



# Gender differences in vegetarian identity: How men and women construe meatless dieting

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## ABSTRACT

Meat is deeply associated with masculine identity. As such, it is unsurprising that women are more likely than men are to become vegetarian. Given the gendered nature of vegetarianism, might men and women who become vegetarian express distinct identities around their diets? Through two highly powered preregistered studies ( $N_s = 890$  and  $1775$ ) of self-identified vegetarians, combining both frequentist and Bayesian approaches, I found that men and women differ along two dimensions of vegetarian identity: (1) dietary motivation and (2) dietary adherence. Compared to vegetarian men, vegetarian women reported that they are more prosocially motivated to follow their diet and adhere to their diet more strictly (i.e., are less likely to cheat and eat meat). By considering differences in how men and women construe vegetarian dieting, investigators can generate deeper insights into the gendered nature of eating behavior.

## 1. Introduction

Approximately 5% of people in the United States are vegetarians (Gallup, 2018), the majority of whom are women (Rosenfeld, 2018; Ruby, 2012). Accordingly, gender has played a central role in psychological investigations of vegetarianism (Rosenfeld, 2018; Ruby, 2012). Recent studies, for example, have documented how men and women have different attitudes toward meat and vegetarianism (Graça, Calheiros, & Oliveira, 2015; Judge & Wilson, 2018), how vegetarian men and women are perceived differently by others (MacInnis & Hodson, 2017; Thomas, 2016), and how omnivorous men and women reason differently about the morality of eating meat (Dowsett, Semmler, Bray, Ankeny, & Chur-Hansen, 2018). What remains less known, however, is whether men and women who go vegetarian construe their diets differently.

Understanding the gendered nature of vegetarianism is important given that overconsumption of meat has adverse effects on both public health and the environment (Tilman & Clark, 2014; Willett et al., 2019). Many scholars and organizations, accordingly, recommend following a more vegetarian diet as a way of improving health and reducing agriculture's environmental impacts (Wynes & Nicholas, 2017). Yet two considerations are critical to understanding how people think about reducing their meat intakes: (1) Food choice comprises a central domain of one's identity (Bisogni, Connors, Devine, & Sobal, 2002), with vegetarianism constituting a distinct social identity (Rosenfeld &

Burrow, 2017a); and (2) food choice-identity is intersected with gender.

If men and women differ in how they construct social identity around vegetarianism, then greater considerations of gender may be needed for advocates, policy makers, and practitioners to successfully persuade consumers to eat less meat. As of yet, conceptual and qualitative research adopting a social identity approach to studying vegetarianism is plentiful, but quantitative research on identity processes involved in vegetarianism is sparse (Rosenfeld, 2018, 2019c). To this end, in one important regard, empirical evidence on whether vegetarian men and women express their vegetarian identities in different ways is entirely lacking—a knowledge gap the current research aimed to address.

There is strong reason to suspect that gender influences how individuals feel and behave with respect to vegetarian eating. A main theoretical framing of the current research relates to gender roles in Western cultures. In contrast to biological sex, gender is a socially constructed identity grounded in social roles. As a social identity, gender can be susceptible to various forms of identity threat (Branscombe, Ellemers, Spears, & Doosje, 1999), such that the stability of one's gender identity may be threatened if one publicly violates gender norms. Thus, enacting gender implicates not only how one views oneself personally but also how one is viewed by others. According to Goffman (1976), people readily engage in “gender displays,” acting in ways that satisfy social expectations about how individuals of their gender ought to act—with men acting masculine and women

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acting feminine. Goffman and other theorists (e.g., West & Zimmerman, 1987) have suggested that gender displays entail enacting behaviors in response to social situations. To this point, role theory proposes that people do not possess a stable trait-like sense of gender; rather, people exhibit and construct gender through social interaction (West & Zimmerman, 1987). This makes gender particularly relevant for impression management (Goffman, 1959): When people are in social contexts, they may be motivated to act more in line with gender norms in order to satisfy others' expectations of them.

Eating is a highly social behavior (Sobal, Bisogni, & Jastran, 2014) with established ties to impression management (Vartanian, 2015; Vartanian, Herman, & Polivy, 2007) and gender displays (Julier & Lindenfeld, 2005; Sobal, 2005). Through the food choices one makes, one can engage in gender displays and symbolically present a gendered image of one's self. Meat poses a particularly relevant food when it comes to gender differences in eating. Several scholars have highlighted that meat is deeply associated with masculinity (Adams, 1990; Rogers, 2008; Rozin, Hormes, Faith, & Wansink, 2012; Rothgerber, 2012; Ruby & Heine, 2011; Sobal, 2005; Stibbe, 2004). Vegetarianism, accordingly, is viewed as a stereotypically feminine behavior (Browarnik, 2012; Mycek, 2018; Sobal, 2005). These gendered conceptions are exemplified through, and reinforced by, advertisements that often portray meat-eating as essential to maintaining a masculine identity while denigrating vegetarianism as the enemy of "eating like a man" (Rogers, 2008). As such, it is unsurprising that, compared to women, men tend to eat more meat (de Boer, Schöler, & Aiking, 2017; Keller & Siegrist, 2015) and are less likely to become vegetarian (Forestell & Nezelek, 2018; Pfeiler & Egloff, 2018; Ruby, 2012). Beyond such gender-category effects, within-group heterogeneity in gender identity among men may even influence how men feel toward meat: Men for whom gender is a more central aspect of their identity are particularly likely to exhibit strong emotional attachments to eating meat (Jansen, 2016).

