



Fleshing Out the Ways Masculinity Threat and Traditional Masculinity Ideology Relate to Meat-Eating and Environmental Attitudes in Australian Men

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Abstract

Meat consumption needs to be reduced to limit climate change but achieving this requires understanding the drivers of meat consumption. In this study, we investigated two potential drivers—a contextual threat to masculinity and the stable individual difference of masculine ideology—and how they predict meat-eating intentions, attitudes, and environmentalism. Employing a sample of 375 Australian men, a population known for its high meat consumption, we did not find support that a contextual threat to men’s masculinity increased pro-meat attitudes or intentions. Instead, we found that prevailing views about masculine ideology significantly predicted meat-related attitudes and intentions, with avoidance of femininity associated with lower avoidance of meat and lower intentions to eat clean meat, and the endorsement of male dominance tied to lower pro-environmental responding. Our findings suggest that situational threats to masculinity may not robustly affect meat consumption intentions and highlight the importance of more stable individual differences in the conception of the male gender identity in maintaining men’s high meat consumption.

Keywords Masculinity · Meat consumption · Vegetarianism · Pro-environmental behaviour · Masculinity threat · Climate change

Animal agriculture is responsible for significant carbon and methane emissions and loss of biodiverse habitats (Springmann et al., 2018). Lowering meat consumption is hence an important step towards minimising climate change. Men tend to consume more meat than women (Rippin et al., 2021); one theoretical reason for this association is that eating meat is typically associated with masculinity, and therefore the male gender identity. Research examining implicit and explicit attitudes has linked meat with masculinity (Patel & Buckland, 2021; Rozin et al., 2012; Timeo & Suitner, 2018): men who identify strongly with masculinity tend to be more likely to eat more meat and are less open to adopting a vegetarian diet (Rosenfeld & Tomiyama, 2021; Stanley et al., 2023). This evidence

converges to align meat consumption with traditional masculinity and meat reduction/avoidance with femininity in Western countries. Our study explores the effect of two aspects of masculinity—men’s endorsement of traditional masculinity ideology and the effect of a threat to their masculinity—on meat consumption, contrasting contextual (threat) as well as individual (ideology) influences.

Men and Masculinity in Relation to Meat Consumption

New research stresses that the association between being a man and meat eating exists because men tend to endorse masculinity to a greater extent than women do, and that it is men who view themselves as more masculine who tend to consume more meat (Rosenfeld & Tomiyama, 2021; Stanley et al., 2023). Specifically, Rosenfeld and Tomiyama (2021) and Stanley and colleagues (2023) both asked men and women to rate how masculine versus feminine they see themselves using a bi-polar scale. The more masculine (and thus less feminine) American men saw themselves, the more meat they tended to report consuming (Rosenfeld & Tomiyama, 2021),

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and the less likely Australian men were to reduce their meat consumption or consider going vegetarian/vegan (Stanley et al., 2023). Therefore, understanding men's masculinity is key to understanding gender differences in meat consumption. However, the measurement of masculinity is debated. Rosenfeld and Tomiyama (2021) and Stanley et al. (2023) used simple constructions of masculinity that varied along a masculine-feminine bipolar scale. Such scales ignore the meaning behind the two poles. Men might identify strongly with a global masculinity construct for entirely different reasons, or they may identify with different understandings of what masculinity means. Indeed, conceptions of masculinity depend on shifting cultural norms, and there is variation among and within cultures in how masculinity is perceived and enacted.

Although a universal 'traditional masculinity' has not been validated, Pleck (1995) describes an interrelated set of traits, including aggression and restricted emotionality, which are shared across many cultures as traditionally masculine. These include the acceptance of a set of rigid standards and expectations that men should follow, such as male dominance over women, restricted emotions, toughness, and self-reliance (Levant et al., 2013). Men differ in the extent they agree with these standards. That is, there are individual differences in traditional masculinity ideology. These differences are expected to be largely stable, with Mesler et al. (2022) describing traditional masculinity as "a persistent individual difference based on one's conformity to the ideals and characteristics typically ascribed to men through male gender roles and norms" (p. 2). Men who endorse such ideology to a greater extent tend to engage in harmful behaviours, including risk-taking behaviour (Giaccardi et al., 2017) and avoiding seeking help (Berger et al., 2005). Here, we examine how endorsement of these ideologies relates to men's meat consumption.

The Content of Masculinity

One previous study by Campos et al. (2020) examined the link between Portuguese men's conformity to four masculine norms and meat consumption. These norms were acceptance of physical violence, prejudice against homosexuals, risk-taking, and heterosexual 'playboy' norms. In contrast to the burgeoning literature that establishes an association between simple measures of global masculinity and meat eating (e.g., Rosenfeld & Tomiyama, 2021), the dimensions of masculine norms that they studied were unrelated to meat eating. A single significant association indicated that men who more strongly endorsed 'playboy' norms (favouring having multiple sexual partners) reported eating less vegetables, and only for men whose gender was made salient by a message informing them that the purpose of the survey was to evaluate their masculinity. As we will argue below, the masculine norms

measured in Campos et al.'s study may not have been those most relevant to men's meat consumption. Thus, further investigation of relevant facets of traditional masculinity ideology and their relation to meat-eating is warranted.

Dominance, toughness, restrictive emotionality, and avoidance of femininity are four facets of masculinity (as measured by the Masculinity Role Norms Inventory or MRNI; Levant et al., 2013) that we propose may help explain men's meat consumption along with their environmentally friendly behaviour more broadly. These dimensions were not examined in Campos et al.'s (2020) research, and to our knowledge, no research has tested their unique contributions to predicting meat-related outcomes.

