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# JOURNAL OF APPLIED SOCIAL PSYCHOLOGY

## Rational and Moral Motives to Reduce Red and Processed Meat Consumption

Journal:	<i>Journal of Applied Social Psychology</i>
Manuscript ID	Draft
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Keywords:	Theory of planned behaviour (TPB), Value belief norm (VBN), Pro-environmental Motives

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**Abstract**

This study analyzed the psychosocial aspects that predict intention to reduce red/processed meat consumption, proposing an integration of the Theory of Planned Behaviour (TPB) and the Value-Belief-Norm (VBN) approaches. Participants (N = 233) filled in a self-report online questionnaire, measuring the intention to reduce red/processed meat consumption, and both TPB (attitude, subjective norm, perceived behavioral control, past behavior) and VBN (universalism, general pro-environmental beliefs, awareness of consequences, ascription of responsibility, personal moral norm) variables. Results indicated that attitude and subjective norm were the strongest predictors of intention, followed by personal moral norm and past behavior. Mediation analyses showed that the impact of the VBN chain (from universalism to personal norm) on intention was mediated by attitude. Discussion focuses on the opportunity to integrate the (rational) TPB approach with the (normative) VBN approach, highlighting psychosocial aspects that public policy should focus on to promote a red/processed meat consumption.

Keywords: Theory of planned behaviour (TPB); Value belief norm (VBN); Rational motives; Pro-environmental motives; Morality; Norms.

## RATIONAL AND MORAL MOTIVES

**Rational and Moral Motives to Reduce Red and Processed Meat Consumption****Introduction**

Western diets are characterized by excessive red and processed meat consumption (RPMC), which is connected to both health and environmental negative consequences. Health consequences include mainly the risk of coronary heart disease, stroke and diabetes (e.g., Bouvard et al., 2015).

Environmental consequences include risky pollution, depletion, and the disruption of water and land resources (e.g., Gardner, Hartle, Garrett, Offringa, & Wasserman, 2019). To reduce these health and environmental risks, public policies should effectively communicate the urgency of a shift to a less animal-based diet. However, there is little agreement over the degree to which public policies should leverage either rational or moral motives to promote the reduction of RPMC. While rational motives consider a behavior to be a result of individual cost-benefit analyses (e.g., Tobler, Visschers, & Siegrist, 2011), moral motives are based on pro-environmental and ethical concerns (Austgulen, Skuland, Schjøll, & Alfnes, 2018; de Boer, de Witt, & Aiking, 2016).

To address this problem, more evidence on the complex relationships among psychosocial motives associated with RPMC is needed. So far, only a few scholars have considered rational and moral motives simultaneously, as well as the main psychosocial factors related to them (e.g., Siegrist, Visschers, & Hartmann, 2015; Yadav, Dokania, & Pathak, 2016). With the aim of contributing to this debate, the present study integrates two theoretical frameworks that are generally used to explain pro-environmental and food choices, namely, the theory of planned behaviour (Ajzen, 1991) and the value-belief-norm theory (Stern, Dietz, Abel, Guagnanon, & Kalof, 1999). These two theories focus on rational and moral considerations respectively, and their integration might usefully clarify which psychosocial aspects public policy should focus on in order to convince people to reduce RPMC (Turaga, Howarth, & Borsuk, 2010).

**1. Theoretical Framework**

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3 The Theory of Planned Behavior (TPB), developed by Ajzen (1991) and the Value-Belief-Norm  
4 (VBN), proposed by Stern et al. (1999), are two psycho-social approaches to the integration of the  
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6 motivations of individuals into the analysis of their intention and behavior. The TPB is mainly  
7  
8 focused on a rational-based explanation of the people's intention to perform a given behavior, while  
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10 the VBN is mainly focused on a value-based explanation ( Kaiser, Hübner, & Bogner, 2005). So  
11  
12 far, few scholars have proposed the integration of these two models (e.g., Fornara, Pattitoni, Mura,  
13  
14 & Strazzera, 2016; Hansla, Gamble, Juliusson, & Gärling, 2008; Menzel & Bögeholz, 2010; Park &  
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16 Ha, 2014), although none of them have investigated whether such integration can contribute to  
17  
18 better explain the intention to reduce RPMC. In the present study, we aimed to integrate the TPB  
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20 and VBN to understand which psychosocial factors are more related to consumers' intention to  
21  
22 reduce RPMC. The two theoretical models, their integration, and related research hypotheses are  
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24 discussed below.

