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## The Meaty gender Gap: Understanding Gender-Based differences in intention to reduce red meat consumption

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### A B S T R A C T

Literature shows that policies aimed at reducing meat consumption benefit from instruments targeting specific population groups. Gender appears to be a strong predictor of dietary patterns, but research detailing differences between men and women in the antecedents of intention to reduce meat consumption is lacking. Our study seeks to fill this gap. Employing an extension of the Theory of Planned Behaviour, newly implemented in the food context, we divided the antecedents of intention into subcomponents. The study focused on a sample of 400 Italian consumers, and the data were analysed applying a Structural Equation Model. Our findings highlighted substantial dissimilarities between genders, particularly in the realm of Perceived Behavioural Control, thereby offering novel perspectives for designing gender-specific interventions to reduce meat consumption.

### 1. Introduction

In environments where meat consumption is prevalent, as frequently seen in Western cultures, the correlation between susceptibility to noncommunicable diseases and the consumption of processed meat, red meat, and saturated fat is becoming more evident. As a result, there is an increasing emphasis on the importance of moderating meat intake. This dietary change not only helps reduce the risks of illness, but also holds potential for promoting environmental sustainability. Thus, adoption of diets that involve reduced meat consumption has become a central focus point in current academic and political discussion (for a more comprehensive analysis, see the review by [Beal et al., 2023](#)).

The literature exploring actions designed to encourage the transition to reduced meat consumption indicates that tailored measures aimed at specific consumer groups are more effective than generic, one-size-fits-all approaches; because segments with different consumption behaviours have different drivers and barriers (for a review see [Kwasny et al., 2022](#)). Therefore, understanding the antecedents of meat consumption behaviour for different consumer groups is an important contribution to improving policy interventions for healthier or more sustainable diets.

The literature review conducted by [Eckl et al. \(2021\)](#) highlights that among the socio-demographic factors, gender is the one that best explains meat consumption. Men and women have been found to follow different dietary patterns, with women consuming more fruit and vegetables and men more meat ([Kiefer et al., 2005](#); [Rätty & Carlsson-Kanyama, 2010](#); [Cordts et al., 2014](#); [Love & Sulikowski, 2018](#); [Di Vita](#)

[et al., 2019](#); [Balatsas-Lekkas et al., 2020](#); [Rosenfeld & Tomiyama, 2021](#); [Fantechi et al., 2022](#)). Furthermore, [Tobler et al. \(2011\)](#) demonstrated that gender is the most significant predictor of reduced meat consumption and [Seffen et al. \(2023\)](#) indicated that women have a higher intention to reduce meat consumption. There are various reasons for different behaviour towards meat between the two genders. Recently, [Michel et al. \(2021\)](#) showed that the associations the two genders make with regard to meat is different, with women paying more attention to animal suffering and men to taste. [Rothgerber \(2013\)](#) pointed out that men tend to justify meat consumption on religious or naturalness grounds or by denying that it causes animal suffering. Other authors ([Guenther et al., 2005](#); [Mycek, 2018](#); [Peeters et al., 2022](#); [Sobal, 2005](#)) have highlighted that meat turns out to be connected to masculinity, especially in Western society. Finally, men pay less attention to their diet and show less interest in the nutritional aspects of food ([Wardle et al., 2004](#)). Women, on the other hand, tend to have more positive attitudes toward plant foods, showing less attachment to meat ([Janda & Trocchia, 2001](#); [Judge & Wilson, 2019](#)).

The existing body of research highlights the relevance of gender differences in meat-related behaviour, yet has not explored the factors that influence the inclination to reduce meat consumption among men and women. Our study plays a crucial role in filling this gap in the literature by elucidating the interplay of determinants that influence the intention to reduce meat consumption. The ultimate objective is to provide actionable insights. Recognizing differentiations in gender-based meat consumption behaviours holds substantial promise in

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refining targeted strategies for advancing sustainability efforts and promoting public health initiatives. To shed new light on the topic, our study aimed to investigate the intention of both males and females to reduce the consumption of red meat, known to be the type of meat with the greatest negative effects on health and the environment (Beal et al., 2023; Bonnet et al., 2020; Papier et al., 2021).

Therefore, our work aimed to answer the following research question:

RQ1: What are the gender differences in the TPB determinants of intention to reduce red meat consumption?

## 2. Theoretical framework

### 2.1. The contribution of the Theory of Planned behaviour to understanding meat consumption

The Theory of Planned Behaviour (TPB) has been shown to be effective in explaining meat consumption in terms of attitude, subjective norm and perceived behavioural control (PBC) (Ajzen, 1991, 2020; Carfora et al., 2020; Steinmetz et al., 2016). Carfora et al. (2017) used the TPB framework to test the role of health information on processed meat consumption in young adults, showing that those who receive the information reduce processed meat consumption more than the control group and reveal greater intention to reduce it further. Povey et al. (2001) applied TPB to identify the drivers of four different eating styles (i.e. meat eaters, meat avoiders, vegetarians and vegans). Other authors have developed extensions of the TPB. For example, Lentz et al. (2018) showed that meat attachment can improve the explanatory power of the model. More recently, Wolstenholme et al. (2021) conducted a study in Italy and UK combining TPB with meat-eater identity and the Trans-theoretical Model. The results showed that depending on the degree to which meat consumption is reduced, the determinants of intention to reduce meat consumption are different. The only exception is attitude, decisive at every stage. Çoker & van der Linden (2022) included past behaviour and gender in the model, improving its ability to explain the intention to reduce meat consumption.