We provide the following definitions based on Levant and colleagues (2013). Dominance refers to the idea that men ought to be in leadership positions, such as being the boss of a workplace, a leader of a group, or the leader of a country. Toughness refers to the idea that men ought to be physically tough, including taking risks even in the face of physical harm. Restrictive emotionality refers to ideals around detaching oneself from emotive situations, hiding hurt feelings, and resisting tender moments like telling someone they care for them. Finally, avoidance of femininity is characterised by the ideals around adherence to gendered norms of preferring action movies over romance novels; football over soap operas; and even in childhood, preferring trucks over dolls.

Adams (1990) and Rothgerber (2013) have both argued that traditional masculine norms around dominance, toughness, and stoicism help men justify their meat consumption. Additionally, men who conform more to traditional gender roles (via a simple conception of global masculinity measured on a feminine-masculine bipolar scale) tend to be more resistant to meat reduction (Rosenfeld & Tomiyama, 2021). Further, the association between meat reducers and femininity (Patel & Buckland, 2021) may deter men who strongly endorse traditional masculinity from reducing their meat consumption. Thus, we argue that the four aspects of traditional masculinity ideology that are most relevant to men's meat consumption are dominance, toughness, restrictive emotionality, and avoidance of femininity.

Threats to Men's Masculinity Affect Masculine-Coded Behaviour

As well as these individual differences in masculinity ideology, there are differences in the contexts that promote displays of masculinity. This is partly because manhood (i.e., being a man, rather than a boy or woman) is a *precarious identity* (Vandello et al., 2008). Compared to women's femininity, men's masculinity is associated with higher status and needs to be constantly proven and maintained by performing masculinity. When men fail to enact masculinity, they can

experience masculinity stress (i.e., a subjective experience of one's masculinity being threatened), which arises from a perceived inconsistency between the self and male norms (Mesler et al., 2022). Similarly, when men perceive a threat to their masculinity that causes them to feel less masculine, they often react by increasing behaviours that are seen as masculine (Vandello et al., 2008) to re-establish their masculinity through visible actions.

Researchers have investigated several contexts that make men feel less masculine and hence, threaten their masculinity (Vescio et al., 2021). One example of a masculinity threat manipulation is giving men false feedback on a bogus test indicating that their score on a knowledge test is comparable to the average woman's score (Weaver & Vescio, 2015). Another well-studied masculinity threat manipulation challenges men to write about the times they have felt masculine (Nakagawa & Hart, 2019; Weaver et al., 2013). Writing about two instances of one's masculinity is easy and is thus a context that affirms masculinity. In contrast, writing about many times one has felt masculine can be difficult, and thus potentially threatening to a man's view of himself as masculine in that situation. When men feel their masculinity is threatened by these kinds of experimental paradigms, many react with increases in aggression (Bosson et al., 2009), sexism (Weaver & Vescio, 2015), and intention to drink alcohol at a party (Fugitt & Ham, 2018). Theoretically, these behaviours help to reassert men's masculinity following the threat.

Men also respond to context-driven masculinity threats with higher meat-eating intentions, lower willingness to reduce meat consumption, and greater attachment to meat (Mesler et al., 2022; Nakagawa & Hart, 2019; Pohlmann, 2022). In Gal and Wilkie (2010, Study 4), men in one condition were asked to list activities they do with women that they would not do with men, and men in the other condition were asked to list things they do with men that they would not do with women. The researchers found that the task in the first condition makes men feel less masculine, and thus threatened their masculinity, while the second condition affirmed their masculinity. All men were then asked to choose food items, with either 10 seconds to make their selections, or as much time as they wanted. Men who had unlimited time to select their items and who were in the masculinity threat condition selected fewer 'feminine' foods compared to those who had their masculinity affirmed (i.e., foods which the researchers identified through pretesting were typically perceived as more feminine). Conversely, when they were rushed to make a decision, there was no difference in the selections of those whose masculinity was threatened or affirmed. These findings suggest that men only engage in compensatory behaviour to reassert masculinity under threat when they have the resources to do so.

In Mesler et al. (2022, Study 3), participants completed a measure of the related construct of 'masculinity stress',

defined as the distress men experience when they view themselves as failing to live up to male gender norms. Then, to manipulate masculinity threat, participants were asked to complete items from the Bem Sex Role Inventory (BSRI; Bem, 1974). They received false feedback that they were either more masculine or less masculine than 85% of the population, which was designed to either affirm or threaten masculinity, respectively. Finally, participants were asked to choose a meal from four options, two of which included red meat. Masculinity stress predicted greater likelihood of selecting a red meat meal, but only for participants who had their masculinity threatened. This suggests that threatening men's masculinity can bring to light the effect of chronic insecurities about their masculinity on meat-eating choices.

Pohlmann (2022, Study 1) investigated the effects of threatening men's masculinity using a different false feedback paradigm. In their study, participants completed a gender knowledge test and received false feedback that their performance was very poor compared to their male peers (to induce masculinity threat), or that their performance was very good (to affirm masculinity). Participants were then invited to select some jerky to eat, with both meat and soy options on offer. Results showed that compassionate men were more likely to select a jerky made from meat (vs soy) if their masculinity was threatened (vs affirmed). This suggests that a contextual threat to masculinity may even override the prevailing individual differences (in compassion) that would otherwise lead men to choose plant-based options.