One reason why people may associate vegetarianism with femininity is that vegetarianism may be viewed as a lighter, more healthful eating pattern. Eating healthful foods is seen as feminine, whereas eating unhealthy foods is seen as masculine (Vartanian et al., 2007). Women are expected to eat light and healthful food and men to eat heavy and hearty food, which may explain why vegetables—as a healthful, low-calorie, low-fat food—are more commonly consumed among women and meat among men (Bradbury & Nicolaou, 2012; Roos, Prättälä, & Koski, 2001). Furthermore, women are socialized to see themselves as more fragile than men are (Boskind-White & White, 1986), which may explain why perceptions exist that meat may be too heavy for women to consume and that vegetables are "wimpy" foods (Sobal, 2005). Social expectations of gender and eating manifest themselves in individuals' behaviors in romantic contexts: When on a date, women are more concerned about eating lightly than are men (Laner & Ventrone, 2000). Women are also more likely to view vegetables as an acceptable dating food compared to men (Amiraian & Sobal, 2009). Simply put, men may feel as if consuming a vegetarian diet—one that is light and healthful—is incongruent with maintaining a masculine identity and thus constitutes a socially discouraged behavior. Vegetarians are generally viewed as health-conscious individuals (Hartmann, Ruby, Schmidt, & Siegrist, 2018), which may in part account for why vegetarianism is perceived as feminine.

Aside from health aspects, another reason why people may associate vegetarianism with femininity stems from the inherent human dominance over other animals that occurs with meat consumption. Masculinity in Western cultures is characterized by strength and dominance (Adams, 1990; Schrock & Schwalbe, 2009), and the hunting, killing, and butchering of animals for meat may signify these connotations of virility (Sobal, 2005; Roos et al., 2001). According to Adam's (1990) feminist-vegetarian critique, male dominance over animals is intertwined with patriarchal dominance over women. Eating meat can make men feel like "real men" (Rothgerber, 2012; Sobal, 2005), symbolically subjugating women and bolstering men's social

standings (Adams, 1990). Compared to women, men tend to exhibit greater social dominance orientation (Pratto, Stallworth, & Sidanius, 1997; Whitley, 1999), and this stronger preference for power-based social hierarchy has been linked to humans' biases against non-human animals (Dhont, Hodson, Costello, & MacInnis, 2014). Hunting has historically been a masculine tradition characterized by dominance over nature, aggression, and the ability to successfully provide for one's family (Fiddes, 1991; Loo, 2001; Sobal, 2005). Essentially, meat may equate to masculinity because feeling superior to animals by eating meat can satiate the need for social dominance hierarchy among men, affirming core values of masculinity (e.g., strength, power) and social roles (e.g., provider for one's family).

Differences in moral attitudes toward animals between men and women, thus not surprisingly, may also play a role in the gendered nature of meat consumption and avoidance. Compared to men, women express greater support for animal rights and welfare (Broida, Tingley, Kimball, & Miele, 1993; Eldridge & Gluck, 1996; Graça, Calheiros, Oliveira, & Milfont, 2018; Knight, Vrij, Cherryman, & Nunkoosing, 2004; Kruse, 1999) and are less likely to endorse speciesism—the notion that some species of animals are less worthy of moral consideration than others are (Caviola, Everett, & Faber, 2019). As such, it is unsurprising that gender differences exist in how people respond to the meat paradox, or the cognitive dissonance of eating meat yet caring about animals (Loughnan, Haslam, & Bastian, 2010). One strategy for alleviating meat-eating dissonance is to dissociate meat from its animal origins (Rothgerber, 2012). Upon being exposed to the life of an animal raised for meat—and thus, entering a state of heightened dissonance—men report increases in meat attachment whereas women report decreases in meat attachment (Dowsett et al., 2018). This divergence is in accordance with research on gender differences in meat-eating justification strategies: Men are more likely than women are to justify eating meat directly and unapologetically (Rothgerber, 2012).

Gender differences exist not only in how people think about their own decisions to eschew meat but also in how they think about other people's decisions to eschew meat. Compared to omnivorous women, omnivorous men are more bothered by vegetarians and are more averse to dating a vegetarian (Judge & Wilson, 2018; Ruby et al., 2016). Just as meat-eaters have varying attitudes toward vegetarians depending on their own gender, so too do meat-eaters have varying attitudes toward vegetarians depending on the vegetarian's gender: People exhibit stronger biases against vegetarian men than against vegetarian women (MacInnis & Hodson, 2017). Thus, being the targets of divergent attitudes, vegetarian men and women may internalize the same eating behavior in different ways.

Interpersonal interactions can reinforce gender roles in eating by making people who violate such roles susceptible to social rejection. For example, men who eat plant-based diets are judged to be less masculine and more feminine than are men who eat meat-based diets (Bradbury & Nicolaou, 2012; Ruby & Heine, 2011), and men are rated more unfavorably for being vegetarian than are women (MacInnis & Hodson, 2017). These evaluations line up with Adams (1990) theorizing that eating a vegetarian diet transgresses dominant gender role dichotomies, with vegetarian men particularly violating the expectation of how masculinity ought to be enacted (Nath, 2011). In terms of a gender display perspective (Goffman, 1976; West & Zimmerman, 1987), a man who refrains from eating meat at a social gathering can symbolically fail to express a masculine identity and thus opens himself up to be categorized as feminine (Nath, 2011). To practice vegetarianism as a man carries a different meaning than does doing so as a woman.