### 2.2. Multicomponent model of the Theory of Planned behaviour

A number of scholars have developed alternative measures for the antecedents of intention within the Ajzen model, in order to offer a more comprehensive representation of the latent constructs. These analyses have looked at fruit and vegetable consumption (Blanchard, et al., 2009a; Blanchard, et al., 2009b; Canova et al., 2020; Contini et al., 2020), organic food (Sadiq et al., 2021), functional foods (Nystrand & Olsen, 2020) and, more generally, healthy consumptions (Lakerveld et al., 2011). In particular, Blanchard et al. (2009a), Blanchard et al. (2009b), Sadiq et al. (2021) and Canova et al. (2020) broke down attitude into an instrumental and an affective/hedonic component, while Contini et al. (2020) further expanded the analysis of PBC by dividing it into perceived opportunities, perceived skills and perceived resources. Lakerveld et al. (2011) differentiated PCB into perceived control and perceived difficulty, while they broke down attitude into an affective component and a cognitive component. Finally, Nystrand & Olsen (2020) included injunctive norms, perceived control, hedonic and utilitarian eating values in Ajzen's model.

The present study used a multicomponent model of the Theory of Planned Behaviour developed by Rhodes et al. (2006) to understand exercise behaviour. The main novelty of this model is its enhanced predictive capacity compared to the original model; due to its improved ability to represent the intended latent constructs, which can be valuable for researchers and policymakers. In Rhodes' model, all antecedents to intention are broken down into subcomponents. Attitude is divided into affective attitude, which pertains to emotional aspects (e.g. pleasant/unpleasant), and instrumental attitude, which relates to the functional

benefits of the behaviour (e.g. beneficial/harmful). Subjective norm includes descriptive norm, which refers to the social pressure related to the behaviour of relevant others, and injunctive norm, which refers to what the individual thinks others expect of him or her. Finally, PBC is divided into perceived opportunity, skills, and resources. The first construct relates to environmental factors that can either facilitate or hinder the behaviour, the second concerns personal abilities that can influence the behaviour, and the third is associated with the material and immaterial means of the individual to execute the behaviour. Through a literature review, we identified which factors could be included in the PBC category. We used the perceived availability of meat alternatives as a perceived opportunity. This choice is consistent with the growing recognition that the market presence of meat alternatives can effectively direct consumers towards healthier or more sustainable food choices (Hielkema & Lund, 2021; Stoll-Kleemann & Schmidt, 2017). We used perceived cooking skills as perceived skills as several studies indicate that limited cooking abilities pose a barrier to reducing meat consumption, especially when it comes to preparing non-meat-based dishes (Eckl et al., 2021; Kemper & White, 2021; Verbeke, 2015). As regards perceived resources, we used three different factors that the literature reports as affecting meat consumption: consumer knowledge regarding the harm of meat consumption on health and the environment, purchasing power for food, and time pressure. Indeed, we know that personal knowledge about the impact of meat consumption on health and the environment has a significant influence on meat consumption and its replacement with alternative sources (Eckl et al., 2021; Kemper & White, 2021; Mancini & Antonioli, 2019). We consider knowledge as a resource for individuals, as it empowers them to make informed choices and enhance their overall quality of life. The role of purchasing power and, more specifically, how increases in income positively correlate with meat consumption is also well known (Milford et al., 2019; Parlasca & Qaim, 2022; Schroeder et al., 1996). Moreover, even with respect to studies on consumer behaviour, literature shows that those who consume more meat have greater purchasing power (Apostolidis & McLeay, 2016, 2019). Finally, many authors report the importance of the time available with respect to food choices (Godinho et al., 2016). If consumers have little time to devote to food, they tend not to change their habits (Courter & Ahmed, 2019; Wood & Neal, 2009).

Our hypothesis posits that employing Rhodes' model can unveil differences between males and females in terms of what influences their intention to reduce red meat consumption.

## 3. Materials and methods

Our study involved a sample of 400 Italians representing a diverse range of consumers in socio-demographic terms, as illustrated in Table 1. The questionnaires were administered online in Italian, in January 2022, by an international marketing research company, using its own consumer panel (Toluna, Inc., Wilton, CT, USA).

**Table 1**  
Sociodemographic characteristics of the sample, compared to Italian population.

| Variable          | Sample (%) | Italian population (%) |
|-------------------|------------|------------------------|
| <i>Gender</i>     |            |                        |
| Men               | 48         | 49                     |
| Women             | 52         | 51                     |
| <i>Age</i>        |            |                        |
| 18–34             | 32         | 24                     |
| 35–54             | 48         | 38                     |
| > 54              | 20         | 38                     |
| <i>Region</i>     |            |                        |
| Northwest         | 26         | 26                     |
| Northeast         | 19         | 19                     |
| Central Italy     | 20         | 20                     |
| South and islands | 35         | 35                     |

Note: source Italian population by ISTAT (2022).

Both the original Italian version and the English translation of the questionnaire are provided in the [Supplementary Material](#). The questionnaire had three separate sections. The first contained a definition of what we mean by red meat in the study, allowing respondents to have a well-defined product in mind. The description given was the following: “The subject of this survey is red meat, including beef and pork, purchased fresh, frozen, canned, cured or already cooked and consumed at home or away from home. Whenever we use the term “red meat” in the questionnaire, we are referring to the product types described above”. Respondents were then asked how often they had consumed red meat in the past three months. Those who reported that they had never consumed it during this time frame were excluded from the questionnaire.