In another false feedback paradigm, Nakagawa and Hart (2019, Study 3) had men in the US complete a gender identity test and then randomly assigned them to receive feedback that they respond like the average woman or average man, thus threatening or affirming masculinity, respectively. Participants who had their masculinity threatened responded with significantly higher agreement that they need meat to feel full, and lower willingness to consider a vegetarian diet. Nakagawa and Hart (Study 2) found the same results using the masculinity threat paradigm that asks men to write about two or eight instances in the past where they have felt particularly masculine in the context of an online experiment with US men. Men who had to write about eight instances were assumed to have their masculinity threatened due to the difficulty of this task, and indeed, these men expressed a greater need for meat to satiate them, and a greater resistance to going vegetarian.

However, contextual threats to masculinity may not always result in greater meat eating. Mertens and Oberhoff (2023) used a similar false feedback paradigm. After completing the BSRI, participants were either told their masculinity score was below average and in a range typical for women (masculinity threat condition), or that they had a slightly above-average score for men (masculinity affirmation condition). They then responded to survey items about

their justifications for eating meat. Contrary to expectations, men's meat-eating justifications did not differ if their masculinity was threatened or affirmed. When the researchers examined participants' actual responses to the BSRI, they found that those who responded with more masculine choices (i.e., selecting more 'masculine'-coded personality traits, like being 'powerful') and fewer 'feminine'-coded traits (such as being 'sensitive') used more direct strategies to justify their meat consumption, including arguments centred on humans being at the top of the food chain and denying animal suffering. These results could indicate that men do not always strategically use meat-eating justifications to compensate for threatened masculinity. However, men in their masculinity threat condition did not self-report greater feelings of threat, and thus the null results may reflect a manipulation failure.

Nevertheless, research largely confirm that consuming meat is a means that some men use to re-assert their masculinity after feeling threatened. Brough et al.'s (2016) research further suggests that these effects extend to environmentally friendly behaviour. Specifically, Brough and colleagues found that men whose masculinity was threatened (vs affirmed) were less likely to indicate a preference for an eco-friendly product. Thus, a contextual threat to men's masculinity could promote meat-eating and discourage pro-environmental action.

Comparing Contextual Effects on Endorsement of Traditional Masculinity

To our knowledge, the research to date has either examined a threat to masculinity, or the ways in which masculinity (variously defined and measured) relates to meat consumption. One exception is a study in which masculinity threat was (unsuccessfully) manipulated and the effects of stereotypes of masculine and feminine traits (using the BSRI) were examined on justifications for eating meat (Mertens & Oberhoff, 2023). While stereotypes are part of masculinity, masculinity ideology refers more broadly to individual differences in how men have internalised cultural expectations about their gender role (Levant & Richmond, 2008). The weight of evidence suggests that masculine-coded behaviours can be contextually 'triggered' by threat (e.g., Brough et al., 2016; Mesler et al., 2022; Nakagawa & Hart, 2019; Pohlmann, 2022), though whether and how such threats overpower the effects of men's prevailing views about masculinity is unclear. For example, is the effect of threat so great that it eliminates any effect of ideology on meat-eating outcomes? This could be possible, given that a threat to masculinity can overpower men's otherwise compassionate nature (Pohlmann, 2022). Alternatively, is the effect of ideology more powerful, such that when it is controlled, there is no effect of threat on meat-eating outcomes?

Based on previous evidence, we posited that both the contextual threat and prevailing ideology would play a role in meat eating, and that examining both context and ideology together would provide new insights about meat consumption and the extent to which it is determined by a pressure to 'prove' one's masculinity in response to contextual threats, and/or by prevailing personal beliefs about masculinity. This insight is important for creating effective approaches to meat-reduction advocacy.

Current Study

In the current study, we investigate the relationship between masculinity and meat consumption by examining simultaneously the contextual effect of threatened masculinity (via an experimental manipulation) and the enduring support of traditional masculinity ideology (dominance, toughness, restrictive emotionality, and avoidance of femininity measured through survey) in an Australian sample. Australia is an ideal setting for this research because meat is associated with Australian masculinity, particularly through the barbecue (Bogueva et al., 2020). Moreover, Australians eat large quantities of meat compared to the world average (OECD, 2019). Bogueva et al. (2020) argued that within Australia, "the thriving of masculinity and its manifestations are linked to the abundance of meat" (p. 29). In this context, there is great opportunity for emissions savings and health improvement if research can aid in understanding the drivers of men's high meat consumption and inform interventions that stem this behaviour.

We also propose that the different dimensions of traditional masculinity ideology will be associated with environmental behaviour. This is because there is evidence that pro-environmental behaviour (PEB) is also seen as feminine, potentially preventing some men from engaging in it (Desrochers & Zelenski, 2022). Research also suggests that traditional masculine norms result in men showing less concern for the environment (Pease, 2019). In fact, women tend to report private-sphere PEB (such as reducing energy use) more often than men, although there is mixed evidence for public-sphere environmental behaviours such as protesting (Hunter et al., 2004), justifying the inclusion of both private- and public-sphere PEB measures.

In addition to examining men's meat-eating and other PEBs, we also explore the association between masculinity and intentions to consume lab-grown 'clean meat'. Clean meat is not yet readily available in Australia, but Bryant and Barnett (2018) found in a systematic review that clean meat appeals more to men than to women, and therefore determining whether a masculinity threat or particular masculine ideologies predicts increased intentions to consume clean meat could offer a masculine-friendly outlet that avoids the environmental and ethical ramifications associated with farmed meat.

We manipulated masculinity threat in a between-subjects experimental design whereby half of the sample was randomly assigned to a masculinity affirming condition in which their masculinity was affirmed by completing the relatively easy task of describing two instances where they felt masculine. The other half was assigned to the masculinity threatening condition, and they completed the more difficult task of listing eight instances of masculinity. This experimental paradigm has successfully induced masculinity threat and affected compensatory behaviours (including meat consumption) in past research (e.g., Nakagawa & Hart, 2019).