In contrast to the well-developed literature on gender differences in attitudes toward meat and vegetarianism, far fewer studies have examined how vegetarian men and women may construe their diets differently. The limited evidence in this domain, however, is promising. Eating in a way that is stereotyped as feminine, vegetarian men may be more susceptible to facing diet-based gender identity threats.

Vegetarian men are more likely than vegetarian women are to be marginalized due to their food choices, imposing on them the need to make greater efforts to strategically manage the intersectionality of their gender and vegetarian identities (Sobal, 2005). One strategy vegetarian men employ to uphold a masculine identity is to explain their decision to eschew meat as one grounded in rational, logical, and scientific reasoning (Greenebaum & Dexter, 2017; DeLessio-Parson, 2017; Mycek, 2018). That is, they uphold a gender-binary notion of maleness as rational and femaleness as emotional (Mycek, 2018), using impression management to foster congruence between their gender and vegetarian identities. Evidence also exists to suggest that, even when they follow the same type of meat-reduced diet, men are more resistant to identifying as vegetarian, whereas women are more open to doing so (Rosenfeld & Tomiyama, 2019a).

Identity phenomena, thus, may impart direct effects on how people construe vegetarianism, over and above actual eating behavior. Such reasoning is supported by research showing that meat-eaters' gender is a unique predictor of their openness to becoming vegetarian, over and above their current pattern of meat consumption, dietary identity variables, dietary motivations, or other demographics (Rosenfeld, Rothgerber, & Tomiyama, 2019a). Based on these findings, and meat's association with masculinity, it is likely that gender intersects with vegetarian identity and ultimately leads men and women to construe meatless dieting divergently.

### 1.1. The current research: gender and vegetarian identity

The current research seeks to advance the current literature on gender and vegetarianism by investigating whether gender associates with how people express identity around vegetarian food choices. That is, do vegetarian men and women construct and rely on different senses of self when it comes to forgoing meat? Moreover, do vegetarian men and women have different motivations for following their diets, judge meat-eaters with different degrees of harshness, and adhere to their own diets at different levels of strictness?

In this investigation, I employed Rosenfeld and Burrow (2017a) Unified Model of Vegetarian Identity (UMVI)—a theoretical framework that conceptualizes vegetarianism as a social identity—to test for psychological differences between vegetarian men and women. The UMVI outlines eight latent variables that characterize how vegetarians think, feel, and behave with respect to following their diets, which include variables related to central aspects of social identity (i.e., centrality, private regard, and public regard), moral judgment and dietary motivation (i.e., omnivorous regard, prosocial motivation, personal motivation, and moral motivation), and dietary adherence (i.e., strictness).

#### 1.1.1. Social identity centrality and regard

Within vegetarian identity, centrality, private regard, and public regard constitute core features of social identification that are common across various identity domains (Luhtanen & Crocker, 1992). Centrality refers to the extent to which one views being vegetarian as a predominant feature of one's self-concept; private regard refers to one's personal feelings toward vegetarians and toward being vegetarian in terms of positive–negative valence; and public regard refers to one's feelings about the way in which meat-eaters and the larger society view vegetarians (Rosenfeld & Burrow, 2017a). Based on previous research, predictions could be made for gender effects in either direction for these three variables, such that there are reasons why men may score more highly than women or why women more highly than men.

On the one hand, men who abstain from eating meat may feel as if their diets define them to a greater extent. The gendered nature of their diets (i.e., eating a “feminine” vegetarian diet) would be incongruent with their gender, which may become recurrently salient to them personally and publicly within social contexts. The gender breakdown of the vegetarian population—that more women than men are vegetarian (Rosenfeld, 2018; Ruby, 2012)—may also play a role in establishing

social norms that influence how people engage in social comparison (Festinger, 1954). Vegetarian men may be more likely to socially compare themselves to other men, feeling like more of a minority within their gender category, which in turn may cause them to view avoiding meat as more central to their identity. Still, on the other hand, women generally face greater social pressures regarding body image and exhibit higher rates of dieting than men do (Rolls, Fedoroff, & Guthrie, 1991; Wardle et al., 2004). Thus, if dieting in general is more strongly intertwined with gender among women than men, then women may be inclined to view vegetarian dieting as a more defining self-attribute in order to affirm gender norms and achieve greater self-consistency. With these conflicting perspectives, it seemed unclear whether vegetarian men or women would exhibit higher centrality.

The extent to which gender may influence how vegetarians feel emotionally about being vegetarian also seemed unclear. On the one hand, women are judged more critically for their food choices in general than men are (Chaiken & Pliner, 1987). Facing this greater degree of criticality and greater social pressures related to body image and dieting (Rolls et al., 1991; Wardle et al., 2004), women may feel as if they are under constant scrutiny for whatever food choices they make. Evidence exists for this view in the realm of vegetarianism: Women are more likely to report hostility from family and friends for becoming vegetarian than men are (Merriman, 2010). At the same time, if women are socially rewarded for restricting their food intake (Mooney, DeTore, & Malloy, 1994), then they may also receive positive feedback for following any diet (including a vegetarian diet). Adding to this potential elevating effect for women, associations of meat with masculinity and vegetarianism with femininity may lead men to feel particularly stigmatized for being vegetarian. Negative attitudes toward vegetarians are common (Kellman, 2000; Minson & Monin, 2012), and research has found that men are rated more unfavorably for being vegetarian than women are (MacInnis & Hodson, 2017). Thus, vegetarian men may in turn hold their vegetarian identity in lower regard. With these conflicting perspectives, the current study sought to clarify this association as well as to test whether gender would show unique links with private and public regards distinctly.