The second section included the collection of items for measuring the subcomponents of the multicomponent TPB. [Table 2](#) describes the scales used with their sources. The back-translation procedure was used to confirm translational equivalence from English to Italian, ensuring that the items encompassed the same concepts as in the original English version. Affective attitude and instrumental attitude were measured using 7-point bipolar adjective items. The other constructs were measured on 7-point scales that ranged from 1 (strongly disagree) to 7 (strongly agree).

Finally, the third section contained the sociodemographic questions.

Sample attention checks were assured at two different moments in the questionnaire. We initially confirmed respondents’ understanding of red meat by presenting a closed-ended question featuring four types of meat (i.e. beef, pork, rabbit and turkey), and instructing them to tick only those considered as red meat. Two of these (beef and pork) were indeed in the investigated category, while the other two were not (rabbit and turkey). Those who answered incorrectly (9 individuals) were excluded from the questionnaire. Respondent attention was further ensured by adding a filter to the scale for attitude measurement. There was one item worded positively and one reversed (i.e., “Eating meat is extremely good” and “Eating meat is extremely bad”). Those who did not answer consistently to these items (28 individuals) did not continue the questionnaire. The panel provider continued sampling until a total of 400 valid responses were obtained.

The structural equation model (SEM) illustrated in [Fig. 1](#) was implemented to process the answers. After developing the model for the sample as a whole, the same data was grouped analysing the differences in determinants between men and women. Data was analysed using Stata 15.1.

#### 4. Results

We initiated our analysis by assessing the internal consistency of the constructs being investigated using Cronbach’s alpha ([Cronbach, 1951](#)). All values exceeded the acceptable threshold of 0.7 ([George & Mallery, 2003](#)). To establish both convergent and discriminant validity, we conducted a confirmatory factor analysis (CFA). In the realm of SEM, convergent and discriminant validity are pivotal in evaluating the reliability of the constructs. Convergent validity evaluates the consistency with which various measures or indicators representing the same latent construct converge, highlighting the coherence in their depiction of that construct. On the other hand, discriminant validity is crucial for distinguishing between distinct constructs within the model, ensuring there is no overlap or ambiguity among the concepts being studied ([Fornell & Larcker, 1981](#)). The CFA was conducted using the maximum likelihood estimation method.

A significant finding from the CFA was the high squared correlation (SC) value of 0.915 between injunctive norm and descriptive norm. This led us to decide not to separate Ajzen’s original construct, defined as “subjective norm”.

Consequently, we performed a new CFA on the model that consolidates injunctive norm and descriptive norm into a single construct, adhering to the criteria mentioned earlier. The AVE (average variance

**Table 2**  
Constructs and related items used for analysis. In brackets, we note the original TPB construct behind the subcomponent.

| Construct                                | Code    | Item   | Source                |
|--|---------|--|-----------------------|
| Intention                                | INT1    | I plan to reduce my red meat consumption in the next 3 months  | Ajzen & Sheikh (2013) |
|  | INT2    | I intend to reduce red meat in my diet in the next 3 months  |                       |
|  | INT3    | I will make an effort to reduce the consumption of red meat in my diet in the next 3 months              |                       |
|  | INT4    | It is likely that I will reduce my consumption of red meat foods on a regular basis in the next 3 months | Dunn et al. (2011)    |
| Instrumental attitude (Attitude)         | INATT1  | Reducing my meat consumption is extremely useful   | Rhodes et al. (2006)  |
|  | INATT2  | Reducing my meat consumption is extremely beneficial   |                       |
|  | INATT3  | Reducing my meat consumption is extremely wise   |                       |
| Affective attitude (Attitude)            | AFFATT1 | Reducing my meat consumption is extremely enjoyable  | Rhodes et al. (2006)  |
|  | AFFATT2 | Reducing my meat consumption is extremely pleasant   |                       |
|  | AFFATT3 | Reducing my meat consumption is extremely interesting  |                       |
| Injunctive norm (Subjective norm)        | INJSN1  | Most people who are important to me think I should reduce my red meat consumption                        | Ajzen & Sheikh (2013) |
|  | INJSN2  | Most people whose opinions I value would approve of me reducing red meat consumption in my diet          |                       |
|  | INJSN3  | Those close to me expect me to regularly reduce my red meat consumption                                  | Dunn et al. (2011)    |
| Descriptive norm (Subjective norm)       | DESSN1  | Most of my friends and colleagues have reduced their red meat consumption                                | Ajzen & Sheikh (2013) |
|  | DESSN2  | Those who are close to me have reduced their red meat consumption  | Dunn et al. (2011)    |
|  | DESSN3  | The people in my life whose opinions I value have reduced red meat consumption                           |                       |
| Cooking skills (PBC-Perceived skills)    | COOK1   | I can prepare a soup from scratch  | Brunner et al. (2010) |
|  | COOK2   | I can bake a cake from scratch   |                       |
|  | COOK3   | I can prepare a sauce from scratch   |                       |
|  | COOK4   | I could prepare a quiche from scratch  |                       |
| Availability (PBC-Perceived opportunity) | AV1     | I find plant-based substitutes for meat that I like in the stores I routinely shop at                    | Contini et al. (2018) |
|  | AV2     | I find a wide range of plant-based meat substitutes in the stores where I routinely shop                 |                       |
|  | AV3     | The stores I routinely shop at use sell plant-based meat substitutes                                     |                       |