Experiments threatening masculinity often challenge men's view of themselves as masculine, but they do not examine the *content* of their masculine identity or ideology. An important strength of the masculinity threat paradigm that we used is that it lets participants define masculinity themselves, "rather than having an external definition imposed upon them" (Nakagawa & Hart, 2019, p. 7), thus accommodating different perspectives of men's masculinity. However, to our knowledge, no research has interrogated the content of men's responses to this prime. It could be the case that men's spontaneous associations of masculinity align well with theoretical accounts of the dimensions of masculine ideology, but there is also evidence that masculinity is changing (Carroll et al., 2019). To address this gap in the literature, we conducted qualitative content analysis to examine and report on how men engage with this task. Doing so sheds light on the 'top of mind' masculine activities and qualities of contemporary Australian men. To understand the effects of support for traditional masculinity ideology, we measured participants' endorsement of male dominance, toughness, restrictive emotionality, and avoidance of femininity using validated measures (Levant et al., 2013). We then examined how manipulated masculinity threat and measured endorsement of these facets of masculine ideology relate to environment- and meat-related attitudes and behaviours. We make the following predictions:

Men whose masculinity is contextually threatened (vs affirmed) will report greater self-reported meat consumption intentions (H1a) and lower private-sphere PEB (H1b).

Greater endorsement of the dominance, toughness, restrictive emotionality, and avoidance of femininity domains of traditional masculinity ideology will be associated with greater self-reported meat consumption intention (H2a) and lower private-sphere PEB (H2b).

Method

Participants

We recruited 387 men living in Australia via Prolific in August 2021, exceeding the number required from our

power analysis, which was based on results from Nakagawa and Hart (2019) (which suggested that for power = .80, and alpha = .05, a minimum sample of 70 was needed) and a pilot study (see Supplementary Files). After screening, our final sample was 375 participants aged 18–75 years ($M = 32.01$, $SD = 11.58$) and most (82.40%) identified as omnivores. Respondents were removed prior to data analysis because their surveys timed out ($n = 2$), they correctly identified the false feedback ($n = 2$), withdrew consent after the debrief ($n = 6$), or failed both attention checks ($n = 2$). The Australian National University Human Research Ethics Committee approved ethical aspects of the study (2021/262) and participants provided informed consent.

Materials and Procedure

Our survey design was a 2 (masculinity threat: high vs low) \times 2 (environmentalist threat: high vs low) experiment. Please see exact item wording for all measures in Tables S1–S5 in the online supplement, alongside null experimental results from an environmentalist threat manipulation (see Figs S1 and S2 and Tables S6 and S7 in the online supplement). Here, we focus on the masculinity threat manipulations and our correlational findings. In the study, the order in which the experimental manipulations were presented was randomised. Following the two experimental manipulations, the survey questions were presented in the following order: meat-related attitudes, pro-environmental intentions, openness to eating clean meat, meat-eating intentions, masculinity ideology and demographic questions.

Experimental Manipulation: Masculinity Threat

Participants were randomly assigned to recall two times (easy; *masculinity affirmed*) or eight times (difficult; *masculinity threatened*) that they felt masculine (Nakagawa & Hart, 2019). As a manipulation check, we asked "How easy did you find it to list the [2/8] times?" from 1 (*extremely easy*) to 7 (*extremely difficult*; Sinclair & Carlsson, 2013). Furthermore, we coded the responses to the manipulation to gain insight into the content of men's masculinity. Specifically, the first author coded responses to the manipulation for the presence or absence of 10 codes derived from the full corpus of data. The second author coded the responses using the same definitions, and intercoder reliability was at least substantial for all codes (κ ranged from .72 to .92; McHugh, 2012), with any disagreements resolved through discussion with the full author team. Table 1 lists the codes with shortened definitions and examples (see Table S8 in the online supplement for detailed definitions and κ values).

Table 1 Descriptions of Behaviour Codes with Representative Examples and Frequencies

Behaviour Code	Definition	Examples	Frequency <i>n</i> (%)
Strength and athleticism	Demonstrating physical strength and participating in activities requiring strength or physical fitness	“Lifting weights”, “Playing football”	258 (68.8%)
Masculine domestic roles	Behaviours related to chores traditionally considered masculine, such as building or fixing things, home or garden maintenance, and driving cars	“Mowing the lawn”, “Driving a manual car”, “Fixing a tap”	145 (38.7%)
Feminine domestic roles	Behaviours related to chores traditionally considered feminine	“Cooking a good meal”, “Cleaning my apartment”	17 (4.5%)
Helping and protecting	Assisting someone emotionally, materially, or financially	“Helping a friend tie a tie”, “Protecting family from a snake”	95 (25.3%)
Romance and sex	Relating to sex, attraction, or romantic behaviour	“I looked at a girl and thought she was beautiful”, “Being intimate with my partner”	80 (21.3%)
Emotional toughness, independence, and leadership	Traditionally masculine emotional roles and behaviours – stoicism, toughness, assertiveness, aggression, independence, leadership, and problem-solving skill	“Being brave in situations of risk”, “Relying on oneself during a time where I suffered a major illness”	83 (22.1%)
Non-traditionally masculine qualities	Attributes or descriptions of behaviour aligned with qualities traditionally considered feminine or that align with literature around non-traditional masculinity	“Being vulnerable”, “Being open about mental illness”	18 (4.8%)
Traditional male-body presentation	Descriptions of cisgender male bodies, or traditionally masculine clothes or accessories	“Shaving my face”, “Having male body parts”, “Wearing a suit”	84 (22.4%)
Fatherhood	Acting as a father	“Being a father”, “Teaching my kids to ride a bike”	30 (8.0%)
Meat consumption	Eating or preparing meat	“Eating steak”	24 (6.4%)
Don't know	Participants were instructed to write ‘don't know’ if they could not think of anything	“Don't know”	55 (14.7%)