#### 1.1.2. Dietary motivation, adherence, and moral judgment

Beyond core social identity dimensions of centrality, private regard, and public regard, the current study further considered vegetarianism as it relates to dietary motivation, adherence, and moral judgment—factors that may inform one's sense of self as a vegetarian. A great deal of research has centered on what motivates people to follow vegetarian diets (Rosenfeld, 2018; Rosenfeld & Burrow, 2017b; Ruby, 2012), yet reports of gender differences in motivation are sparse to null. According to the UMVI framework, three motivational orientations—prosocial, personal, and moral—exist to capture facets of why vegetarians follow their diets. Prosocial motivation refers to the extent to which a desire to benefit something beyond oneself is a reason for vegetarian dieting; personal motivation refers to the extent to which a desire to benefit oneself is a reason; and moral motivation refers to the extent to which beliefs about rightness and wrongness is a reason (Rosenfeld & Burrow, 2017a). Previous findings that women express greater support for animal rights and welfare (Broida et al., 1993; Eldridge & Gluck, 1996; Knight et al., 2004), report lower endorsements of speciesism (Caviola et al., 2019), and are more likely to believe that meat consumption harms the environment (Mullee et al., 2017) suggest that women may be more prosocially and morally motivated to follow a vegetarian diet than men are. Still, these findings reflect ideological differences between men and women, which do not necessarily reveal direct insights into what actually motivates people to make certain food choices. Ideologies may stimulate motivation, yet it remained unclear whether different reasons propel men and women to adopt a vegetarian diet.

Another construct within the UMVI framework is dietary strictness, or the extent to which one adheres to one's vegetarian diet (Rosenfeld & Burrow, 2017a). Many vegetarians violate their diets and eat meat from

time to time (Barr & Chapman, 2002; Kwan & Roth, 2004; Rosenfeld & Tomiyama, 2019b; Rothgerber, 2017), which poses an intriguing matter for research on how individuals construct identity around eating: Vegetarians who eat meat directly violate their social group norm and thus may face social identity threat, being denied vegetarian identity status. The possibility that one can *be* a vegetarian without truly *eating* a vegetarian diet may instigate within-individual and in-group processes as individuals seek to maintain a positive sense of self (Plante, Rosenfeld, Plante, & Reysen, 2019). Gender differences in food attitudes and dieting may predict higher dietary strictness among vegetarian women than men. Women view their food choices as more important to them, exhibit greater restrained eating, and exhibit higher rates of dieting than men do and are judged more critically for their food choices than men are (Chaiken & Pliner, 1987; Kiefer, Rathmanner, & Kunze, 2005; Wardle et al., 2004). These factors, coupled with greater acceptance for women to be vegetarian, may cause women to place a greater importance on following a vegetarian diet strictly and men to violate their diets more willingly when doing so avoids their being labeled as feminine. Still, whether or not a gender effect would emerge for vegetarian dietary strictness remained unclear, as the moral psychological and social identity factors surrounding vegetarian dieting adherence (e.g., Rosenfeld, 2019d) may make it markedly distinct from other forms of eating behavior.

A remaining latent variable within the UMVI framework is omnivorous regard, or how one feels about other people eating meat (Rosenfeld & Burrow, 2017a). Although vegetarians are generally not judgmental of meat-eaters' food choices (Minson & Monin, 2012; Rosenfeld, 2019c), within-group heterogeneity does exist, such that some vegetarians evaluate people negatively for eating meat. No prior perspectives or empirical research, to my knowledge, have reported theories or findings that can directly inform predictions concerning whether vegetarian men or women would differ on omnivorous regard. Documenting such a gender difference, though, can be meaningful. Vegetarians with low omnivorous regard, who judge people negatively for eating meat, may grapple with the recurrently induced psychological burden of feeling moral outrage—anger at the violation of a moral standard (Batson et al., 2007)—in a society where their view of eating meat as morally impermissible contrasts the status quo. Moreover, given that meat-eaters denigrate vegetarians when they think vegetarians are judging them for eating meat (Minson & Monin, 2012), low-omnivorous-regard vegetarians may be at elevated risks for interpersonal conflict and social rejection. Such processes may explain in part why vegetarians are an often stereotyped and stigmatized social group (Kellman, 2000; MacInnis & Hodson, 2017).

## 1.2. Aims of the current research

Through two studies, I tested for gender differences in vegetarian identity, including the dimensions of centrality; private and public regards; prosocial, personal, and moral motivations; omnivorous regard; and strictness. Given the lack of prior work on this topic, and competing predictions that could be made for some dimensions, I initially set no specific directionality for these hypotheses. The aims of this paper, ultimately, are (1) to advance the current literature on gender and eating behavior by expanding it more deeply into the realm of vegetarianism, and (2) to provide methodological insights into how investigators wishing to study vegetarianism and other forms of meat avoidance may consider the role of gender. Beyond these implications for theory and research methodology, the current research also aimed to provide insights that could be used to improve the effects of dietary choices on public health and the environment by emphasizing the importance of considering gender.

