on perceptual strategies than behavioural strategies to resolve their MRCD. Behavioural change is often difficult to accomplish as it requires the disruption of current habits and the fostering of new unfamiliar actions (van’t Riet et al., 2011). Furthermore, when behaviour has become habitual, intentions to change it often have little effect. People are likely to have been consuming meat for long periods of their lives, making it easier for them to adopt a justification at hand than to change habitual behaviour. Following the MRCD framework, one

could argue that people adopt other justifications following a threat to one of their existing justifications. By valuing these justifications highly, individuals may attempt to compensate for inconsistent behaviour. Considering this, interventions aimed at reducing meat consumption can have a backfiring effect, meaning that confrontations with information that challenges their existing beliefs will only strengthen those beliefs (Swire-Thompson et al., 2020). This phenomenon has important practical implications for policymakers and those aiming to change people's attitudes and behaviours. Previous studies have often failed to find support for existence of such backfiring effects (Swire-Thompson et al., 2020). The MRCD framework does not explicitly address the potential outcomes of a certain justification for eating meat being refuted or threatened. Thus, whether these interventions could cause people to adopt a perceptual strategy instead of the desired behavioural change remains unclear.

Individual Differences

The strategies and mechanisms that people use to cope with cognitive dissonance may depend on context-driven factors and individual differences. Studies have shown that gender is an important predictor of attitude towards animals and meat consumption. For example, women have greater difficulty than men in justifying their meat consumption, while men are more likely than women to endorse pro-meat justifications (Rothgerber, 2013). In addition, individual values and political preferences have shown to affect attitudes towards animal exploitation and meat consumption. For example, social dominance orientation and right-wing authoritarianism positively predict attitude towards meat consumption and animal exploitation (Dhont & Hodson, 2014). Additionally, cognitive dissonance can manifest differently in different cultures. Cultures adhere to different values regarding the acceptability of harming and exploiting different animal species; for example, Tian et al. (2016) exposed people to visual stimuli making the relationship between meat and its animal origin salient. Their study results revealed that a lower agency-related mental state was attributed to cows

by French participants than Chinese participants. Mayfield et al. (2007) found that the majority of Swedish participants were not bothered by thinking of the animal origins of meat while consuming it. In another study, reminding consumers about the psychological attributes of animals (triggering MRCD) led to more disgust in North American participants than in Asian participants (Ruby & Heine, 2012). These results suggest that individual differences could affect the sensitivity towards MRCD, the way it is activated, and the way it is reduced.

Cialdini et al. (1995) found that the need to reduce dissonance is dependent on individuals' preference for consistency within their responses. People with a higher preference for consistency have a stronger motivation to reduce dissonance. In one study, Cialdini et al. (1995) led participants to perform a task that was inconsistent with their existing attitudes. They found that people with a high preference for consistency were more likely to change their attitude in favour of the action than those with a low preference for consistency. As aforementioned, individuals may compensate for inconsistent beliefs and behaviour by adopting perceptual strategies. In this case, they place a high value on other justifications following a threat to existing beliefs. The need to adopt this strategy is expected to be even greater for individuals with higher preference for consistency. Therefore, we propose that people with higher preference for consistency are more likely to adopt dissonance-reducing strategies, leading to stronger backfiring effects.

Study Aim

In this study, we investigate the possible backfiring effects of interventions aimed at reducing meat consumption. While emerging work has identified common justifications for meat consumption, we attempt to identify strategies people use when common justifications are targeted to seek evidence for backfiring effects. To achieve this goal, we tested whether targeting a particular justification ('necessary', 'natural', 'normal', or 'nice') results in increased adoption of other justifications. When one such justification is invalidated as an

argument in a successful target intervention, people may experience a feeling of dissonance between their attitudes and behaviours. In line with the aforementioned MRCD framework, we expect participants to attempt to reduce the inconsistency in their beliefs and behaviour by attaching more value to other meat-eating justification. Therefore, we have formulated the following hypotheses:

H1: The target intervention decreases the adoption of the targeted justifications.

H2: The target intervention increases the adoption of the non-targeted justifications. We also expect that this effect will be stronger for people with a higher preference for consistency.

H3: Preference for consistency moderates the effect of the target intervention on the adoption of non-targeted justifications.

Methods

Design

In the present study, we tested whether targeting a particular justification (‘necessary’, ‘natural’, ‘normal’, or ‘nice’) results in increased adoption of other justifications among participants. This study used a 4×2 mixed design with target domain (‘normal’, ‘natural’, ‘necessary’, or ‘nice’) as a between-subject factor and change in adoption of justifications (targeted versus non-targeted) as a within-subject factor. Participants were randomly assigned to one of the four conditions in which they were exposed to an intervention that targeted one of the four common meat-eating justifications. The dependent measure included the change in meat-eating justifications (pre- and post-intervention) for each of the four domains. Preference for consistency was included as a moderator. We expected a stronger change in scores of the non-targeted justifications for people with a higher preference for consistency.