### 31 1.1. *The Theory of Planned Behavior*

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33  
34 The TPB (Ajzen, 1991) is an example of a rational decision-making model, which states that the  
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36 main proximal determinant of behavior is related to the people's motivation and conscious plan to  
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38 perform the behavior in question, namely behavioral intention. In turn, behavioral intention is  
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40 described as a function of attitude, subjective norm, and perceived behavioral control towards that  
41  
42 behavior (Figure 1). *Attitude* is the result of the personal beliefs about the perceived consequences  
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44 of the behavior in question (Ajzen, 1991), and these beliefs are based upon two perceptions: the  
45  
46 probability of the behavioral outcomes and their personal evaluation. *Subjective norm* refers to the  
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48 perception of social pressure to perform the behavior (Ajzen, 1991), and is a result of normative  
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50 beliefs. Normative beliefs are based upon the perceptions of the likelihood that specific salient  
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52 groups or individuals (referents) expect that the person performs the behavior, combined with the  
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54 person's motivation to comply with their expectation. Finally, *perceived behavioral control* refers to  
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3 the individuals' perception of their ability to engage in the behavior (Ajzen,1991), and it is  
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5 described as the perception of control over the opportunities or obstacles to perform the behavior in  
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7 question (Ajzen,1991).  
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10 The TPB has been frequently applied to explain different food choices, and past scholars  
11  
12 have confirmed the predictive power of intentions towards different food choices, such as healthy  
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14 products (e.g., Caso & Carfora, 2017) or sustainable foods (e.g., Han & Hansen, 2012). Previous  
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16 studies have also confirmed that attitude is the main predictor of many food choices, followed by  
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18 perceived behavioral control (Qi & Ploeger, 2019; Wang, Pacho, Liu, & Kajungiro, 2019). The  
19  
20 predictive role of attitudes has been also confirmed when a food choice is associated with  
21  
22 environmental benefits, such as selecting organic (Carfora et al., 2019a; Yadav et al., 2016) or local  
23  
24 foods, and reducing red meat consumption (Rees et al., 2018). The predictive role of subjective  
25  
26 norm is less clear and seems to depend on the specific food-related behavior. For example, in line  
27  
28 with the TPB assumptions, some prior research has shown that subjective norm is the strongest  
29  
30 predictor of intention related to fast food consumption (Dunn, Mohr, Wilson, & Wittert, 2011) or  
31  
32 food waste reduction (Stancu, Haugaard, & Lähteenmäki, 2016). Other research has instead  
33  
34 reported that subjective norm fails to predict intention to purchase organic food (e.g., Yadav et al.,  
35  
36 2016) and red meat consumption (Carfora, Caso, & Conner, 2017a; Graça, Calheiros, & Oliveira,  
37  
38 2015; Zur & Klöckner, 2014). Therefore, more investigation is needed to clarify the role of  
39  
40 subjective norm in predicting the intention to reduce RPMC.  
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46 Following the traditional TPB assumptions related to the prediction of individuals'  
47  
48 intentions, in the present study we tested the following hypotheses.  
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51 **H1:** Participants with a high positive attitude towards reducing RPMC have a higher  
52  
53 intention to reduce RPMC.  
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56 **H2:** Participants who perceive a high social pressure to reduce RPMC (i.e., high subjective  
57  
58 norm) have a higher intention to reduce RPMC.  
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3 **H3:** Participants with a high perception of behavioral control over their RPMC (i.e., high  
4 perceived behavioral control) have a higher intention to reduce RPMC.  
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8 In the present study, we also considered the predictive role of past behavior. Both health and  
9 environmental research suggests the inclusion of *past behavior* in robust models that assess food  
10 choice intention and behavior (e.g. Klöckner, 2013), and many researchers have included past  
11 behavior as an additional variable into TPB model applied to pro-environmental and healthy food  
12 choices (e.g., Caso, Carfora, & Conner, 2016; Gkargkavouzi, Halkos, & Matsiori, 2019).  
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19 **H4:** Participants' past RPMC decreases their intention to reduce RPMC in the future.  
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## 21 22 1.2. *The Value-Belief-Norm* 23 24