Note. Some responses were categorised into multiple categories. Eleven participants (3% of responses) did not fit into any category. All quotes above are verbatim responses from participants

Meat-Related Attitudes and Behavioural Intentions

To capture *meat avoidance attitudes*, we adapted Nakagawa and Hart's (2019) composite of three meat-related items. We used three items assessing participants' willingness to eat less meat to reduce their environmental footprint ($\alpha = .77$), with a higher mean score across the three items indicating a higher willingness to reduce meat consumption. Participants responded to items such as “I would consider becoming vegetarian at some point in my life to reduce my environmental footprint” using a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). We also modelled a question on Pohlmann's (2014) *meat consumption intentions* item, asking participants to build their own pizza by adding toppings in their preferred amounts (from 0 = *none* to 100 = *a lot*), with meat options including beef, chicken, and pepperoni, and summed the amount of meat ingredients added such that higher numbers indicate greater meat consumption intentions. *Openness*

to clean meat was measured based on Bryant et al.'s (2019) three-item scale ($\alpha = .89$). Participants read a description of clean meat, then rated behavioural intentions towards clean meat, such as “Eat clean meat as a replacement for conventional meat”, using a scale ranging from 1 (*extremely unlikely*) to 7 (*extremely likely*), with higher scores indicating greater openness to consume clean meat.

Pro-Environmental Intentions

Participants rated their intentions to engage in four private-sphere (e.g., “Reduce driving for environmental reasons,” $\alpha = .76$) and six public-sphere (e.g., “Participate in protests regarding environmental conditions,” $\alpha = .91$) behaviours on a scale that ranged from 1 (*extremely unlikely*) to 7 (*extremely likely*). A mean was calculated from the four items, with higher scores indicating higher pro-environmental intentions.

Masculinity Ideology

Participants completed four subscales from the Masculinity Role Norms Ideology Scale-Short Form (Levant et al., 2013), with three items each to measure *avoidance of femininity* (e.g., “A man should prefer watching action movies to reading romantic novels”, $\alpha = .89$), *dominance* (e.g., “A man should always be the boss”, $\alpha = .92$), *restrictive emotionality* (e.g., “A man should never admit when others hurt his feelings”, $\alpha = .77$), and *toughness* (e.g., “I think a young man should try to be physically tough, even if he’s not that big”, $\alpha = .79$). Items were rated using a scale from 1 (*strongly disagree*) to 7 (*strongly agree*), with higher mean scores indicating higher endorsement of the subdimension of masculinity ideology.

Results

Descriptive Findings and Manipulation Check

Data are available on the OSF (<https://osf.io/gc3r8/>). Manipulation checks confirmed that participants in the high threat condition found the task more difficult and took longer to complete it, than participants in the low threat condition (see Table S9 in the online supplement). Table 1 reports the behaviour codes that we interpreted from the masculinity threat manipulation (i.e., the times participants felt masculine) along with examples and frequencies. Much of the often-reported content fits the traditional masculinity definition (strength and athleticism; emotional toughness), with non-traditional responses emerging at a much lower frequency (feminine domestic roles, non-traditionally masculine qualities). Meat consumption was only reported 6.4% of the time, suggesting that meat-related content was not readily thought of as an instance of masculinity for most of the sample. This response was one of the few to significantly relate to men’s responses on the outcome variables (see Table S10 in the online supplement for full results), suggesting that men who consider

meat-eating to be a salient aspect of their masculinity do indeed eat more meat and resist meat avoidance.

The Effect of Threat Condition

To examine the effect of the masculinity threat experiment on participants’ meat-eating attitudes, behavioural intentions, and pro-environmental behavioural intentions, we conducted ANOVAs comparing the effects of threat and affirm conditions. As can be observed in Table 2, there was a null effect of experimental condition. Participants reported very similar (and not significantly different) levels of meat-eating attitudes, behaviour, and pro-environmental behavioural intentions, regardless of experimental condition.

Endorsement of Masculinity Ideology

Average scores on each MRNI subscale were low (see Table 3), suggesting that most Australian men do not identify with traditional norms of masculinity. The exception was toughness, which also emerged as a code from the content analysis (‘emotional toughness’ in Table 1).

Correlations are presented in Table 3 and demonstrated consistent, significant associations between all domains of masculine ideology and the outcome variables, all in a direction consistent with the hypotheses (with no significant associations between masculinity threat condition and the dependent variables). That is, the more that participants endorse avoidance of femininity, dominance, restrictive emotionality, or toughness, the less willing they are to avoid meat, the more meat they want to consume when constructing a pizza to eat, and the less they engage in PEB. These components of masculine ideology were also associated with a lower willingness to eat clean meat. Table 3 also highlights that the dimensions of traditional masculinity ideology are strongly, positively associated with each other.