Procedure

People participated in the study by completing an online survey in Qualtrics. Participants first completed the 4N scale and the preference for consistency scale. Subsequently, they watched a short video and read a short text in which one of the justifications was targeted. In addition, the participants were asked to answer some specific questions about the video and text that enabled us to determine whether the they had watched and read them in full. Afterwards, the participants completed the 4N scale (a second time), the SDS-17 and several funnel debriefing questions. At the end of the study, the participants answered some demographic questions on their age, gender, nationality and English skills.

Materials

4N Scale

The 16-item version of the 4N scale devised by Piazza et al. (2015) was used to measure four common justifications for eating meat (Appendix A). The scale consists of statements about meat consumption, four for each N (e.g., 'It is only natural to eat meat', 'It is necessary to eat meat in order to be healthy', 'Not eating meat is socially unacceptable', and 'Meat adds so much flavour to a meal it does not make sense to leave it out'). Participants rated their level of agreement with each statement on a seven-point Likert scale (1 = 'completely disagree'; 7 = 'completely agree'). Various adjustments were made to the survey items to adjust them to the goals of the current study. The items 'Most people I know eat meat' and 'Meat is delicious' were changed to 'It is abnormal to have a vegetarian diet' and 'Plant-based meals taste as delicious as meat-based meals', respectively. We adjusted these items because we expected that responses to the initial items would not be affected by the implementation of the target intervention.

PFC Scale

To measure participants' preference for consistency, we used the PFC scale (Appendix B) devised by Cialdini et al. (1995). The scale consists of 18 items (e.g., 'I prefer to be around people whose reactions I can anticipate', 'It is important to me that my actions are consistent with my beliefs', and 'I want to be described by others as a stable, predictable person'). Participants rated their level of agreement with each statement on a nine-point Likert scale (1 = 'strongly disagree'; 9 = 'strongly agree').

SDS-17 and Funnel Debriefing

Demand characteristics and social desirability bias might be a concern regarding the topic of meat consumption. We anticipated that our participants could understand the nature of the study and respond in favour of the hypothesis. As the participants might have inferred that meat-eating was labelled as 'bad' behaviour, social desirability could have caused them to answer questions in a manner viewed as favourable. Because we acknowledged that these aspects might undesirably influence the study results, we attempted to attune to these issues by using the SDS-17 (Stöber, 2001) to measure social desirability (Appendix C). The scale comprises 17 items (e.g., 'I sometimes litter', 'I always admit my mistakes openly and face the potential negative consequences', and 'In traffic, I am always polite and considerate of others'). The participants decided whether each statement described them or not by answering 'true' or 'false'.

In addition, we incorporated a funnel debriefing procedure by asking questions to assess participants' awareness of the study aim and hypotheses without inducing awareness. Therefore, we began with some general questions about the nature of the study (e.g., 'Do you have any idea what the study was about, and if so, what?') and ended with more specific questions (e.g., 'Why do you think we showed you the video and the text?' and 'We asked you multiple times to complete a questionnaire about your attitude towards meat

consumption. What hypothesis do you think we had regarding this measure?'). Based on the answers, we were able to assess whether each participant had deduced the study aim and could, therefore, may have purposefully answered in accordance with the hypotheses. Because this could have negatively affected the results, data from these participants were excluded from the analysis.

Persuasive Videos and Texts

Each participant watched a short video and read a short text in which arguments that debunked one of the four justifications were presented[1]. We targeted peoples' belief that meat is necessary by showing contradictory arguments that challenged existing views on the necessity of eating meat. A short animation video (Life Noggin, 2018) of 3:44 minutes in length was presented to the participants. In this video, the argument is presented that meat is not necessary, as proteins and vitamins can also be obtained from eating vegetarian products. The narrative of the video also explains that meat consumption can cause serious health issues. The accompanying 568-word text (Harvard Health Publishing, 2020; Reasonable Vegan, 2015) supplied additional arguments about meat alternatives and indicated that plant-based alternatives contain the necessary components that contribute to a complete and healthy diet without meat.

We targeted people's belief that eating meat is natural by confronting them with contradictory arguments against existing beliefs about the physiology and lifestyle of human ancestors. In the video (Plant based news, 2018), a doctor explains that humans are not anatomically designed to eat meat because of our jaw structure and digestive system. The doctor also argues that humans are not naturally scavengers because of their physiology, as

[1] Minor adjustments have been made to the original texts to make them suitable for the study. The texts can be found in the Appendix D.

well as that humans could not hunt efficiently enough to collect enough meat to feed themselves. The video lasted 6:45 minutes. The 449-word text (Peta, n.d.) presented additional arguments that contradicted people's existing beliefs about human ancestors' diets and anatomy, such as that human stomach acid cannot break down or kill dangerous bacteria in meat.

We targeted people's belief that eating meat is normal by targeting their existing beliefs about current dietary norms in society. The 2:50-minute video (CBC News: The National, 2019) explains that a growing number of consumers want alternatives to animal protein and that the industry responds to this changing norm. The argument is presented that plant-based products are becoming a trend. In addition, the video gives examples of companies that are investing in plant products. The 537-word text (Vox, 2020) provided additional information on the growing consumer demand for plant-based products.