25 The TPB has been often criticized for overlooking the psycho-social factors related to  
26 morality (Armitage & Conner, 2001). Consistently, several health and environmental studies  
27 showed that the inclusion of value-based drivers increases the explanatory power of intention (e.g.,  
28 Jansson, Marell, & Nordlund, 2010; Rivis, Sheeran, & Armitage, 2009; Steg & Vlek, 2009). To  
29 analyse how these antecedents determine consumers' intentions, most authors have applied the  
30 Value-Belief-Norm theory (VBN; Stern, 2000). According to the VBN model (Figure 2), norm  
31 activation is triggered by a chain of five related factors, which are values, general pro-  
32 environmental beliefs, awareness of consequences, ascription of responsibility, and personal moral  
33 norm.  
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45 *Values* are guiding principles in one's life (Stern et al., 1999). Making reference to the  
46 widely employed value theory (Schwartz, 1992), the VBN theory states that the self-enhancement  
47 and the self-transcendence dimensions affect people's general beliefs about the relationship  
48 between humans and the environment. While the self-enhancement dimension is characterised by  
49 the pursuit of egoistic goals, the self-transcendence dimension is characterized by concern for others  
50 and environmental values.  
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3 To assess *general pro-environmental beliefs*, past research has mainly referred to the new  
4 ecological paradigm, measuring the endorsement of a pro-environmental worldview (e.g., Dunlap &  
5 Van Lierem 1978; Hawcroft & Milfont, 2010). However, an interesting perspective in this regard is  
6 offered by the new human interdependence paradigm (NHIP; Corral-Verdugo, Carrus, Bonnes,  
7 Moser, & Sinha, 2008), which considers the fact that people may have a utilitarian drive to behave  
8 in an ecological way. Thus, in the present study we used the NHIP construct as a measure of general  
9 pro-environmental beliefs.  
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19 The VBN theory considers values and general pro-environmental beliefs as the antecedents  
20 of three variables included in the Norm Activation Model (NAM; Schwartz, 1977), namely,  
21 awareness of consequences, ascription of responsibility, and personal moral norm. *Awareness of*  
22 *consequences* refers to the degree to which people are aware of the negative consequences of their  
23 behaviours on the environment. This awareness provokes an *ascription of responsibility*, which is  
24 the feeling of being responsible for the negative impact of the non-implementation of pro-  
25 environmental behaviors. In turn, ascription of responsibility activates *personal moral norm*, which  
26 is related to the feeling of moral obligation to perform or refrain from a specific behavior  
27 (Schwartz, 1977).  
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40 In the domain of the studies on food choice, the VBN model has been successfully applied  
41 to explain behavioral intention (e.g., Shin & Hancer, 2016; Yang, 2016). For example, past studies  
42 have shown that a strong endorsement of self-transcendence values induces to eat less meat (de  
43 Boer, Hoogland, & Boersema, 2007), the awareness of consequences influences ascription of  
44 responsibility and ascription of responsibility influences personal moral norm in relation to choice  
45 an organic menu (Shin, Im, Jung, & Severt, 2018).  
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54 Finally, both in the case of the VBN and TPB models and their integration, past studies  
55 suggested that the influence of the personal moral norm is an important factor in shaping intentions  
56 to perform behaviors (e.g., Fornara et al., 2016; Parker, Manstead, & Stradling, 1996; Turaga, et al.,  
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2010). The important role of personal moral norm was also confirmed in studies aimed at explaining green food-related behaviour in many contexts (e.g., Thøgersen & Ölander, 2002).

Starting from the above, in the present study we tested the following hypotheses.

**H5:** Participants with a high value of universalism have high pro-environmental beliefs.

**H6:** Participants with high general pro-environmental beliefs are more aware of the consequences of the environmental impact of RPMC (i.e., high awareness of consequences).

**H7:** Participants with high awareness of consequences feel of being responsible for the negative environmental impact of their RPMC (i.e., high ascription of responsibility).

**H8:** Participants with the high ascription of responsibility feel a moral obligation about reducing their RPMC (i.e., high personal moral norm).

**H9:** Participants with high personal moral norm intend to reduce their RPMC more.

### *1.3 Integrating TPB and VBN*

To develop a comprehensive model to explain people's intention to reduce RPMC, in the present study we tested different relationships among TPB and VBN variables (Figure 3).

Within the TPB model, attitude towards a behavior is a function of the individual beliefs regarding any behavioral consequences and the individual evaluation of those consequences (Ajzen & Fishbein, 1980). Accordingly, the awareness of consequences has been shown to be a significant antecedent of pro-environmental attitudes (Floress et al., 2017; Fornara et al., 2016; Halkos, Matsiori, & Dritsas, 2019). We therefore expected the awareness of consequences to predict participants' attitude towards reducing RPMC.

**H10:** Participants' awareness of the environmental consequences of excessive RPMC predicts attitude towards reducing RPMC.