(continued on next page)

Table 2 (continued)

| Construct   | Code  | Item  | Source                |
|---|-------|---|-----------------------|
|   | AV4   | I can buy the plant-based meat substitutes I prefer at stores near where I live or work |                       |
| Time pressure (PBC-Perceived resources)             | TIME1 | I am always looking to save time  | Buckley et al. (2007) |
|   | TIME2 | I am often rushing to get everything done   |                       |
|   | TIME3 | I am always in a rush   |                       |
| Purchasing power for food (PBC-Perceived resources) | MR1   | I spend as much money on food products as I like  | Contini et al. (2018) |
|   | MR2   | If I wanted to, I could afford to spend more money on food products                     |                       |
|   | MR3   | I cannot afford to spend more money on food products (R)                                |                       |
| Knowledge (PBC-Perceived resources)                 | KNOW1 | I know the effects of red meat consumption on my health                                 | New                   |
|   | KNOW2 | I know the effects of red meat consumption on the environment                           |                       |
|   | KNOW3 | I know the environmental benefits to be achieved by reducing red meat in my diet        |                       |
|   | KNOW4 | I know the health benefits obtained from reducing red meat in my diet                   |                       |

Notes: (R) indicates the reversed items. The item codes are derived from the initials of the respective constructs, situated in the neighbouring section of the table.

extracted) values (Table 3) exceeded the 0.5 threshold (Fornell & Larcker, 1981) and the factor loadings (Table 4) exceeded the 0.5 threshold (Cheung & Wang, 2017; Stancu & Lähteenmäki, 2022) and loaded significantly on their respective factors ( $p < 0.001$ ). The composite reliability (CR) ranged from 0.76 to 0.96, comfortably surpassing the minimum acceptable level of 0.60, as proposed by Fornell and Larcker (1981). These findings collectively ensured convergent validity. Furthermore, we also confirmed discriminant validity as the AVEs exceeded the SCs.

The model also exhibited strong goodness-of-fit statistics (Hu & Bentler, 1999). The RMSEA index recorded 0.066, below the maximum allowable 0.08, while the CFI index equalled the minimum recommended value of 0.9. The SRMR, at 0.056, was less than the maximum allowable 0.08. The TLI exceeded 0.9 (0.936) and the  $\chi^2$  to degrees of freedom ratio was 2.72, staying below the recommended threshold of 3. Table 5 shows the results of the structural model and the ability of the selected factors to explain Intention is good ( $R^2 = 0.60$ ).

The intention to reduce red meat in one's diet was significantly and positively determined by instrumental attitude, subjective norm, availability of meat substitutes, and knowledge of the negative effects of meat consumption. In contrast, affective attitude, cooking skills, time pressure and purchasing power for food were not significant. The Supplementary Material (Table A) presents the zero-order correlations categorized by gender. We then went on to analyse the differences between men and women by gender-based grouping. The Lagrange multiplier test showed that the measurement structure was common to the two groups ( $\chi^2 = 29.34$  df = 25p-values = 0.25), while the Wald test applied to the coefficients of the structural model showed that they differed significantly between the two groups ( $\chi^2 = 32.29$  df = 8p-values = 0.00). Given that the measurements are equal, but the coefficients of the structural model vary, the grouping analysis is justified. The separate coefficients for men and women are shown in Table 6. In addition, grouping improved the explanatory power of the model ( $R^2$  for men 0.65 and  $R^2$  for women 0.61). The Supplementary Material (Table B) displays the means of the factor scores for each construct by gender, along with the significant differences.