## 2. Study 1

### 2.1. Method

This study's sample size, materials, and analyses were preregistered via the Open Science Framework (OSF) (see [https://osf.io/tfz4y/?view\\_only=f1ededee94f14126b3cf20e7165e68bd](https://osf.io/tfz4y/?view_only=f1ededee94f14126b3cf20e7165e68bd) for preregistration).

#### 2.1.1. Participants

Surveys suggest that approximately 60% of vegetarian adults in the United States are women, whereas 40% are men (Gallup, 2012; Vegetarian Times, 2008). A power analysis, assuming this gender ratio, indicated that a sample of 820 participants would provide 80% power to detect small standardized effect sizes of  $d = 0.20$  between men and women at a significance threshold of  $p = .05$ . As such, I recruited a total of 900 vegetarian participants (i.e., those who self-identify as vegetarian and/or vegan).

Nine hundred vegetarian participants from the U.S. were recruited to take part in this study via Amazon Mechanical Turk (MTurk) in exchange for \$0.40. After excluding seven participants who failed an attention check in the survey, two participants who reported a non-binary gender identity status, and one participant who did not report any gender, 890 participants between the ages of 20 and 82 ( $M_{\text{age}} = 36.43$ ,  $SD = 11.41$ ) were retained for analyses. Of these participants, 495 (56%) were women and 395 (44%) were men.

#### 2.1.2. Materials

**2.1.2.1. Vegetarian identity.** Vegetarian identity was assessed using Rosenfeld and Burrow (2018) Dietarian Identity Questionnaire (DIQ) (as validated for assessing vegetarian identity by Rosenfeld, 2019c). The DIQ began with an initial item that assessed which of the following animal products participants eat or do not eat: red meat, poultry, fish, egg, and dairy. A participant's "dietary pattern" referred to those foods he or she indicated eating and/or not eating.

Following this dietary pattern item, the DIQ included 33 items assessing centrality; private and public regards; prosocial, personal, and moral motivations; omnivorous (also referred to as "out-group") regard; and strictness. An example item for centrality ( $\alpha = 0.95$ ) included "My dietary pattern has a big impact on how I think of myself." An example item for private regard ( $\alpha = 0.81$ ) included "People who follow my dietary pattern should take pride in their food choices." An example item for public regard ( $\alpha = 0.93$ ) included "People who follow my dietary pattern are judged negatively for their food choices" (reverse-scored). An example item for prosocial motivation ( $\alpha = 0.95$ ) included "I follow my dietary pattern because eating this way is good for the world." An example item for personal motivation ( $\alpha = 0.89$ ) included "I follow my dietary pattern because I am concerned about the effects of my food choices on my own well-being." An example item for moral motivation ( $\alpha = 0.93$ ) included "I feel that I have a moral obligation to follow my dietary pattern." An example item for omnivorous regard ( $\alpha = 0.96$ ) included "I judge people negatively for eating foods that go against my dietary pattern" (reverse-scored). An example item for strictness ( $\alpha = 0.94$ ) included "I can be flexible and sometimes eat foods that go against my dietary pattern" (reverse-scored). Responses to all items ranged from 1 (Strongly Disagree) to 7 (Strongly Agree).

#### 2.1.3. Procedure

After consenting to take part in this research, participants first indicated their dietary pattern and then completed all DIQ items. Participants completed the eight DIQ subscales in a randomized order. After completing the DIQ, participants completed demographic questions wherein they indicated their gender.

## 2.2. Results and discussion

Data are available at [https://osf.io/vzcd4/?view\\_only=](https://osf.io/vzcd4/?view_only=)

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First, I tested whether homogeneity of variance and normality—two assumptions underlying independent samples *t*-tests—existed between men and women for all eight vegetarian identity variables. Levene's tests for equality of variance revealed that variances were not significantly different for centrality, personal motivation, moral motivation, and strictness (all  $p$ s > 0.05), but were unequal for private regard, public regard, omnivorous regard, and prosocial motivation (all  $p$ s < 0.05). Shapiro-Wilk tests revealed that the assumption of normality was violated for all eight variables. Accordingly, for all analyses, instead of *t*-tests, I conducted appropriate Mann-Whitney *U* tests.<sup>1</sup>

Compared to men, women reported higher private regard, lower public regard, higher prosocial motivation, higher moral motivation, higher omnivorous regard, and higher strictness. There were not significant differences between men and women on centrality or personal motivation (see Table 1).

### 2.2.1. Bayesian analyses (Post Hoc)

In order to complement preregistered frequentist analyses and to provide greater insights into gender differences in vegetarian identity, I conducted Bayesian analyses *post hoc*. Two advantages of Bayesian analyses are that evidence can support either an alternative or null hypothesis and that results can be interpreted along a continuum of strength of evidence. Frequentist analyses, in contrast, entail a dichotomous decision to either reject or fail to reject a null hypothesis. Bayes Factors (BFs) were calculated using a data augmentation algorithm with 5 chains of 1000 iterations and a default prior based on a Cauchy distribution (0, 0.707), with a null hypothesis of no gender difference and a two-sided alternative hypothesis of any gender difference.

Results indicated strong evidence for lower public regard, higher prosocial motivation, and higher strictness among women than men, supporting inferences drawn from frequentist analyses. In line with null results from frequentist analyses, Bayesian analyses indicated weak evidence for any gender difference in either centrality or personal motivation. In contrast to significant results from frequentist analyses, Bayesian analyses indicated weak evidence for any gender difference in private regard, moral motivation, or omnivorous regard (see Table 1).