Past studies have also endorsed moral concepts as significant antecedents of attitude rather than of intention (Raats et al., 1995; Sparks, Shepherd, Wieringa, & Zimmermanns, 1995). Especially attitudes related to the pro-environmental behaviors are composed of a set of evaluations,

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3 where the personal moral norm have an important role (Thompson, Reimer, & Prokopy, 2015), and  
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5 past studies consistently found that personal moral norm predicts environmental attitudes (Fornara  
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7 et al., 2016; Kaiser, 2005; Kaiser & Scheuthle, 2003; Klöckner, 2013). For example, in a study on  
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9 attitude towards the environment and green products, results revealed that consumers' personal  
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11 moral norm was the most important predictor of the attitude towards green product (Chen & Chai,  
12  
13 2010).  
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16  
17 **H11:** Participants' personal moral norm predicts attitude towards reducing RPMC.  
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20 A number of scholars supported the thesis that voluntary control is a precondition of moral  
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22 responsibility (e.g., Fischer, & Ravizza, 2000; Smith, 2008). However, so far such relationship has  
23  
24 not been tested in the domain of food choice.  
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27 **H12:** Participants' perceived behavioral control over their RPMC predicts their ascription of  
28  
29 responsibility about reducing meat consumption to protect the environment.  
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32 In addition to testing the above hypotheses, we developed some research questions about the  
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34 presence of a series of indirect effects among the study variables. Consistent with the VBN  
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36 assumptions, several studies (e.g., Bamberg & Möser, 2007; Fornara et al., 2016; Jakovcevic &  
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38 Reyna, 2016; Nordlund & Garvill, 2003; Steg, Dreijerink, & Abrahamse, 2005) have confirmed the  
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40 presence of a mediation chain from value-based antecedents (e.g., biospheric values, pro-  
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42 environmental beliefs, awareness of consequences, ascription of responsibility and personal moral  
43  
44 norm) to intention. In the case of the intention to reduce meat consumption, one study (Van Der  
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46 Werff & Steg, 2015) showed an indirect effect of awareness of consequences on meat consumption  
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48 via ascription of responsibility and personal moral norm. The more people are aware of the  
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50 environmental problems, the more they feel they can contribute by reducing meat consumption,  
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52 which is in turn related to a moral obligation that influences actual consumption. Starting from the  
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54 above evidence, in the present study we verified whether personal moral norm would mediate the  
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3 impact of the VBN chain (universalism, then general pro-environmental beliefs, awareness of  
4 consequences, and ascription of responsibility) on intention (Research Question 1 - **RQ1**).

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8 Few authors have considered attitude as another factor that can mediate the effect of the  
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10 VBN chain on intention towards pro-environmental behaviors. For example, one study (Zhang,  
11 Geng, & Sun, 2017) showed that not only personal moral norm but also attitude significantly  
12 mediated the effect between awareness of consequences and intention of environmental complaint.  
13  
14 Importantly, a study of Klockner (2013) on pro-environmental behavior showed that part of the  
15 impact of personal moral norms on intentions was mediated by attitude. Fornara et al. (2016)  
16 reported a similar result by showing that personal moral norm had a strong indirect link with  
17 intention via attitude towards the use of green energies. These results suggest that people consider  
18 favorable what is in line with their personal values. However, no scholar has yet assessed whether  
19 attitude mediates the impact of all VBN predictors on intention related to sustainable food choice.  
20  
21 Therefore, in the present study we verified whether attitude would mediate the impact of the VBN  
22 chain (universalism, then general pro-environmental beliefs, awareness of consequences, ascription  
23 of responsibility, and personal moral norm) on intention (Research Question 2 – **RQ2**). Considering  
24 the limited past evidence on the issue, we did not make any specific predictions about the greater  
25 effectiveness of either this mediation chain or the one via personal moral norm.  
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## 43 **2. Method**

### 44 *2.1. Participants and Measures*

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48 The present study was implemented following receipt of ethical approval by the Catholic  
49 University of the Sacred Heart (Milan). In April 2018, a total of 233 online questionnaires were  
50 collected with a convenience sample of Italian consumers (107 male; 126 female; mean age =  
51 25.91; SD = 12.33). At the beginning of the online questionnaire, participants read an explanation  
52 of the study and provided written consent. Through the questionnaire, we measured TPB variables  
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(attitude, subjective norm, perceived behavioral control), VBN variables (universalism, general pro-environmental beliefs, awareness of consequences, ascription of responsibility, personal moral norm), and past RPMC. Table 1 shows standardized factor loadings for each item.