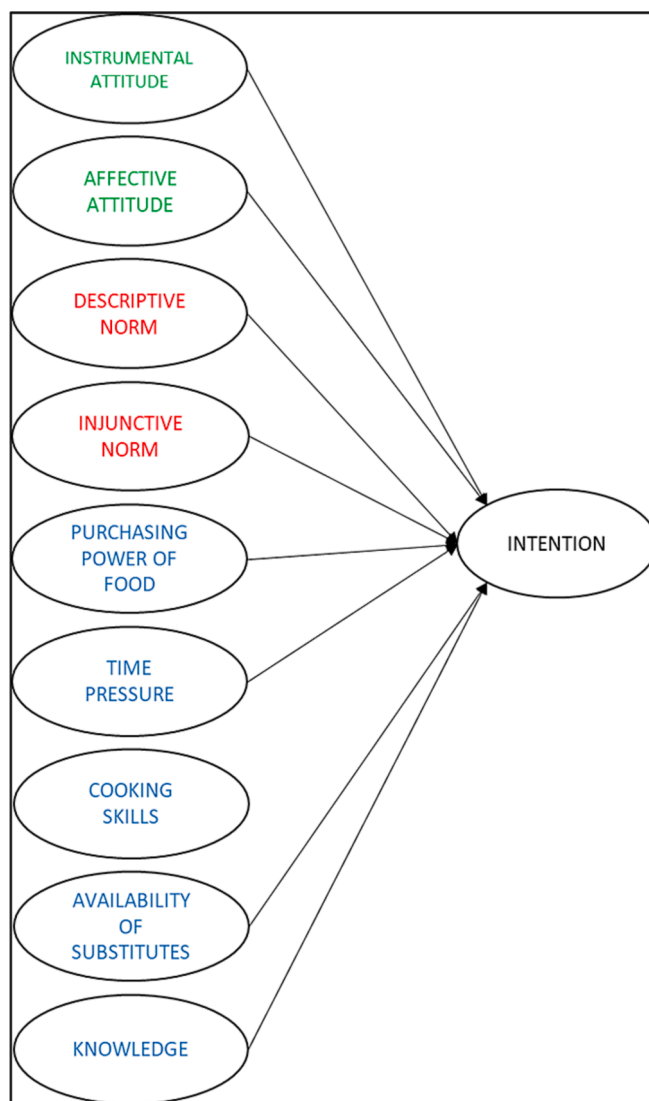


Fig. 1. Structural equation model to identify determinants of intention to reduce red meat consumption. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Grouping confirmed good goodness-of-fit statistics: the RMSEA index was 0.073, the CFI index 0.87, SRMR was 0.068, TLI was 0.91 and the ratio of  $\chi^2$  and degrees of freedom was 1.77.

The results showed that all constructs were significantly correlated with the intention, at least for one of the two genders. Only instrumental attitude and subjective norm were significant drivers for both genders. Thus, a positive attitude related to the instrumental component and favourable social pressure to reduce red meat increased the intention to reduce red meat consumption for both men and women. In contrast, the affective attitude was significant and only played a positive role for women. In the PBC subcomponents, the determinants were totally different. Our observations suggest that, among men, the intention to decrease red meat consumption exhibited a negative correlation with cooking skills but a positive correlation with knowledge about the effects of meat consumption and time pressure. For women, however, intention increased as the availability of meat alternatives increased and purchasing power decreased.

### 5. Discussion

In order to analyse the determinants of intention to reduce red meat



**Table 3**  
AVE, CR and SC of each construct.

| Construct                   | CR   | AVE  | Squared correlation among latent variables |      |      |      |      |      |      |      |   |  |  |
|-----------------------------|------|------|--|------|------|------|------|------|------|------|---|--|--|
|                             |      |      | 1  | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9 |  |  |
| 1 Intention                 | 0.96 | 0.88 | 1  |      |      |      |      |      |      |      |   |  |  |
| 2 Instrumental attitude     | 0.87 | 0.62 | 0.40                                       | 1    |      |      |      |      |      |      |   |  |  |
| 3 Affective attitude        | 0.90 | 0.66 | 0.25                                       | 0.48 | 1    |      |      |      |      |      |   |  |  |
| 4 Subjective norm           | 0.86 | 0.66 | 0.40                                       | 0.20 | 0.18 | 1    |      |      |      |      |   |  |  |
| 5 Cooking skills            | 0.90 | 0.69 | 0.01                                       | 0.00 | 0.01 | 0.00 | 1    |      |      |      |   |  |  |
| 6 Time pressure             | 0.76 | 0.53 | 0.01                                       | 0.02 | 0.02 | 0.02 | 0.03 | 1    |      |      |   |  |  |
| 7 Availability              | 0.90 | 0.70 | 0.18                                       | 0.15 | 0.06 | 0.12 | 0.03 | 0.00 | 1    |      |   |  |  |
| 8 Purchasing power for food | 0.76 | 0.52 | 0.00                                       | 0.00 | 0.01 | 0.00 | 0.03 | 0.03 | 0.05 | 1    |   |  |  |
| 9 Knowledge                 | 0.88 | 0.66 | 0.18                                       | 0.11 | 0.02 | 0.05 | 0.23 | 0.01 | 0.14 | 0.07 | 1 |  |  |

**Table 4**  
Factor loadings, mean, and standard deviation of the various items and Cronbach's alpha of constructs.

| Construct                          | Code    | Factor loadings | Mean | Standard deviation | Alpha |
|------------------------------------|---------|-----------------|------|--------------------|-------|
| Intention                          | INT1    | 0.96            | 3.94 | 1.73               | 0.96  |
|                                    | INT2    | 0.93            | 3.78 | 1.77               |       |
|                                    | INT3    | 0.94            | 4.01 | 1.72               |       |
|                                    | INT4    | 0.91            | 3.96 | 1.74               |       |
| Instrumental attitude (ATT)        | INATT1  | 0.87            | 4.22 | 1.54               | 0.82  |
|                                    | INATT2  | 0.81            | 4.23 | 1.46               |       |
|                                    | INATT3  | 0.67            | 4.33 | 1.42               |       |
| Affective attitude (ATT)           | AFFATT1 | 0.82            | 3.97 | 1.50               | 0.85  |
|                                    | AFFATT2 | 0.86            | 3.78 | 1.53               |       |
|                                    | AFFATT3 | 0.75            | 3.69 | 1.43               |       |
| Subjective norm                    | DESSN1  | 0.76            | 3.38 | 1.54               | 0.86  |
|                                    | DESSN2  | 0.86            | 3.41 | 1.61               |       |
|                                    | DESSN3  | 0.85            | 3.41 | 1.56               |       |
|                                    | INJSN1  | 0.83            | 3.25 | 1.58               |       |
| Cooking skills (PBC-PS)            | INJSN2  | 0.81            | 3.73 | 1.59               | 0.90  |
|                                    | INJSN3  | 0.75            | 3.16 | 1.50               |       |
|                                    | COOK1   | 0.80            | 5.50 | 1.55               |       |
|                                    | COOK2   | 0.84            | 5.34 | 1.66               |       |
| Availability (PBC-PO)              | COOK3   | 0.82            | 5.28 | 1.61               | 0.9   |
|                                    | COOK4   | 0.86            | 5.35 | 1.67               |       |
|                                    | AV1     | 0.82            | 3.93 | 1.66               |       |
|                                    | AV2     | 0.88            | 4.06 | 1.62               |       |
| Time pressure (PBC-PR)             | AV3     | 0.82            | 4.39 | 1.62               | 0.75  |
|                                    | AV4     | 0.82            | 4.18 | 1.67               |       |
|                                    | TIME1   | 0.50            | 4.45 | 1.43               |       |
| Purchasing power for food (PBC-PR) | TIME2   | 0.72            | 3.83 | 1.49               | 0.74  |
|                                    | TIME3   | 0.90            | 3.38 | 1.53               |       |
|                                    | MR1     | 0.70            | 4.41 | 1.43               |       |
|                                    | MR2     | 0.87            | 4.19 | 1.47               |       |
| Knowledge (PBC-PR)                 | MR3     | 0.56            | 4.27 | 1.63               | 0.88  |
|                                    | KNOW1   | 0.81            | 5.17 | 1.25               |       |
|                                    | KNOW2   | 0.83            | 5.01 | 1.33               |       |
|                                    | KNOW3   | 0.82            | 5.07 | 1.27               |       |
|                                    | KNOW4   | 0.78            | 5.14 | 1.27               |       |