## 3. Study 2

I conducted a preregistered direct replication of Study 1 with a larger new sample in order to test whether effects would generalize across datasets. Data for this study came from a series of three other studies (each study's  $N = 600$  self-identified vegetarians) I conducted (Rosenfeld, 2019d), which I combined into a single dataset ( $N = 1800$ ). In this second study, I preregistered the Bayesian analyses conducted *post hoc* in Study 1. I also specified directional hypotheses for the effects observed in Study 1 within this study's preregistration.

### 3.1. Method

This study's sample size, materials, hypotheses, and analyses were preregistered via OSF (see [https://osf.io/jvq72/?view\\_only=f25da5a21b054944b03bca846f9ce2b9](https://osf.io/jvq72/?view_only=f25da5a21b054944b03bca846f9ce2b9) for preregistration).

#### 3.1.1. Participants

One thousand eight hundred participants from the U.S. were recruited to take part in this study via MTurk in exchange for \$0.40. After excluding nine participants who reported that they were not vegetarian/vegan, six participants who failed an attention check in the

<sup>1</sup> I note that these analyses diverge from those specified in my preregistration plan. A reviewer highlighted that the assumption of normality was violated for all variables. Thus, instead of conducting parametric *t*-tests as planned, I conducted nonparametric Mann-Whitney *U* tests.

survey, nine participants who reported a non-binary gender identity status, and one participant who reported being younger than 18 years of age, 1775 participants between the ages of 18 and 81 ( $M_{\text{age}} = 34.67$ ,  $SD = 10.63$ ) were retained for analyses. Of these participants, 1019 (57%) were women and 756 (43%) were men. This sample provided 99% power to detect small standardized effect sizes of  $d = 0.20$  between men and women at a significance threshold of  $p = .05$ .

### 3.1.2. Materials

3.1.2.1. *Vegetarian identity.* Vegetarian identity was assessed using the same methodology outlined in Study 1. Internal consistencies were high for all eight vegetarian identity scales (centrality  $\alpha = 0.93$ , private regard  $\alpha = 0.80$ , public regard  $\alpha = 0.92$ , prosocial motivation  $\alpha = 0.95$ , personal motivation  $\alpha = 0.88$ , moral motivation  $\alpha = 0.92$ , omnivorous regard  $\alpha = 0.96$ , and strictness  $\alpha = 0.93$ ).

### 3.1.3. Procedure

Procedure was the same as in Study 1.

## 3.2. Results and discussion

Data are available at [https://osf.io/hf7xc/?view\\_only=7204beb62b3d49eaa56d60057c411f10](https://osf.io/hf7xc/?view_only=7204beb62b3d49eaa56d60057c411f10).

Levene's tests for equality of variance revealed that variances were not significantly different between men and women for any of the eight vegetarian identity variables (all  $p$ s > 0.05). Shapiro-Wilk tests revealed that the assumption of normality was violated for all eight variables. Accordingly, for all analyses, instead of *t*-tests, I conducted appropriate Mann-Whitney *U* tests.<sup>2</sup> Frequentist analyses indicated that, compared to men, women reported higher centrality, higher private regard, lower public regard, higher prosocial motivation, higher personal motivation, higher moral motivation, higher omnivorous regard, and higher strictness (see Table 2).

Bayes Factors (BFs) were calculated using a data augmentation algorithm with 5 chains of 1000 iterations and a default prior based on a Cauchy distribution (0, 0.707), with a null hypothesis of men scoring more highly than women and an alternative hypothesis of women scoring more highly than men for all variables except for public regard (for which these hypotheses were reversed). Supporting inferences drawn from frequentist analyses, results indicated extremely strong evidence for higher centrality, higher omnivorous regard, and higher strictness among women than men (BFs > 100); very strong evidence for higher private regard among women than men (BF > 30); and strong evidence for higher prosocial motivation among women than men (BF > 10). Evidence was weak to moderate for lower public regard and higher personal motivation among women than men. In contrast to significant results from frequentist analyses, Bayesian analyses indicated weak evidence for any gender difference in moral motivation (see Table 2).

## 4. General discussion

Across both studies, frequentist and Bayesian analyses converged to suggest that men and women differed consistently along two out of eight dimensions of vegetarian identity: Compared to men, women reported that they are more prosocially motivated to follow their vegetarian diet and adhere to their vegetarian diet more strictly. These differences were small but reliable. Men and women did not

<sup>2</sup> As noted for Study 1, I note again that Study 2's analyses diverge from those specified in my preregistration plan. A reviewer highlighted that the assumption of normality was violated for all variables. Thus, instead of conducting parametric *t*-tests as planned, I conducted nonparametric Mann-Whitney *U* tests. Moreover, computations and interpretations of Bayes Factors deviating from those preregistered were suggested by the reviewer.