*Attitude.* Participants' attitude towards reducing RPMC was measured with three items using a 7-point semantic differential scale ("Reducing RPMC is/would be...bad – good, positive – negative, important – not important"; Carfora, Catellani, Caso, & Conner, 2019a). Higher scores indicated a greater positive attitude towards reducing RPMC ( $\alpha = .80$ ).

*Subjective norm.* Participants' subjective norm was assessed with three items ("Most people who are important to me think that I should reduce RPMC... strongly disagree (1) – strongly agree (7)"; "People who are important to me would approve my reduction of RPMC ... strongly disagree (1) – strongly agree (7)"; "People who are important to me want me to reduce RPMC... strongly disagree (1) – strongly agree (7)"; Carfora, Caso, & Conner, 2017b). Higher scores indicated a greater perception of social pressure towards reducing RPMC ( $\alpha = .86$ ).

*Perceived behavioral control.* Participants' perceived behavioural control over reducing RPMC was assessed with three items ("How much do you feel that whether you reduce your red/processed meat consumption is beyond your control... strongly disagree (1) – strongly agree (7)" "Whether or not I reduce my RPMC is entirely up to me... strongly disagree (1) – strongly agree (7)"; "I see myself as capable of reducing RPMC... strongly disagree (1) – strongly agree (7); Carfora et al., 2017a). Higher scores indicated greater control over reducing RPMC ( $\alpha = .76$ ).

*Universalism.* Participants' value of universalism was assessed with three items of the Portrait Values Questionnaire male and female versions ("S/He strongly believes that people should care for nature. Looking after the environment is important to her/him... not like me at all (1) – very much like me (5)"; "S/He thinks it is important that every person in the world be treated equally. S/He believes everyone should have equal opportunities in life... not like me at all (1) – very much like me (5)"; "It is important to her/him to listen to people who are different from her/him. Even when

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3 s/he disagrees with them, s/he still wants to understand them...not like me at all (1) – very much  
4 like me (5)”; Schwartz, 2007). Higher scores indicated a greater value of universalism ( $\alpha = .70$ ).

7  
8 *General pro-environmental beliefs.* To assess general pro-environmental beliefs we employed  
9 three items selected from the NHIP scale (Corral-Verdugo et al., 2008), concerning the degree of  
10 agreement with a set of statements about general pro-environmental beliefs (“Human progress can  
11 be achieved only by maintaining ecological balance... strongly disagree (1) – strongly agree (7)”;  
12 “Preserving nature now means ensuring the future for human beings... strongly disagree (1) –  
13 strongly agree (7)”; “Human beings can progress only by conserving nature's resources... strongly  
14 disagree (1) – strongly agree (7)”). Higher scores indicated greater pro-environmental beliefs ( $\alpha =$   
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25 .89).

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27 *Awareness of consequences.* We assessed participants’ awareness of consequences in relation to  
28 the environmental consequences connected to an excessive RPMC with three items (“An excessive  
29 RPMC causes environmental problems... strongly disagree (1) – strongly agree (7)”; “A reduction  
30 of RPMC contributes to the environmental protection... strongly disagree (1) – strongly agree (7)”;  
31 “An excessive RPMC causes serious environmental problems, such as climate change... strongly  
32 disagree (1) – strongly agree (7)”; adapted from van der Werff & Steg, 2009). Higher scores  
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41 indicated greater awareness of consequences ( $\alpha = .88$ ).

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43 *Ascription of responsibility.* Participants’ ascription of responsibility was assessed with two  
44 items (“I think it is useful to reduce RPMC to reduce environmental problems... strongly disagree  
45 (1) – strongly agree (7)”; “I can take on responsibility for the environment by reducing my  
46 RPMC... strongly disagree (1) – strongly agree (7)”; “I think I can contribute to reducing  
47 environmental problems by reducing RPMC“... strongly disagree (1) – strongly agree (7)”;;  
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60 adapted from van der Werff & Steg, 2009). Higher scores indicated greater ascription of  
responsibility (mean  $r = .76$ ;  $p < .001$ ).

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3     *Personal moral norm.* We measured personal moral norm with three items (“I would feel guilty  
4 if I would not reduce my red/processed meat consumption... strongly disagree (1) – strongly agree  
5 (7)”; “I feel morally obliged to reduce RPMC... strongly disagree (1) – strongly agree (7)”;  
6  
7 “Having an excessive RPMC is against my moral principles... strongly disagree (1) – strongly  
8 agree (7)”; adapted from van der Werff & Steg, 2009). Higher scores indicated greater personal  
9 moral norm ( $\alpha = .96$ ).