Notes: In brackets, it shows the original construct that the subcomponent derives from. ATT = attitude; PBC = perceived behavioural control; PS = perceived skills; PO = perceived opportunities; PR = perceived resources.

in men and women, we conducted a study on an Italian sample using the model developed by Rhodes et al. (2006), which broke down the antecedents of intention as per the theory of planned behaviour into sub-components. By adopting the multicomponent model, the results of our study contribute to improving knowledge in the area of food consumption behaviour by highlighting different determinants between men and women.

5.1. Theoretical implications

In particular, our research found that subjective norm predict intention in both men and women. Furthermore, the analysis showed that there is no distinction between injunctive and descriptive norm. This finding indicates that social pressure in the context of meat

**Table 5**  
Results of the structural equation model.

| Variable                           | Coefficient | Standard error |
|------------------------------------|-------------|----------------|
| Instrumental attitude (ATT)        | 0.31***     | 0.07           |
| Affective attitude (ATT)           | 0.06        | 0.07           |
| Subjective norm                    | 0.39***     | 0.04           |
| Cooking skills (PBC-PS)            | -0.01       | 0.05           |
| Availability (PBC-PO)              | 0.09**      | 0.05           |
| Time pressure (PBC-PR)             | 0.00        | 0.04           |
| Purchasing power for food (PBC-PR) | -0.05       | 0.05           |
| Knowledge (PBC-PR)                 | 0.20***     | 0.06           |

Notes: \*\*\* indicates 99 % significance, \*\* indicates 95 % significance. In brackets it shows the original construct that the subcomponent derives from. ATT = attitude; PBC = perceived behavioural control; PS = perceived skills; PO = perceived opportunities; PR = perceived resources.

**Table 6**  
Antecedents of the intention to reduce red meat consumption for men and women.

| Variable                           | Men         |                | Women       |                |
|------------------------------------|-------------|----------------|-------------|----------------|
|                                    | Coefficient | Standard error | Coefficient | Standard error |
| Instrumental attitude (ATT)        | 0.24***     | 0.08           | 0.28**      | 0.11           |
| Affective attitude (ATT)           | -0.02       | 0.08           | 0.17*       | 0.10           |
| Subjective norm                    | 0.47***     | 0.06           | 0.38***     | 0.06           |
| Cooking skills (PBC-PS)            | -0.16***    | 0.06           | 0.11        | 0.06           |
| Availability (PBC-PO)              | 0.05        | 0.06           | 0.13**      | 0.06           |
| Time pressure (PBC-PR)             | 0.17***     | 0.06           | -0.09       | 0.06           |
| Purchasing power for food (PBC-PR) | 0.04        | 0.06           | -0.12**     | 0.06           |
| Knowledge (PBC-PR)                 | 0.31***     | 0.07           | 0.07        | 0.07           |

Notes: \*\*\* indicates 99 % significance, \*\* indicates 95 % significance, \* indicates 90 % significance. In brackets, it shows the original construct that the sub-component derives from. ATT = attitude; PBC = perceived behavioural control; PS = perceived skills; PO = perceived opportunities; PR = perceived resources.

consumption is represented by a single construct, i.e. the individual's perception of what relevant others expect from them (injunctive norm) coincides with their perception of what relevant others actually do (descriptive norm). This result is confirmed by the literature showing that the same consumption habits develop within the family. For example, Sturgeon Delia (2021) pointed out that having a vegetarian family encourages the practice of this type of diet, while it is difficult to pursue a vegetarian diet when family members do not support this eating style. Our result suggests a divergence from the application of the multicomponent model in sports. In the case of sports, social pressure can be broken down into two different factors; the first related to the behaviour of the reference group; the second to the expectations of the reference group with respect to the others, showing that there can be a

disconnect between what people do and what they would like others to do (Somerset & Hoare, 2018).

With regard to attitude and perceived behavioural control, distinct subcomponents emerge; therefore for these constructs the model does not differ from the one developed by Rhodes et al. (2006) for exercise behaviour.