**Table 1**  
Vegetarian identity differences between men and women (Study 1).

Vegetarian Identity	Men ( <i>n</i> = 395)	Women ( <i>n</i> = 495)	<i>U</i>	<i>r</i>	95% Confidence Interval of <i>r</i>	<i>p</i>	Bayes Factor
	Mean (SD)	Mean (SD)					
Centrality	4.86 (1.48)	5.01 (1.45)	92123.5	−0.06	[−0.13, 0.02]	0.138	0.30
Private Regard	5.21 (1.08)	5.41 (0.92)	88375.5*	−0.10	[−0.17, −0.02]	0.013	2.32
Public Regard	3.68 (1.59)	3.32 (1.44)	110777.5***	0.13	[0.06, 0.21]	< 0.001	15.12
Prosocial Motivation	4.69 (1.57)	5.03 (1.39)	86561**	−0.12	[−0.19, −0.04]	0.003	9.62
Personal Motivation	5.67 (1.18)	5.79 (1.20)	90488.5	−0.07	[−0.15, 0.00]	0.053	0.30
Moral Motivation	4.61 (1.69)	4.86 (1.66)	89561*	−0.08	[−0.16, −0.01]	0.031	1.56
Omnivorous Regard	4.93 (1.62)	5.22 (1.47)	88557.5*	−0.09	[−0.17, −0.02]	0.018	1.66
Strictness	4.83 (1.68)	5.23 (1.63)	84201.5***	−0.14	[−0.21, −0.06]	< 0.001	11.20

*r* = rank-biserial correlation.

**Table 2**  
Vegetarian identity differences between men and women (Study 2). Significant results (*p* < .05) that replicated those observed in Study 1 are displayed in bold font.

Vegetarian Identity	Men ( <i>n</i> = 756)	Women ( <i>n</i> = 1019)	<i>U</i>	<i>p</i>	Bayes Factor
	Mean (SD)	Mean (SD)			
Centrality	4.77 (1.38)	5.05 (1.31)	343205.5***	< 0.001	1059.90
<b>Private Regard</b>	<b>5.12 (1.00)</b>	<b>5.28 (0.95)</b>	<b>348134.5***</b>	<b>&lt; 0.001</b>	<b>55.48</b>
<b>Public Regard</b>	<b>3.78 (1.45)</b>	<b>3.59 (1.50)</b>	<b>416875**</b>	<b>0.003</b>	<b>5.38</b>
<b>Prosocial Motivation</b>	<b>4.51 (1.57)</b>	<b>4.75 (1.52)</b>	<b>351949.5**</b>	<b>0.002</b>	<b>21.47</b>
Personal Motivation	5.55 (1.17)	5.70 (1.16)	352698.5**	0.002	4.32
<b>Moral Motivation</b>	<b>4.31 (1.66)</b>	<b>4.47 (1.73)</b>	<b>362498.5*</b>	<b>0.033</b>	<b>0.65</b>
<b>Omnivorous Regard</b>	<b>5.07 (1.54)</b>	<b>5.35 (1.50)</b>	<b>344530.5***</b>	<b>&lt; 0.001</b>	<b>110.27</b>
<b>Strictness</b>	<b>4.74 (1.62)</b>	<b>5.05 (1.63)</b>	<b>341109.5***</b>	<b>&lt; 0.001</b>	<b>383.24</b>

consistently differ in the extents to which they view being vegetarian as central to their overall identity (centrality), take pride in being vegetarian (private regard), feel as if other people judge vegetarians negatively (public regard), are either personally or morally motivated to follow their vegetarian diet, or evaluate other people less negatively for eating meat (omnivorous regard).

The current studies' findings on prosocial motivation suggest the following gender difference: Compared to vegetarian men, vegetarian women are more inclined to view their diets as grounded in a desire to benefit causes beyond themselves (e.g., for animals, the environment). This inference supports prior findings that women are more morally concerned about animals (Broida et al., 1993; Caviola et al., 2019; Eldridge & Gluck, 1996; Knight et al., 2004) and are more likely to believe that meat consumption harms the environment (Mullee et al., 2017) than men are. Moreover, aside from the theoretical relevance these findings have for potential gender differences in moral reasoning, they may also have applied implications relevant to societal concerns about meat consumption. Further considerations of gender may help policy makers, advocates, and practitioners curtail dietary messages to men and women strategically in order to address the adverse health, environmental, and ethical implications of meat consumption—particularly so if different reasons attract men and women to vegetarianism. Experimental research testing whether men and women respond differently to ethical, environmental, and health messages related to meat consumption would be informative.

Regarding dietary adherence, vegetarian women reported following their diets more strictly than vegetarian men did. Identifying this gender difference in dietary strictness between vegetarian men and women can be useful as scholars continue to investigate psychological phenomena surrounding the paradox that many people self-identify as vegetarian yet eat meat occasionally (Barr & Chapman, 2002; Kwan & Roth, 2004; Rosenfeld, 2019d; Rosenfeld & Tomiyama, 2019b; Rothgerber, 2017). The current studies suggest that a greater proportion of these vegetarians who violate their diets on occasion may be men, rather than women. Discrepancies between how people self-identify as vegetarian and how strictly they adhere to meat abstention can pose challenges as demographers and researchers operationalize

what it means to be a vegetarian. As vegetarian men and women exhibit varying degrees of dietary adherence, whether or not an investigator defines vegetarians as people who “self-identify as vegetarian” or as people who “never eat meat” may yield different gender breakdowns.