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12     *Intention to reduce RPMC* was measured using three items (“I intend to reduce my RPMC...  
13 strongly disagree (1) – strongly agree (7)”; “I plan to reduce my RPMC... strongly disagree (1) –  
14 strongly agree (7)”; “I want to reduce my RPMC... strongly disagree (1) – strongly agree (7)”;  
15 Carfora et al., 2017b). Higher scores indicated greater intention to reduce RPMC ( $\alpha = .94$ ).

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18     *Past RPMC* over the previous week was assessed with two items, with a response scale from  
19 “0” to “more than 14” (“How many servings of red meat have you eaten in the previous  
20 week?”; “How many servings of processed meat have you eaten in the previous week?”; Carfora et  
21 al., 2017b). Higher scores indicated greater consumption of red/processed meat in the previous  
22 week (mean  $r = .43$ ;  $p < .001$ ).

## 2.2.     *Data Analyses*

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All analyses were performed with a maximum-likelihood estimation approach using MPLUS 7. In the preliminary analyses, we used confirmatory factor analysis to verify the measurement model. To verify the internal consistency among the measurement items for each variable, we used composite reliability. We also tested convergent and discriminant validities of our data.

In the main analyses, we verified our hypotheses (H1 – H12) and the research question (R1) about our comprehensive model. To do so, we ran structural equation modelling (SEM) analyses, which tested the goodness-of-fit of two nested models.

To test H1 – H4, we built Model 1, which included the TPB paths from attitude, subjective norm, perceived behavioural control and past behaviour to intention as free parameters. In Model 1,

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3 the regression weights of the other hypothesised paths (H5 – H12) were fixed to 0. To test H5 –  
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5 H12 we then built Model 2, a comprehensive theoretical model which included TPB predictors, past  
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7 behaviour, and the estimation of the paths related to VBN variables. In Model 2 we included the  
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9 paths from TPB predictors and past behaviour to intention (i.e., H1, H2, H3, H4) as free parameters.  
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11 We also set the following paths (related to the VBN chain) as free parameters: the path from  
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13 universalism to general pro-environmental beliefs (H5); the path from general pro-environmental  
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15 beliefs to awareness of consequences (H6); the path from awareness of consequences to ascription  
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17 of responsibility (H7); the path from ascription of responsibility to personal moral norm (H8); the  
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19 path from personal moral norm to intention to reduce RPMC (H9). Finally, we inserted the  
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21 following paths among TPB and VBN variables as free parameters: the path from awareness of  
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23 consequences to attitude (H10); the path from personal moral norm to attitude (H11); the path from  
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25 perceived behavioural control to ascription of responsibility (H12).

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30 To compare Model 2 with Model 1, we used a Chi-squared difference test ( $\Delta\chi^2$ ), given their  
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32 nested nature. If the  $\Delta\chi^2$  value were significant for the reduced degrees of freedom we could  
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34 conclude that Model 2 had a better fit than Model 1.

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37 To investigate our RQ1, in Model 2 we analysed indirect paths from the VBN chain to intention  
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39 via either personal moral norm or attitude. Regarding the mediating role of personal moral norm,  
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41 we tested all the simple and sequential mediation chains from VBN to intention via personal moral  
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43 norm. Regarding the mediating role of attitude, we tested all the simple and sequential mediation  
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45 chains from VBN variables (including personal moral norm) to intention via attitude.

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49 The adequacy of fit of measurement and structural models were tested using Chi-square and  
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51 incremental goodness-of-fit indexes: root mean square error of approximation (RMSEA) < .05,  
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53 comparative fit index (CFI) < .90, Tucker-Lewis index (TLI) < .90 and standardized root mean  
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55 squared residual (SRMR) < .08 (Browne & Cudeck, 1993; Hu & Bentler, 1999). Models with  
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significant Chi-Square test results were accepted on the condition that the CFI or TLI value reaches .95 or more, and the value of RMSEA was fewer than .08 (Hair et al., 2010).

### 3. Results

#### 3.1. Preliminary analyses

Table 1 shows means, standard deviations, composite reliability and AVE of each study variable, plus standard loadings of each item. Table 2 reports the estimates relevant to convergent and discriminant validity.

Confirmatory factor analysis showed that the measurement model fit the data satisfactorily ( $\chi^2(305) = 447.98, p < .001$ ; RMSEA = .04, CFI = .96, TLI = .95, SRMR = .05). Results revealed that all the composite reliability values were greater than the minimum threshold of .60 (Bagozzi & Yi, 1988), ranging from .70 to .91. Thus, the reliability of the measurement model was confirmed.