Table 2 ANOVA Results from Masculinity Threat Manipulation

Outcome variables	Threat Condition, Mean (SD)	Affirm Condition Mean (SD)	ANOVA results
Meat Avoidance	3.62 (1.63)	3.65 (1.54)	$F(1, 373)=0.04, p=.839, \eta^2<.001$
Meat Consumption Intentions	90.39 (76.35)	85.34 (75.58)	$F(1, 373)=0.41, p=.520, \eta^2=.001$
Private Sphere PEB	4.38 (1.43)	4.47 (1.41)	$F(1, 373)=0.43, p=.512, \eta^2=.001$
Public Sphere PEB	3.67 (1.54)	3.87 (1.53)	$F(1, 373)=1.61, p=.206, \eta^2=.004$
Clean Meat Consumption	4.50 (1.68)	4.69 (1.68)	$F(1, 373)=1.13, p=.289, \eta^2=.003$

Note. $n = 179$ for the threat condition, $n = 196$ for affirm condition

Table 3 Correlations Between All Study Variables and Descriptive Statistics for the Full Sample

	1	2	3	4	5	6	7	8	9	10
1. Masculinity threat	-									
2. Avoidance of Femininity	.02	-								
3. Dominance	.03	.71***	-							
4. Restrictive Emotionality	-.02	.64***	.59***	-						
5. Toughness	-.05	.55***	.49***	.57***	-					
6. Meat Avoidance	-.01	-.38***	-.35***	-.29***	-.32***	-				
7. Meat Consumption Intentions	.03	.17***	.21***	.19***	.20***	-.41***	-			
8. Private PEB	-.03	-.30***	-.35***	-.27***	-.22***	.49***	-.24***	-		
9. Public PEB	-.07	-.29***	-.31***	-.30***	-.22***	.51***	-.27***	.76***	-	
10. Clean Meat Consumption	-.06	-.31***	-.30***	-.26***	-.18***	.33***	-.17**	.42***	.47***	-
<i>M (SD)</i>	-	2.16 (1.4)	1.63 (1.04)	2.09 (1.15)	3.45 (1.55)	3.63 (1.59)	87.75 (75.89)	4.43 (1.42)	3.78 (1.53)	4.60 (1.68)

Note. *N* = 375

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

Examining the Simultaneous Effect of Threat Condition and Masculine Ideologies

To examine the effect of the masculinity threat conditions and masculine ideologies on participants' meat-eating attitudes, meat consumption intentions, and PEBs, we conducted a series of regression analyses testing the unique associations that a set of predictors have with a single outcome variable, thus disentangling the distinct effects that interrelated predictors have with outcomes.

Since the correlations (Table 3) shows that endorsing one of the ideologies is associated with endorsing the others, and to account for this overlap, we conducted a series of multiple linear regression models (one per dependent variable). Experimental condition was entered as a binary predictor (Threat condition coded as 1, Affirm condition coded as 0), and the MRNI subscales were entered as continuous predictor variables. Results are presented in Table 4 and show that the overall model was significant for all dependent variables, indicating that together, experimental condition and masculinity ideology predicted attitudes towards meat consumption and PEB. In line with the ANOVA results, masculinity threat condition was not a significant predictor of any outcome variable. Disentangling unique effects of each dimension of traditional masculinity ideology, we found that avoidance of femininity and toughness were the only significant predictors of meat avoidance, indicating that the more participants wanted to avoid femininity or endorsed male toughness, the less willing they were to eliminate their meat intake. Avoidance of femininity also predicted less willingness to consume clean meat. There were no significant independent associations between the dimensions of traditional masculinity ideology and meat consumption intentions. Dominance was the only significant, negative predictor of private-sphere PEB, whereas both dominance and restrictive emotionality independently predicted lower engagement in public-sphere PEB. Table S11 in the online supplement repeats these regression analyses while testing for interactions between MRNI subscales and masculinity threat condition and does not identify any significant effects of masculinity ideology that depend on whether masculinity was threatened. Together, our results show that these outcomes were not influenced by a threat to masculinity and were instead associated with participants' enduring ideological attitudes regarding masculinity.

Discussion

Overall, we found that threatening men's masculinity did not significantly affect attitudes towards meat consumption. Instead, attitudes towards meat consumption and pro-environmental behaviour in general were associated

Table 4 Results from Multiple Linear Regression Analyses with Masculinity Threat Condition and Endorsement of Masculinity Ideology (MRNI Subscales) Predicting Meat- and Environment-Related Variables

	Meat Avoidance		Meat Consumption Intentions		Private PEB		Public PEB		Clean Meat Consumption	
	β	<i>p</i>	β	<i>p</i>	β	<i>p</i>	β	<i>p</i>	β	<i>p</i>
Masculinity threat	-.01	.867	.04	.473	-.03	.582	-.06	.196	-.05	.340
Avoidance of Femininity	-.21	.005	-.03	.739	-.06	.410	-.08	.291	-.17	.030
Dominance	-.14	.050	.14	.061	-.26	<.001	-.15	.040	.14	.056
Restrictive Emotionality	.01	.936	.06	.394	-.06	.394	-.14	.039	-.08	.263
Toughness	-.14	.026	.11	.098	-.03	.652	-.03	.658	.02	.762
Overall regression	$R^2 = .17, F(5, 369) = 14.93, p < .001$		$R^2 = .06, F(5, 369) = 4.60, p < .001$		$R^2 = .13, F(5, 369) = 11.09, p < .001$		$R^2 = .12, F(5, 369) = 10.22, p < .001$		$R^2 = .11, F(5, 369) = 9.23, p < .001$	

Note. $N = 375$. Standardised regression coefficients (betas) are shown and bolded if they are significant at the $p < .05$ level

with endorsement of one or more of the four domains of traditional masculinity ideology that we measured. Moreover, the interaction between the threatened masculinity manipulation and the traditional masculinity ideologies were non-significant, which suggests that the associations between masculinity ideologies and meat consumption did not change based on condition. Additionally, the content of the open-ended responses participants gave during the masculinity threat manipulation (where they were asked to recall times they felt masculine) were analysed and they showed the behaviours or traits our sample associated with their own masculinity. These include strength and athleticism as well as masculine domestic roles, with few thinking of meat consumption.