Although neither strong nor consistent enough to warrant conclusive inferences, the current studies' findings taken together provide suggestive evidence that vegetarian women may have slightly lower public regard than vegetarian men do. As vegetarianism is a stereotypically feminine behavior, and given that people judge men more harshly for being vegetarian than they judge women (MacInnis & Hodson, 2017), it would seem surprising for women to feel as if other people judge vegetarians more negatively than men feel. Unraveling gender effects on public regard may be of interest to future research. Given that violating gender roles in eating can be met with social disapproval (Adams, 1990; Nath, 2011), men who practice vegetarianism may be more likely to experience backlash whereas women may experience greater acceptance (Sedupane, 2017; Torti, 2017), which may have consequences for how individuals feel either prideful or ashamed of their vegetarian identity. From this, one might predict lower public regard among vegetarian men than women. A possible explanation as to why vegetarian women may exhibit lower public regard than men is that women, in general, are judged more critically for their food choices and face greater social pressures related to body image and dieting than men do (Chaiken & Pliner, 1987; Rolls et al., 1991; Wardle et al., 2004). As such, regardless of whether or not women eat in a feminine way that satisfies gender expectations—as vegetarian dieting does—it may be that women feel as if they are under constant scrutiny for any food choices they make. This general feeling of food-based social evaluation may outweigh any potential buffering effect that gender may have on public regard for vegetarian women. Substantive explanations for a gender difference in vegetarian identity public regard may thus provide insights into eating behavior processes more broadly, beyond simply meat avoidance. As the current data cannot speak to mechanisms and instead are restricted to bivariate between-gender comparisons, there is potential for further research to identify more nuanced effects.

#### 4.1. Future directions: Gender as a covariate and moderator

Methodologically, these observed differences suggest that, in future research on vegetarianism and other variants of meat avoidance, investigators should consider entering gender as a covariate in analyses, as gender may confound relationships of interest—particularly when related to matters of dietary motivation or adherence. Differences in vegetarian identity dimensions between men and women, though of small effect size, may introduce meaningful amounts of variance between groups of individuals when those groups are of varying gender proportions. Many studies have demonstrated psychological differences not only between vegetarians with different types of ethical and health motivations but also between various types of vegetarians based on their dietary patterns, such as distinguishing between vegans and other vegetarians (Hoffman, Stallings, Bessinger, & Brooks, 2013; Janssen, Busch, Rödiger, & Hamm, 2016; Radnitz, Beezhold, & DiMatteo, 2015; Rosenfeld, 2019a, 2019b, 2019e; Rothgerber, 2014; Ruby, 2012). What remains unknown, however, is the extent to which differences in the gender breakdown of various vegetarian subgroups may directly explain variances in outcome variables, thereby confounding the unique explanatory power of people's dietary patterns or motivations.

A further consideration for future work is to consider how gender may moderate links of interest between psychological variables both within and beyond vegetarian identity. Already, Dowsett and colleagues (2018) have demonstrated that, upon being exposed to the life of an animal raised for meat, men report increases in meat attachment whereas women report decreases in meat attachment. This divergence is in accordance with Rothgerber (2012) finding that men are more likely than women are to justify eating meat directly and unapologetically. Coupled with the current studies' observed difference in prosocial dietary motivation between vegetarian men and women, these findings point toward promising future directions in evaluating the role of gender in research on the moralization of food choice, particularly in the realm of cognitive dissonance, attitudes toward animals, and meat consumption. Moral attitudes in these domains offer predictive value for how people construct and express social identity around their diets (Rosenfeld, Rothgerber, & Tomiyama, 2019b) and thus may be valuable considerations for investigators interested in identity processes in the domain of eating.

The current research is the first to document gender differences in vegetarian identity and invites subsequent work to test mechanisms by which these differences not only arise but also influence how vegetarians and meat-eaters alike construe their food choices. With concerns about the health and environmental impacts of meat consumption pressing (Willett et al., 2019) and resistance to meat reduction lingering (Graça et al., 2015; Markowski & Roxburgh, 2018), there is much to be gained from psychological perspectives on vegetarianism.

#### 4.2. Strengths and limitations

Strengths of the current research methodology include its high statistical power, use of preregistration and direct replication, and use of Bayesian analyses to complement inferences drawn from frequentist results. One limitation is its lack of consideration of sexual orientation, a factor that may interact with conceptions of masculinity and femininity. A second factor to note is the potential for self-presentation to skew the true nature of dietary motivation differences between men and women. Namely, support for animal rights may be viewed as a feminine attitude (Kruse, 1999), which may deter men from reporting their true moral or prosocial motivations for vegetarianism. A third limitation is the potential that participants misrepresented themselves as vegetarian in order to receive payment for completing the surveys used in this research. A fourth limitation, as common to research on gender differences, is that the correlational nature of the studies presented cannot allow for causal inferences. Self-selection effects may be present in how men and women adopt vegetarian diets. Particularly valuable for future

research would be cross-sectional designs testing for interactions between gender and dietary status (vegetarian versus meat-eater) on outcomes, longitudinal designs that track changes in eating behavior over time, and experimental research that primes gender. An additional limitation, given that the current research comprised only participants from the U.S., is that its findings may not be generalizable across cultures. Future research would benefit from studying gender differences in the formation and expression of vegetarian identity across various cultures, giving particular consideration to cultural differences in gender roles and eating norms.

## 5. Conclusion

What foods people eat, how much they eat, and how they feel about eating those foods exhibit significant associations with gender. Vegetarianism appears to be one domain of eating behavior in which gender differences are detectable. Not only do people associate meat with masculinity and evaluate men and women differently based on whether or not they eat meat, but vegetarian men and women furthermore have different motivations for following their diets and adhere to their diets with varying degrees of strictness: Compared to men, women are more prosocially motivated and adhere more strictly. By considering how the expression of vegetarian identity differs between men and women, investigators can generate deeper insights into the gendered nature of eating behavior.

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## CRediT authorship contribution statement

**Daniel L. Rosenfeld:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing - original draft, Writing - review & editing.

## Declaration of Competing Interest

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

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.foodqual.2019.103859>.

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