The standardized item loadings of all observed variables on their corresponding latent constructs varied from .61 to .96 (Table 1), thus being highly significant. The average variance extracted (AVE) from latent constructs ranged from .53 to .78. Thus, all AVE values were above the recommended threshold of .05 (Anderson & Gerbing, 1988; Fornell & Larcker, 1981). These findings showed that all measurement items presented a high convergent validity. Discriminant validity was also confirmed because all AVEs were higher than squared correlations between latent constructs (Fornell & Larcker, 1981).

#### 3.2. Main analyses

As shown in Table 3, the goodness of fit of Model 1 was not acceptable [ $\chi^2(38) = 448.27, p < .001$ ; RMSEA = .22, CFI = .26, TLI = .24, SRMR = .21]. TPB variables were therefore not sufficient to predict participants' intention to reduce RPMC. The comparison between Model 1 and Model 2 ( $\Delta\chi^2(19) = 422.64, p = .001$ ) indicated that Model 2 had a better explanatory power concerning behavioural intention and higher goodness of fit indices [ $\chi^2(19) = 25.63, p < .001$ ; RMSEA = .04, CFI = .99, TLI = .97, SRMR = .05] than the more parsimonious Model 1. For this

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3 reason, we accepted the more comprehensive Model 2 as the best model to explain participants'  
4 intentions to reduce RPMC (Figure 4). In this Model 2, attitude ( $R^2 = .21$ ), general pro-  
5 environmental beliefs ( $R^2 = .19$ ), awareness of consequences ( $R^2 = .07$ ), ascription of responsibility  
6 ( $R^2 = .45$ ), personal moral norm ( $R^2 = .27$ ), and intention ( $R^2 = .40$ ) had significant levels of  
7 explained variance.  
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14 As regards the contribution of TPB variables in explaining the intention to reduce RPMC,  
15 the results of Model 2 confirmed H1 and H2, showing that participants' attitude ( $\beta = .38; p < .001$ )  
16 and subjective norm ( $\beta = .30; p < .001$ ) predicted the intention to reduce RPMC. The results did not  
17 instead support H3, because perceived behavioural control did not contribute to explain  
18 participants' intention to reduce RPMC ( $\beta = -.02; p = .68$ ). Finally, the path of past RPMC on  
19 participants' intention to reduce RPMC turned out to be significant ( $\beta = -.09; p < .001$ ), confirming  
20 H4.  
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31 As regards the contribution of VBN in explaining the intention to reduce RPMC, the  
32 findings of Model 2 confirmed our H5, by showing that universalism predicted general pro-  
33 environmental beliefs ( $\beta = .43; p < .001$ ). Results also showed that participants' pro-environmental  
34 beliefs predicted their awareness of consequences ( $\beta = .26; p < .001$ ), which in turn predicted  
35 ascription of responsibility ( $\beta = .63; p < .001$ ). H6 and H7 were therefore also confirmed. In  
36 addition, findings showed that participants' ascription of responsibility predicted their personal  
37 moral norm ( $\beta = .35; p < .001$ ), which in turn explained the intention to reduce RPMC ( $\beta = .14; p <$   
38  $.001$ ). Thus, H8 and H9 were also accepted.  
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49 We then examined the hypothesised relationships among TPB and VBN variables. As we  
50 stated in H10 and H11, awareness of consequences ( $\beta = .19; p < .001$ ) and personal moral norm ( $\beta$   
51  $= .32; p < .001$ ) influenced participants' attitude. Moreover, perceived behavioural control  
52 explained participants' ascription of responsibility ( $\beta = .17; p < .001$ ), supporting our H12.  
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3 Finally, we considered our RQ1 about the mediation chains from universalism to the  
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5 intention to reduce RPMC. With a first set of mediation analyses, we verified if personal moral  
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7 norm mediated the impact of the VBN chain on intention (Table 4). Results showed that the  
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9 stronger mediation chain was the simple mediation path from ascription of responsibility to  
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11 intention via personal moral norm (*Ind. Effect* = .10;  $p = .03$ ), followed by the sequential mediation  
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13 chain from awareness of consequences to intention via ascription of responsibility and then personal  
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15 moral norm (*Ind. Effect* = .04;  $p = .03$ ). Importantly, the mediation path from universalism to  
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17 intention was not significant (*Ind. Effect* = .01;  $p = .07$ ).  
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21 With a second set of mediation analyses, we verified if attitude toward reducing RPMC  
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23 mediated the impact of the VBN chain on intention (Table 5). Results showed that the stronger  
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25 mediation chains were the path from ascription of responsibility to intention via attitude (*Ind. Effect*  
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27 = .14;  $p = .001$ ), and the path from awareness of consequences to intention via personal moral norm  
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29 (*Ind. Effect* = .10;  $p = .001$ ). Differently from the mediation paths via personal moral norm, the full  
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31 chain from universalism to intention via the other VBN predictors was significantly mediated by  
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33 attitude (.01;  $p = .02$ ).  
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38 In sum, the above results confirmed the importance of considering attitude as an important  
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40 part of the sequential chain from universalism to intention to reduce RPMC, given that this  
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42 mediation had a higher indirect effect on intention, compared to the chain that considered only the  
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44 mediating role of the VBN variables.  
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#### 47 **4. Discussion**