We targeted people's belief that meat is nice by attempting to convince them that plant-based alternatives are perceived to be as delicious as meat-based products. The participants watched a 4:23-minute video (Plant based news, 2019) in which meat-eaters consume plant-based products without realising that they are not eating meat. The 478-word text (Insider, 2019; Livekindly, 2018) provided additional examples of situations where professional chefs and customers could not differentiate between meat- and plant-based dishes.

Data Analysis

Primary Analyses

Data analysis was performed using statistics software (JASP version 0.14.1). Since we were interested in the change in the adoption of all the justifications, we needed to calculate the difference scores between the two measurement points (before and after the intervention) on the 4N scale. We distinguished between the targeted and non-targeted scores. First, we

tested whether the target intervention successfully targeted participants' justifications for eating meat (*H1*). A successful target intervention would mean that participants adjusted their scores for the targeted justifications downwards. Therefore, difference scores needed to be lower than zero. A one-sample t-test was conducted to determine whether the difference scores of the targeted domains were significantly lower than zero. Afterwards, we tested whether the target intervention increased adoption of the non-targeted justifications (*H2*). Because we predicted that participants would adjust their scores upwards after the intervention, difference scores were expected to be higher than zero. To investigate whether the intervention increased adoption of the non-targeted justification, we conducted another one-sample t-test to determine whether the difference scores of the non-targeted scores were significantly higher than zero.

Secondary Analyses

We tested whether the preference for consistency moderated the effect of the target intervention on the difference scores (*H3*). A regression analysis was performed to determine whether there was a stronger change in the non-targeted justifications for individuals with a higher preference for consistency. Additionally, we tested whether social desirability correlated with change in adoption of justifications. We performed a regression analysis to assess whether the SDS-17 score correlated with changes in the targeted and non-targeted justifications.

Exploratory Analyses

Lastly, for each condition, we tested whether each intervention caused participants to significantly decrease their scores for the targeted justifications. Assuming that not all interventions may have been successful in significantly decreasing adoption of the targeted justification, we assessed if we could find a significant effect for the non-targeted scores within conditions where the intervention proved to be successful.

Participants

Participants were recruited through the participant pool of Tilburg University. The majority of them were undergraduate students. The online survey was completed by 151 participants (127 women, 21 men, 2 other, 1 prefer not to say). Both Dutch (N = 110) and international students (N = 41) participated in the study. The majority of them (91%) were in the age range of 18–24 years. Because the study was combined with another study, both vegetarians and meat-eaters participated (vegetarians were later excluded from the analysis). Before being enrolled in the study, all participants read and agreed to a consent form.

Results

Data Exclusion

Data acquired from participants who adhered to a vegetarian diet or did not clarify their diet were excluded from the analysis (N = 33). In addition, we excluded data from participants who did not take at least 20 seconds to watch the video or read the text (N = 12), answered one of the check questions incorrectly or did not answer these questions (N = 9). Based on the funnel debriefing questions, we excluded participants who guessed the study aim and hypothesis or indicated that they had answered untruthfully (N = 5). Lastly, we excluded participants who indicated that their English skills were insufficient to properly complete the survey (N = 1). Eventually, we excluded 43 cases and thus included data from 108 participants in the data analysis [2].

Primary Analyses

We first assessed whether the target intervention decreased adoption of the targeted justifications (*H1*) and increased adoption of the non-targeted justifications (*H2*). The difference scores for the targeted justifications were, on average, lower than zero. Consistent

[2] Some cases did not meet several of the criteria.

with *H1*, the target intervention significantly decreased adoption of the targeted justifications, M = -0.347, SD = 0.776, $t(107)$ = -4.648, $p < .001$, Cohen's d = -0.447 , 95% CI [-∞, -0.280]. The difference scores for the non-targeted justifications were, on average, also lower than zero. Inconsistent with *H2*, the target intervention did not significantly increase adoption of the non-targeted justifications. We found a significant effect in the opposite direction, M = -0.244, SD = 0.388, $t(107)$ = -6.531, $p < .001$, Cohen's d = -0.628, 95% CI [-∞, -0.454]. The separate values for each justification ('necessary', 'normal', 'nice', and 'natural') are presented in Table 1.

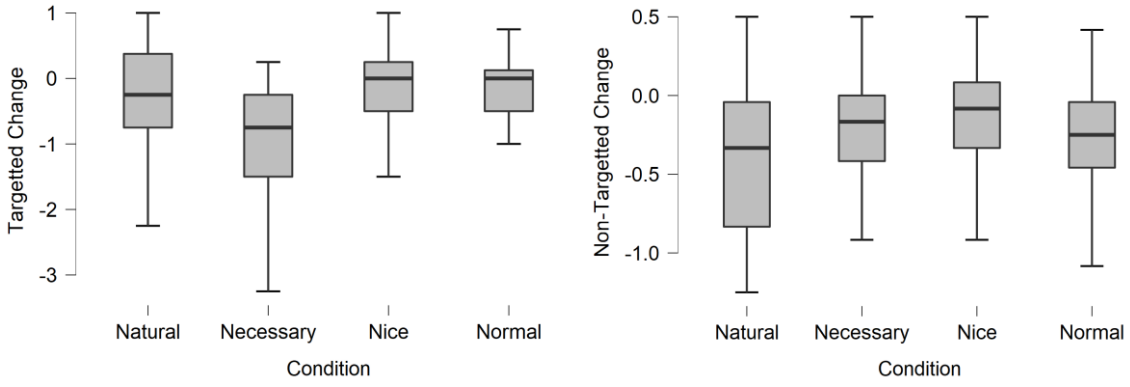
Table 1

Means and Standard Deviations for Change in Adoption of Targeted and Non-Targeted Justifications per Condition