The finding of the null effect from the masculinity threat differs from previous research (Gal & Wilkie, 2010; Mesler et al., 2022; Nakagawa & Hart, 2019; Pohlmann, 2022), but aligns with recent failures to replicate masculinity threat experiments (Atkinson, 2022; Mertens & Oberhoff, 2023) and suggest that masculinity threats may not be as robust to manipulation as previously assumed. In our study, the manipulation check shows that it was harder for participants to name eight (as opposed to two) instances of masculinity. However, such difficulty was not associated with the compensatory behaviour we hypothesized based on previous research (increased meat eating; decreased environmental behaviours).

The anonymous nature of online surveys could potentially explain these results. This is because anonymous online studies could lessen feelings of threat and thus any compensatory masculine behaviour because masculinity is typically affirmed publicly through social acts (Vandello et al., 2008). However, Atkinson (2022) found null effects of a masculinity threat experiment on a range of variables relating to relationships and health behaviour in an in-person setting, indicating that masculinity threat may be subject to other complex contextual factors not captured in classic experimental settings. Instead, our findings highlight the importance of individual differences in masculinity ideology in predicting meat-related variables and suggest that enduring beliefs about masculinity may be more important predictors of meat-related variables and PEB than short-term threats to masculine identity. The relatively low endorsement of traditional masculinity ideology may also help explain the reduced effect, as our participants may not have been strongly invested in masculinity, and therefore less affected by a threat to it.

Participants who reported in the open-ended text (i.e., our experimental manipulation task) that eating meat made them feel masculine reported higher meat consumption intentions, and lower openness to private-sphere PEB and meat avoidance. This suggests that men for whom meat-eating is top-of-mind in relation to their masculinity tend to show greater disregard for the environment, thus providing further evidence for the link between masculinity, meat-eating,

and environmentalism. Higher belief in male dominance, captured through greater agreement that men should be in leadership roles (in the MRNI subscales), predicted lower pro-environmental behavioural intentions. As dominance is the most consistent unique predictor of the PEB variables, differences in endorsement of the dominance aspect of traditional masculinity could underpin the process by which men reject caring for the environment. Adams (1990) argues that patriarchal male dominance and human dominance over nature are linked through processes of objectification of both women and the environment. In fact, Bloodhart and Swim (2010) found that countries with higher gender inequality are more likely to have higher environmental exploitation.

A construct similar to the endorsement of male dominance is social dominance orientation (SDO), which refers to a tendency to accept and defend social hierarchies, including gender-based hierarchy (Pratto et al., 1994). SDO is typically applied to explain why some people are more prejudiced than others, but it can help explain individuals' justification of power over nature, including animals, and could help explain why dominance as a domain of traditional masculinity predicted lower pro-environmental behavioural intentions. Indeed, SDO predicts greater support for animal exploitation and meat consumption (Dhont & Hodson, 2014). Men generally display more SDO than women (Pratto et al., 1994), which may help explain why men consume more meat, and refer to human superiority over animals to justify this consumption (Rothgerber, 2013). Similarly, Mertens and Oberhoff (2023) found that men adhering to male norms of dominance were more likely to use direct justification for meat consumption (e.g., denial of animal suffering, endorsing a hierarchical disparity between humans and animals), which predicts higher meat consumption compared to indirect (or apologetic) justifications (e.g., avoiding thinking of animal suffering). SDO also predicts peoples' belief in human superiority over nature, and therefore lower environmental concern (Milfont et al., 2013). There is conceptual overlap between SDO and the dominance facet of traditional masculinity (Pratto et al., 1994), with SDO relating to a preference for social hierarchy in general, and dominance targeted towards male dominance in leadership roles over women. Future research could clarify whether the constructs independently relate to environment-relevant variables, or which construct more strongly underlies environmental attitudes and behaviours.

Avoidance of femininity was the strongest unique predictor of negative attitudes towards meat avoidance and less openness to consuming clean meat. These results further confirm that vegetarianism, veganism, and other forms of meat reduction are associated with lower masculinity and higher femininity (Rozin et al., 2012). Traditional masculinity involves avoiding being seen as feminine

(Levant et al., 2013), which may explain why men endorsing traditional masculinity avoid reducing their meat consumption. Similarly, concerns about maintaining a façade of 'toughness' predicted lower willingness to avoid meat consumption, further supporting the idea that some men may view going vegetarian or vegan as subverting male norms of toughness. However, inconsistent with evidence that PEB, particularly in the private sphere, is associated with femininity (Desrochers & Zelenski, 2022), there were no significant unique associations between avoidance of femininity and non-meat related PEB.

The final significant unique effect of masculinity ideology on our outcomes revealed that the more that men endorsed restrictive emotionality, the less willing they were to take part in public displays of PEB. This finding indicates that distinct from the other facets of masculinity ideology included in the study, the more that men wanted to remain emotionally detached and suppress their emotions or tender feelings, the lower their intentions to show their support for environmental causes through visible displays like protests, attending environmental activist events, or sharing petitions. There is mixed evidence on gender differences in public-sphere PEB (Hunter et al., 2004), however protests can be powerful settings for shared expression of emotion. Furthermore, emotions (particularly anger) may motivate people to take part in protest for climate change (e.g., Stanley et al., 2021). This could explain why restrictive emotionality, as the domain of masculinity ideology most concerned about masking emotional displays, is the most important predictor of intentions to take part in public-sphere PEB in our study.