Instrumental attitude proves to be a determinant for both men and women, indicating that the functional benefits of reducing meat consumption predict the intention of each gender. Affective attitude, on the other hand, only plays a significant role for women. This result can be explained by the fact that women are more prone to emotional eating (Guerrero-Hreins et al., 2022; Larsen et al., 2006). In addition, women pay more attention to issues such as animal welfare that solicit the emotional sphere (Blanc et al., 2020; Cembalo et al., 2016; Tzioumis et al., 2018).

Regarding perceived behavioural control, the literature review shows that in many studies that applied Ajzen's model, PBC was found to be non-significant or weakly significant in explaining the reduction in meat consumption (Çoker & van der Linden, 2022; Harland et al., 1999; Krispenz & Bertrams, 2020; Spence et al., 2018; Thangavelu et al., 2022; Wolstenholme et al., 2021). In contrast, our results show that, following the breakdown of the construct into its subcomponents and separate PCB analysis for the two genders, all selected drivers are associated with the intention, although some affect men's intention and some affect women's intention.

For men, the determinants are cooking skills, time pressure and knowledge of the effects of meat consumption on health and the environment. More specifically, cooking skills have a negative effect on men's intention to reduce meat consumption, proposing that a higher level of cooking skills among men is associated with a lower inclination to reduce meat consumption. This result surprised us, because the literature associates poor cooking skills with difficulty in preparing alternative dishes to meat (Eckl et al., 2021; Kemper & White, 2021; Verbeke, 2015), so it was safe to assume that greater cooking skills might result in a greater inclination to replace meat with plant-based foods. However, the negative correlation between cooking skills and intention to reduce meat consumption might be explained by the fact that previous studies had not differentiated between the cooking habits of males and females. Although our study did not specifically measure the ability to cook meat, our interpretation of the findings suggests that men who cook have developed a particular skill set and a love for cooking meat leading them to be less inclined to cook vegetarian dishes. This consideration is supported by literature showing that meat preparation, such as barbecuing, is a task normally performed by men (Leer, 2022). On the other hand, men's predisposition to prepare meat dishes might be traced back to the aforementioned cultural and societal factors related to the link between masculinity and meat consumption (Guenther et al., 2005; Mycek, 2018; Sobal, 2005) and men's lower interest in the nutritional aspects of food (Wardle et al., 2004; Sanchez-Sabate & Sabaté, 2019).

Time pressure is positively associated with the intention to reduce meat consumption for men. This finding was also unexpected, as in the literature those with less time are less likely to change habits (Courter & Ahmed, 2019; Wood & Neal, 2009). One explanation for the findings of our analysis may be that time pressure is correlated with the habit of eating meals outside the home (Mills et al., 2018). Going to a restaurant and having the option to choose from a variety of plant-based dishes can make reducing meat consumption more convenient and accessible. Additionally, being in a restaurant setting may also increase exposure to and awareness of plant-based options (Ye & Mattila, 2021; Zhang et al., 2023).

Knowledge of the impact of red meat consumption on health and the environment in the case of men is a predictor of the intention to reduce meat consumption. This finding is consistent with the literature (Eckl et al., 2021; Kemper & White, 2021; Mancini & Antonioli, 2019). Such alignment could stem from a correlation between men who have a

deeper understanding of the effects of red meat consumption on health and the environment and those who tend to prioritize their health and/or environmental concerns more than some other men. Therefore, our interpretation suggests that prioritizing health and/or the environment could serve as a mediator in the relationship between heightened knowledge of the impacts of meat consumption and the intention to reduce meat consumption among men.

For women, the PCB components that influence intention are the presence of meat alternatives in stores and purchasing power for food. The role of product availability on intention is consistent with the literature (Hielkema & Lund, 2021; Stoll-Kleemann & Schmidt, 2017). The difference in importance compared to men can be explained by the fact that women are the ones predominantly involved in food shopping (Quadlin & Doan, 2018), so are the ones with more experience of how much the availability of a product affects choices. Women are therefore more aware that the absence of alternatives to red meat at the place where they make food purchases is a concrete barrier to reducing meat consumption.

Regarding purchasing power for food, our study indicates that it does not significantly impact men. Conversely, women with lower purchasing power exhibit a stronger tendency to reduce their meat consumption. This finding aligns with previous research that has established a positive correlation between income and meat consumption (Milford et al., 2019; Parlasca & Qaim, 2022; Schroeder et al., 1996). It suggests that women with lower purchasing power tend to favour meat alternatives that are generally more affordable, while men tend to maintain a relatively consistent meat consumption pattern, regardless of their income level.

## 5.2. Applied implications

Our findings provide insights for gender-specific food policies. To foster virtuous eating behaviours in men, the main lever turns out to be improving knowledge of the health and environmental impacts of red meat. Information campaigns that promote the health properties of alternative dishes appear to be the most useful strategies to foster the shift to healthier or more sustainable diets. Among young people, the school environment is referred to in the literature as an ideal setting for promoting more sustainable or healthy food choices, including those that differ from family choices (Story et al., 2009). In this context, one strategy that can complement conventional nutrition education is to offer a wide selection of plant-based meals in canteens and promote them in visibility terms. The challenge facing institutions in this area is measured by their ability to produce an offer that is seen as attractive in comparison with the alternatives that young people can find outside school (van Kleef et al., 2019).