	Non-Targeted Change				Targeted Change			
	Natural	Necessary	Nice	Normal	Natural	Necessary	Nice	Normal
N	23	29	29	27	23	29	29	27
Mean	-0.413	-0.187	-0.135	-0.278	-0.239	-0.914	-0.078	-0.120
SD	0.484	0.349	0.333	0.357	0.740	0.922	0.551	0.521
Minimum	-1.250	-0.917	-0.917	-1.083	-2.250	-3.250	-1.500	-1.000
Maximum	0.500	0.500	0.500	0.417	1.000	0.250	1.000	0.750

Figure 1

Boxplot of Change in Scores for Each Justification.

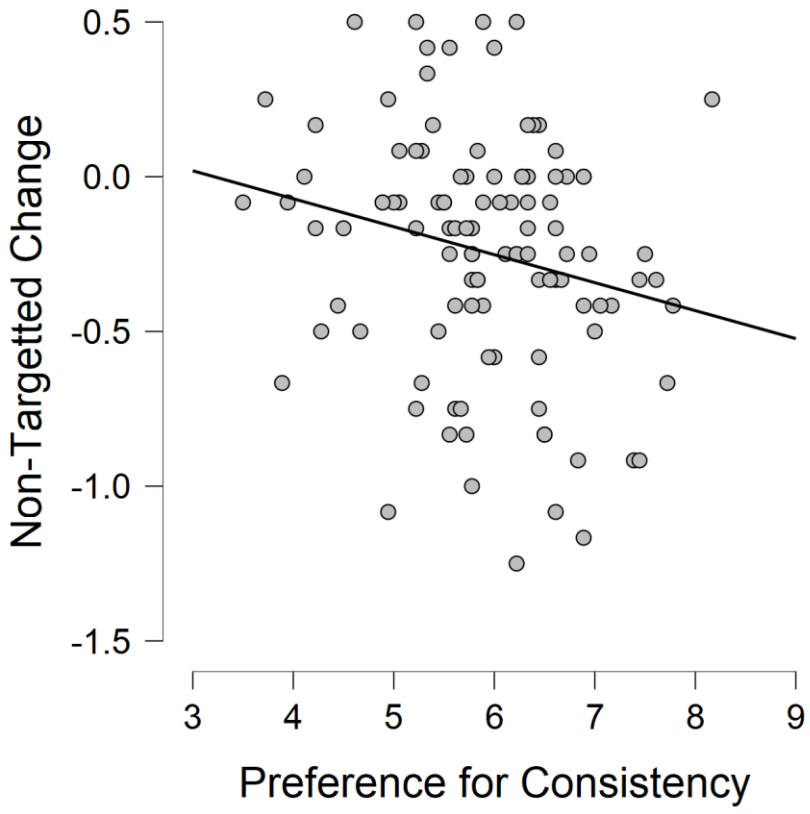


Secondary Analyses

To assess whether preference for consistency moderated the effect of the target intervention on adoption of the non-targeted justification after the intervention (*H3*), a correlation analysis was performed. The scatterplot presented in Figure 2 illustrates the relationship between preference for consistency and change in adoption of the non-targeted justifications. One can observe that among participants with a higher preference for consistency, adoption of the non-targeted justifications tended to decrease more strongly after the intervention. The results of the Pearson correlation indicate a significant negative association between preference for consistency and change in adoption of the non-targeted justifications, $r(106) = -.216$, $p = .025$.

Figure 2

Scatter Plot Depicting the Correlation between Preference for Consistency and Change in Adoption of Non-Targeted Justifications.



We performed a correlation analysis to assess whether social desirability correlated with change in the scores for the justifications. The results indicate that SDS score did not significantly correlate with change in targeted justification scores, $r(106) = -.079$, $p = .416$ and non-targeted justification scores, $r(106) = .019$, $p = .843$.

Exploratory analyses

To assess whether the four interventions differed in their effectiveness, we performed an ANOVA and observed the marginal means. Table 2 presents the values for each condition. One can observe that the target intervention for necessary had the only significant effect on change in adoption of this justification.

Table 2

Marginal Means per Condition for Targeted Scores

		95% CI for Mean Difference					
Condition	Marginal Mean	Lower	Upper	*SE*	*t*	*df*	*p*
Natural	-0.239	-0.530	0.052	0.147	-1.631	104	.106
Necessary	-0.914	-1.173	-0.655	0.131	-7.000	104	< .001
Nice	-0.078	-0.336	0.181	0.131	-0.594	104	.554
Normal	-0.120	-0.389	0.148	0.135	-0.890	104	.376

Because we observed that the ‘necessary’ intervention was the only successful one in targeting the justification, we assessed if we could find a significant effect for the non-targeted scores within the ‘necessary’ condition. Table 3 presents the marginal means of the non-targeted scores per condition. One can observe that we did find a significant effect on the non-targeted scores within this condition but in the opposite direction.