While our results support the importance of traditional masculine ideology in meat reduction and PEBs, it also suggests that definitions of masculinity are changing. Most men did not identify with the traditional definition of masculinity captured by the MRNI, suggesting that the nature of Australian masculinity—including meat consumption—may be shifting. This is further supported by the content analysis exploring the type of behaviours men associated with masculinity in the free recall scenario. Although the study was advertised as being about meat consumption, only 24 participants listed eating meat as an activity that made them feel masculine. Thus, when Australian men consider their own masculinity, meat consumption may not come quickly to mind, even though most Australian men eat meat. We suggest the association between meat and masculinity may not be top-of-mind, complementing findings that meat is becoming less defining of Australian men (Carroll et al., 2019) and possibly that meat consumption does not *explicitly* make most men feel more masculine. Instead, the connection between meat and masculinity may be more *implicit* (Love & Sulikowski, 2018).

Limitations and Future Research Directions

There are several caveats to our findings. First, participants may have been motivated to report more responses in which masculinity is displayed in positive ways (e.g., protection instead of aggression) due to social desirability bias (Nederhof, 1985), or a bias towards positivity (Fiedler et al., 1987). Second, it may be easier to report concrete behaviours (such as playing sport) than attitudes or norms, and results of a free recall task may not reflect the deeper, less tangible aspects of masculinity (such as emotional strength and independence). Thus, while the content analysis suggests a shift away from traditional gender norms, it remains unclear whether this truly reflects a change in the content of masculinity. Our research provides insight into Australian masculinity and meat consumption, but the literature concerning masculinity threats and the meat/masculinity association reflects the bias psychological research places on samples from Western, educated, industrialised, affluent, and democratic societies (Schulz et al., 2018), and would benefit from research outside Western countries.

More detailed future research could go beyond our analysis of direct associations and examine more extensive models including possible mediating variables. For example, greater avoidance of femininity may be associated with fear of conforming to feminine norms, which may be associated with greater meat reduction, and anything associated with 'clean'. Further, regarding avenues for future research, one idea is to examine the possibility of threatening specific masculine ideals. This could help us understand the extent to which masculine ideologies identified through our correlational findings are potentially causally related to meat-eating. For example, by asking participants to list eight (or two) times they felt like a 'dominant man,' it may be possible to invoke threat towards this specific aspect of the content of their masculinity. Such a study could ascertain whether threatening this specific domain of masculinity may produce compensatory behaviour related to that domain, such as increased dominance over nature, and meat consumption.

Practice Implications

The reduced explicit importance of eating meat as a display of masculinity (compared to behaviours surrounding strength and toughness) suggests that meat reduction campaigns and strategies could emphasise other aspects of masculinity, including strength and stoicism. For example, given the predominance of strength-related recollections of one's own masculinity, an alternative suggestion is for meat reduction campaigns to target men by linking plant protein with physical strength, such as in the documentary *The Game Changers* (Psihoyos, 2018), which features vegan

elite athletes. This approach should be targeted carefully as it may further entrench harmful gender roles and alienate meat reducers who do not embody the traditional masculine ideal (Oliver, 2021). At the same time, future efforts to encourage meat reduction among men must also consider the implicit nature of the meat-masculinity link and how to make them explicit (Love & Sulikowski, 2018). To challenge men's implicit assumptions, these may need to be brought into the open; when men are asked to explicitly consider their identification with most traditional masculine norms, they tend to reject them, based on the distribution of responses to the MRNI subscales. This suggests that there may be other implicit assumptions that need to be assessed and brought forward to be able to challenge them.

Our findings further suggest that reducing meat consumption and encouraging pro-environmental behaviour could be achieved by devaluing male norms of dominance and avoidance of femininity, thus reducing associated harmful behaviours. Interventions promoting gender-equitable norms can reduce gendered violence (Pulerwitz et al., 2014), and similar approaches could be taken for other problematic behaviours associated with traditional masculine norms. However, to avoid a counterproductive externalised response to feeling threatened from interventions targeting male norms, Gerdes (2022) proposes promoting more diverse and healthy ways to enact masculinity. A growing field of study seeks to investigate positive masculinity by reframing masculinity to emphasise positive traits. Similar to our content analysis findings, positive masculine traits include but go beyond physical strength, emotional toughness (but not restricting one's emotions), and using strength to protect loved ones (McDermott et al., 2019). Research suggests that men who identify more strongly with non-traditional masculine norms (i.e., 'new masculinity') eat less meat (De Backer et al., 2020).

Conclusion

Our findings suggest that enduring attitudes about traditional masculinity, particularly dominance, avoidance of femininity, toughness, and restrictive emotionality, are stronger predictors than a temporary threat to masculinity, both on meat consumption and environmentally friendly behaviour. Given how men tend to consume more meat than women (Rippin et al., 2021) and that addressing high levels of meat consumption is an important step towards addressing climate change, efforts to reframe masculinity in a more positive way could contribute to reducing meat consumption, and hence mitigate climate change.

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Data Availability The data generated by the survey research during and/or analysed during the current study are available on the OSF, along with supplementary files: <https://osf.io/gc3r8/>.

Declarations

Ethical Approval and Consent to Participate Participants gave informed consent to participate.

The Australian National University Human Research Ethics Committee approved ethical aspects of the study (2021/262).

Human and Animal Ethics The study used human participants over the age of 18.

Consent for Publication Participants who did not consent for their data to be used for a publication were removed from the analysis.

Conflict of Interests None to declare.

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