As for women, targeted actions are particularly important because of the role women play in food purchases at household level (Quadlin & Doan, 2018) and the importance of the family in shaping consumption habits (Ho et al., 2022). For women, low purchasing power has proven to be a driver of their intention to reduce meat consumption. This result draws our attention to the price system as a determinant of food preferences. With this in mind, one proposal is to put taxes on meat on the table of policy makers. In support of this strategy, a recent literature review conducted by Funke et al. (2022) highlighted that the price of meat is underestimated related to real social costs and indicates that consumption taxes on meat prove to be an effective choice to address environmental externalities and improve public health. The same authors showed that meat taxes could ease the competitiveness concerns of domestic producers by using additional revenues from taxes to compensate producers in disadvantaged areas and incentivise more sustainable animal husbandry. Another driver exclusive to females is the emotional dimension. This finding implies insights for healthy food promotion campaigns targeting women, which should leverage the association between food and positive mood, using keywords such as "sunny day", "lifting the spirit", "connection with loved ones",

“comfort”, and “relaxation” both in imagery and language. Lastly, various studies have shown the importance of supply in guiding food preferences (Hielkema & Lund, 2021; Stoll-Kleemann & Schmidt, 2017; Contini et al., 2020). In this regard, it would be beneficial for women to improve the distribution, visibility, and variety of protein food offerings alternative to meat that are appropriate, in taste and convenience terms, to current consumer preferences (Drewnowski & Monsivais, 2020; Fantechi et al., 2023).

### 5.3. Strengths, limitations and future research

We employed a novel extension of the Theory of Planned Behaviour to conduct gender-specific analyses in the food consumption area. This enabled us to address a crucial gap in knowledge pertaining to the motivations driving discrepancies in meat consumption between men and women. Furthermore, we responded to a key research gap highlighted by Eckl et al. (2021) which underscored the lack of data on PBC in the context of meat consumption behaviour. Our comprehensive examination of this aspect revealed previously unnoticed correlations in the existing literature (e.g. Krispenz & Bertrams, 2020; Lentz et al., 2018). Moreover, when we divided our sample by gender, we observed substantial differences within the PBC framework. This discovery carries significant implications for future research, highlighting the importance of accounting for gender when investigating meat consumption and intentions to reduce it.

In the context of new research insights, the role of time pressure on meat consumption intention deserves further consideration. We have indicated the frequency of consumption of out-of-home meals as a possible mediator of the correlation between time pressure and intention, but we did not bring empirical data to support this claim. This result opens up new avenues of research, suggesting an in-depth study of the relationship between time pressure and meat consumption as a future development, including an analysis of the factors mediating this relationship. The topic is of particular interest because time pressure is an increasingly common phenomenon, and the prospect that it may contribute to the spread of better diets appears to be an opportunity not to be underestimated.

One potential limitation of our research could be related to how we measured cooking skills and knowledge. Based on our understanding from existing literature, our interpretation of the cooking skills results indicates that men who claimed cooking proficiency predominantly possess skills in cooking meat. However, our scale didn't explicitly assess the ability to cook meat as the dishes listed didn't specify whether they involved meat or vegetables. This aspect requires further exploration in future studies, employing more precise scales designed specifically for evaluating meat preparation skills. Regarding knowledge, our preliminary statistical analysis suggests the reliability of the scale. However, there might be considerations about the accuracy of measuring the knowledge of red meat's impacts on health and sustainability. In particular, the wording we used might not have allowed us to assess the true depth of knowledge, as we did not explicitly inquire about the significance that respondents attribute to the specific impacts of meat consumption on health and the environment. This opens the door for further investigation, where subsequent studies could improve our scale and explore the aspect of knowledge using more precise phrasing to measure awareness regarding the consequences of meat consumption.

Another limitation is the use of a cross-sectional survey design. This design means that we capture a snapshot of respondents' perspectives at a specific moment when they complete the questionnaire regarding their intention to reduce meat consumption. Our study does not enable us to confirm whether this intention actually results in a reduction in meat consumption. Additional research will be useful to incorporate real behaviour into the framework to understand this transition better. This will shed new light on any potential barriers or factors that may facilitate this process.

## 6. Conclusions

The article's key contribution lies in its analysis of the factors that predict intentions to reduce red meat consumption in men and women, revealing substantial gender-specific differences. It emphasizes the necessity of tailoring studies and strategies by gender in policies, information campaigns, and interventions. The practical implications underscore the importance of tailored initiatives: men benefit from increased awareness of meat's impact, while women's choices are influenced by both affordability and emotional connections to food.

## 7. Ethical Statement

Hereby, I Caterina Contini consciously assure that for the manuscript “The Meaty Gender Gap: Understanding Gender-Based Differences in Intention to Reduce Red Meat Consumption” the following is fulfilled:

- 1) This material is the authors' own original work, which has not been previously published elsewhere.
- 2) The paper is not currently being considered for publication elsewhere.
- 3) The paper reflects the authors' own research and analysis in a truthful and complete manner.
- 4) The paper properly credits the meaningful contributions of co-authors and co-researchers.
- 5) The results are appropriately placed in the context of prior and existing research.
- 6) All sources used are properly disclosed.
- 7) All authors have been personally and actively involved in substantial work leading to the paper, and will take public responsibility for its content.
- 8) The study was explained to consumers in the online questionnaire. They were informed that they would participate in the survey using their personal device, that all data will be de-identified and only reported in the aggregate. All participants acknowledged an informed consent statement in order to participate in the study.

### CRediT authorship contribution statement

**Tommaso Fantechi:** Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Caterina Contini:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Leonardo Casini:** Conceptualization.

### 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.

### Data availability

Data will be made available on request.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.foodqual.2023.105078>.

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