Table 3

Marginal Means per Condition for Non-targeted Scores

		95% CI for Mean Difference					
Condition	Marginal Mean	Lower	Upper	*SE*	*t*	*df*	*p*
Natural	-0.413	-0.570	-0.256	0.079	-5.219	104	< .001
Necessary	-0.187	-0.327	-0.047	0.070	-2.650	104	.009
Nice	-0.135	-0.275	0.005	0.070	-1.916	104	.058
Normal	-0.278	-0.423	-0.133	0.073	-3.803	104	< .001

Discussion

Rothgerber (2020) has developed a framework aimed at explaining how cognitive dissonance is resolved when meat eaters encounter conflict between their meat-eating behaviour and feelings of compassion for animals. Following the MRCD framework, triggers that evoke dissonance do not always cause people to change their behaviour by reducing their meat consumption. Instead, these triggers might cause them to adopt other justifications to reduce dissonance and maintain meat-eating behaviour, termed a perceptual strategy. The present work aimed to demonstrate that perceptual strategies can account for dissonance reduction and the maintenance of meat-eating behaviour. We performed an intervention that targeted one of the common justifications for eating meat (‘necessary’, ‘natural’, ‘normal’, or ‘nice’). We first tested whether the target intervention successfully reduced the adoption of the targeted justifications. The results of the primary analyses reveal that the target intervention significantly decreased the adoption of the targeted justifications among participants. Contrary to our expectations, the target intervention did not significantly increase the adoption of the non-targeted justifications. Instead, we have found a significant effect in the opposite direction. Moreover, the results of the exploratory analyses revealed that among the four interventions the ‘necessary’ intervention was the only intervention that significantly decreased the adoption of the targeted justifications. We tested whether we could confirm our hypothesis using data from within this condition. Still within this condition

we have also found that the intervention significantly decreased the adoption of non-targeted justifications.

Our third hypothesis follows the proposition of Cialdini et al. (1995) that individuals with a higher preference for consistency have a stronger motivation to reduce dissonance. We tested whether people with higher preference for consistency are more likely to adopt dissonance reducing strategies. The results reveal that participants with a higher preference for consistency tended to more strongly decrease adoption of the non-targeted justifications after the intervention. This result contradicts the expectation that people with higher preference for consistency are more likely to adopt dissonance reducing strategies which leads to stronger adoption of non-targeted justifications. Lastly, we could not confirm that SDS-17 scores correlated with change in targeted justifications. Therefore, we do not assume that the study results are entirely explained by social desirability.

Taken together, the results of this study do not confirm that perceptual strategies account for dissonance reduction and the maintenance of meat-eating behaviour. We cannot confirm that backfiring effects are associated with the application of interventions aimed at reducing meat consumption. Instead, we have found that targeting one justification led to a reduction in the adoption of other justifications. Previous studies have also often failed to find evidence for backfiring effects (Swire-Thompson et al., 2020). For instance, Wood and Porter (2019) performed five experiments where they tested issues of potential backfire. None of the results of these experiments demonstrate backfiring effects.

The MRCD framework outlines that people have a wide range of mechanisms at their disposal for reducing MRCD. In addition, it offers an initial outline regarding which factors contribute to the adoption of certain mechanisms. In the present study, we attempted to activate dissonance and measured one expression of MRCD reduction. However, this reduction mechanism may not be the initial strategy an individual would adopt to deal with

cognitive dissonance in a real-world setting. Individuals might instead employ different strategies to deal with cognitive dissonance. For instance, they might use a “look-the-other-way” strategy, which in case would involve ignoring the animal origin of meat (Kunst & Hohle, 2016). In other words, they may not feel the urge to justify their meat consumption. This argument may account for why we did not succeed in finding evidence that people adopt other justifications following a threat to one of their existing justifications.

Limitations and Future Research

One limitation of this study is that it may not address all relevant justifications. Though Piazza et al. (2015) have found that the four justifications (‘necessary’, ‘natural’, ‘normal’, or ‘nice’) were the most commonly and used ones, we cannot deny that other justifications might had an impact on this study. As previously mentioned, the denial of a mind to animals (Bastian et al., 2012) and moral disengagement (Loughnan et al., 2010) have also been identified as relevant justifications of meat consumption. As we did not measure these justifications, it remains uncertain whether people may have used these justifications to compensate for inconsistencies in attitudes and behaviour. It is recommended that future studies incorporate and measure these justifications.

Furthermore, cultural and individual differences have been proven to influence MRCD. Political preferences, culture and gender have effects on susceptibility of MRCD, the adoption of particular reduction mechanisms, the timing of activating MRCD and the desire to reduce MRCD (Rothgerber, 2020). In addition, there are clear differences between men and women when dealing with MRCD (Rothgerber, 2013). Studies have found that women generally feel more empathy towards animals (Knight et al., 2004) and are often less attached to meat-eating (Dowsett et al., 2018). According to the MRCD framework, performing an intervention to increase MRCD in this particular population increases the likelihood of them changing their behaviour by reducing their level of meat consumption or it encourages them

to adopt a “look-the-other-way” strategy. In contrast, studies have found that men often feel less compassion for animals (Knight et al., 2004) and are more attached to their meat-eating behaviours (Dowsett et al., 2018). The MRCD framework implies that men are more likely to adopt a perceptual strategy by adopting other justifications when MRCD is triggered. Given however, that 85% of our sample consists of women, this might have biased our results. These differences should be considered. It is recommended that future studies should not only try to create a more representative sample but should also assess whether backfiring effects occur within these specific target populations.

Implications for Practice

The study results offer implications for policies that encourage people to eat less meat. Current concerns associated with meat consumption (e.g., climate change, animal welfare) place pressure on us to change our consumption standards. We need a strategy to effectively break peoples’ habitual consumption patterns and help them transition to a more sustainable lifestyle. Following the MRCD framework, it was hypothesized that interventions aimed at reducing meat consumption might produce backfiring effects. The proposition that people combat the moral concerns related to meat consumption by adopting other justifications inhibits the desired effect of these interventions. However, the results of the present study do not demonstrate this effect. This outcome suggests that these interventions may have potential when it comes to reducing meat consumption. In addition, given that studies often failed to find support for existence of backfiring effects (Swire-Thompson et al., 2020), the results of this study may also suggest that backfiring effects do not substantially affect the implementation of these interventions.

Conclusion

The present study investigated the possible side effects of interventions aimed at reducing meat consumption. We aimed to identify how targeting one justification for eating

meat leads to increased adoption of other justifications for eating meat. We performed an intervention study with 151 participants and measured the adoption of four common justifications for eating meat (‘necessary’, ‘natural’, ‘normal’, or ‘nice’) before and after the intervention. The results of this study do not reveal that people increased their adoption of other justifications after the intervention. In other words, we cannot confirm that backfiring effects are associated with the application of these interventions.

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Appendix A

4N Scale Adapted

Natural

1. It is only natural to eat meat

2. It is unnatural to eat an all plant-based diet.

3. Our human ancestors ate meat all the time.

4. Human beings naturally crave meat.

Necessary

5. It is necessary to eat meat in order to be healthy.

6. You cannot get all the protein, vitamins, and mineral you need on an all plant-based diet.

7. Human beings need to eat meat

8. A healthy diet requires at least some meat.

Normal

9. Not eating meat is socially unacceptable.

10. It is abnormal for humans not to eat meat.

11. It is abnormal to have a vegetarian diet.

12. It is normal to eat meat.

Nice

13. Plant-based meal taste as delicious as meat based meal.

14. Meat adds so much flavour to a meal it does not make sense to leave it out.

15. The best tasting food is normally a meat based dish (e.g., steak, chicken breast, grilled fish).

16. Meals without meat would just be bland and boring.

Note: Level of agreement or disagreement rated on a 1–7 scale (1 = Strongly disagree; 7 = Strongly agree)

Appendix B

PFC Scale

1. I prefer to be around people whose reactions I can anticipate.

2. It is important to me that my actions are consistent with my beliefs.

3. Even if my attitudes and actions seemed consistent with one another to me, it would bother me if they did not seem consistent in the eyes of others.

4. It is important to me that those who know me can predict what I will do.

5. I want to be described by others as a stable, predictable person.

6. Admirable people are consistent and predictable.

7. The appearance of consistency is an important part of the image I present to the world.

8. It bothers me when someone I depend on is unpredictable.

9. I don't like to appear as if I am inconsistent.

10. I get uncomfortable when I find my behaviour contradicts my beliefs.

11. An important requirement for any friend of mine is personal consistency.

12. I typically prefer to do things the same way.

13. I dislike people who are constantly changing their opinions.

14. I want my close friends to be predictable.

15. It is important to me that others view me as a stable person.

16. I make an effort to appear consistent to others.

17. I'm uncomfortable holding two beliefs that are inconsistent.

18. It doesn't bother me much if my actions are inconsistent. [reverse-scored]

Items were scored on a scale with the category designations: 1 = Strongly disagree, 2 = Disagree, 3 = Somewhat disagree, 4 =Slightly disagree, 5 = Neither agree nor disagree, 6 = Slightly agree, 7 = Somewhat agree, 8 = Agree, 9 = Strongly agree.

Appendix C

Below you will find a list of statements. Please read each statement carefully and decide if that statement describes you or not. If it describes you, check the word "true"; if not, check the word "false".

1. I sometimes litter.
2. I always admit my mistakes openly and face the potential negative consequences.
3. In traffic I am always polite and considerate of others.
4. I have tried illegal drugs (for example, marijuana, cocaine, etc.).
5. I always accept others' opinions, even when they don't agree with my own.
6. I take out my bad moods on others now and then.
7. There has been an occasion when I took advantage of someone else.
8. In conversations I always listen attentively and let others finish their sentences.
9. I never hesitate to help someone in case of emergency.
10. When I have made a promise, I keep it--no ifs, ands or buts.
11. I occasionally speak badly of others behind their back.
12. I would never live off other people.
13. I always stay friendly and courteous with other people, even when I am stressed out.
14. During arguments I always stay objective and matter-of-fact.
15. There has been at least one occasion when I failed to return an item that I borrowed.
16. I always eat a healthy diet.
17. Sometimes I only help because I expect something in return.

Note

Answer categories are "true" (1) and "false" (0). Items 1, 4, 6, 7, 11, 15, and 17 are reverse keyed. Item 4 was deleted from the final version of the SDS-17.

Appendix D

Necessary

People who eat meat argue that it's "necessary" for humans to consume animals. However, is it really true that we can only get our necessary nutrients by eating meat?

Some people believe that humans have to eat meat to be healthy and in some cases they may be right. If someone does not have access to sufficient plant foods to meet their dietary needs perhaps because they live in an inhospitable climate or in an impoverished country it may be necessary for them to eat a mix of plant and animal foods. But when people say it is Necessary to eat animal products to be healthy they are usually talking about their own consumption habits and health.

Provided you have access to a range of plant based foods and B12 supplementation it is not necessary to consume animal products. The health advisory bodies of most first world nations recognise the fact that a vegan diet is suitable for people at all stages of life. Our bodies don't need to eat plants, animals, or fungi to be healthy; they need to consume a certain complement of essential nutrients. These nutrients can be found in a variety of different diets including a plant based diet. The idea that consuming animal products is necessary to human health is an outdated one, as the necessary nutrients can easily be obtained from other sources.

Research shows that vegetarians generally get the recommended daily amount of protein, which is easily obtained from dairy products and eggs. There are many plant sources that can help vegans meet their protein needs, including peas, beans, seeds, nuts, soy products, and whole grains. Vegetarians used to be told that they had to combine "complementary" plant proteins (rice with beans, for example) at every meal to get all the amino acids contained in meat protein. Now, health experts say that such rigid planning is unnecessary. According to the American Dietetic Association, eating a wide variety of protein sources every day is sufficient.

Moreover, vitamin B12 is found only in animal products, but those products include dairy foods and eggs, so most vegetarians get all they need. If you avoid animal products altogether, you should eat foods fortified with vitamin B12 (certain soy and rice beverages and breakfast cereals) or take a vitamin B12 supplement to avoid a deficiency.

Furthermore, studies show that in Western countries, vegetarians tend to get the same amount of iron as meat eaters. But the iron in meat (especially red meat) is more readily absorbed than the kind found in plant foods, known as non-heme iron. The absorption of non-heme iron is enhanced by vitamin C and other acids found in fruits and vegetables, but it may be inhibited by the phytic acid in whole grains, beans, lentils, seeds, and nuts.

In addition, phytic acid in whole grains, seeds, beans, and legumes also reduces zinc absorption, but vegetarians in Western countries do not appear to be zinc-deficient.

Lastly, diets that include no fish or eggs are low in EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). Our bodies can convert ALA (alpha linolenic acid) in plant foods to EPA and DHA, but not very efficiently. Vegans can get DHA from algae supplements, which increase blood levels of DHA as well as EPA (by a process called retroversion). DHA-fortified breakfast bars and soy milk are also available. Good ALA sources include flaxseed, walnuts, canola oil, and soy.

Natural

People who eat meat argue that it's "natural" for humans to consume animals. But is this true or just an excuse to justify their meat consumption? Are we really supposed to eat meat?
To start, humans have short, soft fingernails and small, dull canine teeth. All true carnivores have sharp claws and large canine teeth that are capable of tearing flesh without the help of knives and forks.

In addition, real carnivores' jaws move only up and down, enabling them to tear chunks of flesh from their prey. Humans can move their jaws up and down and from side to side, and we also have flat molars (which carnivores lack), allowing us to grind up fruit and vegetables with our back teeth like herbivores do. Dr. Richard Leakey, a renowned anthropologist, says, "You can't tear flesh by hand, you can't tear hide by hand. Our anterior teeth are not suited for tearing flesh or hide. We don't … have large canine teeth, and we wouldn't have been able to deal with food sources that required those large canines."
Furthermore, carnivores have short intestinal tracts that allow meat to pass quickly through their digestive system. Humans' intestinal tracts are much longer, like those of plant-eaters. This gives the body more time to break down fiber and absorb the nutrients from plant-based foods.

Moreover, true carnivores gulp down chunks of raw flesh, relying on their strong stomach acids to break it down and kill the dangerous bacteria in meat that would otherwise sicken or kill them. Humans have much weaker stomach acids that are similar to those found in animals who digest pre-chewed fruits and vegetables. Without carnivorous stomach acids to kill the bacteria in meat, dining on animal flesh can give us food poisoning. According to the U.S. Department of Agriculture, meat is a significant cause of foodborne illness. Every year in the U.S. alone, food poisoning sickens more than 48 million people and kills more than 3,000. Because of this, we must cook meat to make it easier to digest and to destroy bacteria, but there may be a link between cooking meat at high temperatures and the development of colon cancer.

Lastly, during most of our evolutionary history, we were largely vegetarian: Plant foods, such as yams, made up the bulk of our ancestors' diet. The addition of modest amounts of meat to the early human diet came with the discovery of fire, which allowed us to lower the risk of being sickened or killed by parasites and bacteria in meat. This didn't turn our ancestors into carnivores but rather allowed early humans to survive in areas and during periods in which plant foods were unavailable or scarce.

Normal

People who eat meat argue that it is normal to do that. However, in the last few years, trends have proven the contrary and show that plant-based diets are becoming the norm.

Namely, in the last three months of 2020, some of the biggest companies in the world announced major moves into the plant-based meat space. In September, Tesco — the UK's largest supermarket chain — announced plans to increase sales of plant-based products 300 percent by 2025. Last month, Unilever — the world's 19th largest food and beverage manufacturer — set a new annual global sales target of $1.2 billion from plant-based meat and dairy within the next five to seven years, about five times what it forecasts it will make from plant-based sales in 2020. And a few days later, Ikea announced that half its restaurant meals and 80 percent of its packaged food offerings would be plant-based by 2025.

Those announcements were just the latest notable steps some major restaurant chains and food companies took in the last year or so toward plant-based products. This isn't Big Food's first foray into plant-based meat and dairy, though. Over the last few years, some food companies have acquired plant-based startups or launched their own meatless meat products. But these latest announcements — pledging to significantly increase plant-based sales by 2025 — represent a much bigger investment in the future of animal-free protein than we've seen in the past.

These moves have largely been made in response to growing consumer demand. The last few years have seen the new wave of meatless meat achieve something of mainstream status, and the pandemic has only added to the momentum. Concerns about the spread of the coronavirus at meatpacking facilities and supply-chain troubles at grocery stores early in the pandemic seemed to contribute to greater demand for meatless meat.
Some of these companies are touting their pledges as initiatives to help them meet their broader sustainability goals, which is a good bet. Meat, milk, and egg production accounts for 14.5 percent of greenhouse gas emissions, and in numerous reports scientists have called on world leaders to use dietary change as a tool to curb emissions. Despite animal agriculture's outsized impact on the environment, governments have been slow to enact policies to reduce animal product consumption, so these corporate pledges are meaningful steps in the fight against climate change and our hyper-industrialized farming system.

To be sure, these recent pledges are voluntary, and progress on corporate sustainability has been mixed. A recent Bloomberg analysis found that out of 187 companies that set climate pledges to be achieved by 2020 or earlier, three quarters of the companies met their goals — but some goals were quite modest, and a tenth of companies didn't even report their progress.

So, time will tell if companies make good on their word to significantly increase their plant-based offerings. For now, these moves are worth cautiously celebrating. Plant-based meats account for a tiny portion of US meat sales, but the upside seems obvious to the industry. Big Food isn't composed of nonprofit organizations, and the largest among them have a fiduciary responsibility to their shareholders to maximize returns. A move to invest more in plant-based food suggests they think there's a real market here.

Nice
People who eat meat argue that they do this because it tastes nice. However in the last few years meat substitutes have proven to be of great quality.

Can professional chefs tell the difference between animal meat and plant-based meat?
In an experiment two chefs (Chefs Randy Feltis and Jason Parsons) were blindfolded as they sampled three different meat options. Each option featured a vegan and non-vegan version.
In the first round the chefs were first fed a crab cake with chipotle mayo. Chef Feltis correctly identified his vegan crab cake, but Chef Parsons, who ate the meat version, also thought it was vegan.
In round two, the chefs ate Szechuan chicken. Although Parsons was fed the vegan version, he said, "Totally chicken" without hesitation. Feltis also guessed incorrectly, claiming that his chicken was vegan when it was actually animal-based.
The final round featured a chicken schnitzel on a plain white bun with condiments. Parsons correctly identified his vegan schnitzel, but again, Feltis, who ate the meat, thought his tasting was also vegan.

Although the chefs were able to identify a few of the vegan options, they seemed to be more confused when it came to the animal-based meat. “You can’t tell what is vegan these days. It’s incredible how far vegan food has come.”
That it has. From plant-based burgers that bleed to vegan cheese that melts, vegan options are no longer substandard alternatives. Due to the recent advancements by innovative entrepreneurs, plant-based products have started to gain the respect of omnivorous chefs and restaurateurs worldwide.

In another experiment, Burger King Sweden challenged customers to guess whether the Whopper was meat or plant based.
Burger King locations in Sweden are so confident that their meatless menu options taste like the real thing that they are challenging customers to guess if their meals are made from meat or plant-based substitutes.
Guests who purchase Whoppers or Crispy Chicken Burgers from the company's new "50/50 menu" could receive a Rebel Whopper or Rebel Chicken King — two of Burger King's newest meatless menu items.
Customers can then scan the code on the packaging to check if their meal contains meat through the Burger King app — but only after they guess which category their sandwich falls into.
Daniel Schröder (marketing director for Burger King Sweden) said that 60% of customers have guessed the makeup of their sandwich correctly and 40% have missed the mark. While there is no reward for guessing correctly, Schröder said that customers are still enjoying "the fun of the challenge and the pride of getting it right."
"We are really proud of how hard it is to tell our plant-based burgers apart from real meat," Schröder said in a statement given to INSIDER. "With the 50/50 menu, we hope that more people dare to try them. And hopefully have fun trying to figure out which one they got."