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49 The purpose of the present study was to integrate an explanation of the intention to reduce RPMC  
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51 based on a rational cost-benefit analysis with an explanation based on value-based motives. To do  
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53 so, we integrated the TPB predictors, which are based on a rational- choice deliberation, with the  
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55 VBN predictors, which are based on values and moral norms. Our results confirmed the predictive  
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57 power of a model that integrates the rational and moral motives (plus past behaviour). Compared to  
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3 a TPB model, our comprehensive model was more satisfactory and explained a higher level of the  
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5 variance of participants' intention ( $R^2 = .40$ ). Our results have several theoretical and practical  
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7 implications, concerning the psychosocial predictors of the intention to reduce RPMC, but also  
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9 more generally the predictors of other pro-environmental intentions.  
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12 First, we found that the combined TPB-VBN model may be more effective than the classic  
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14 TPB model in explaining RPMC, because TPB and VBN are designed to capture different aspects  
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16 of a person's intention. The TPB model is meant to capture motives related to individual cost-  
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18 benefit analyses, whereas the VBN focuses more on moral motives. Our results showed that  
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20 participants' intention to reduce RPMC was more associated to a rational consideration of benefits  
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22 related to the behaviour in question than to moral considerations based on pro-environmental  
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24 motives. These results are in line with the study of Shin (2018) showing that rational motives such  
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26 as attitude and subjective norm (but with the exception of perceived behavioral control) are the best  
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28 predictors of the intention to choose organic menu items, compared to pro-environmental motives.  
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33 Second, the present study contributes to the current literature on how to explain and increase  
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35 people intention to act pro-environmentally via sustainable food choices, by showing the very  
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37 important role of attitude. As we hypothesised, attitude was the strongest predictor of the intention  
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39 to reduce RPMC and this was partly explained by both the awareness of the environmental  
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41 consequences of an excessive RPMC and the personal moral norm to reduce it. The indirect effect  
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43 of personal moral norm on intention via attitude has been so far scarcely investigated in relation to  
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45 pro-environmental food choices (e.g., Fornara et al., 2016; Klockner 2013; Zhang, Geng, & Sun,  
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47 2017). In this regard, what we found offers support to the existence of a close connection between  
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49 the sense of a moral obligation to perform a pro-environmental behavior and its consequent pro-  
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51 and-cons evaluation, suggesting that moral motives may guide participants' behavioral intention  
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53 only if the consequences of the behavior are positively considered in individualistic terms. This  
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55 result is in line with the new human interdependence paradigm (Corral-Verdugo et al., 2008), for  
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3 which people may have a utilitarian drive to behave in an ecological way. Moreover, the results of  
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5 our mediation analyses suggest that the more people are guided by environmental values, are  
6  
7 informed about environmental problems and feel they can contribute by reducing RPMC, the more  
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9 they feel an obligation to reduce RPMC. At the same time, we found that this chain of value-based  
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11 factors is not enough to influence participants' actual intention. This is the case only when attitude  
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13 is also taken into account, that is, when people consider a favourable behavior that is in line with  
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15 their pro-environmental values and beliefs. To sum up, moral motives seem to guide the intention to  
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17 reduce RPMC only if they are associated with a rational positive evaluation towards it. Future  
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19 studies might consider which communication or behavioral strategies can be usefully employed to  
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21 transform values, beliefs, and norms in a coherent and favourable attitude towards reduced RPMC.  
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27 Third, our findings suggest that not only attitude but also subjective norm is an important  
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29 predictor of the intention to reduce RPMC. A previous study conducted in Italy (Carfora et al.,  
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31 2017a) had not found a significant connection between the perception of a social pressure to reduce  
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33 RPMC and the intention to reduce it. These different findings might be due to the increasing  
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35 awareness of the impact of RPMC on the environment, suggesting that RPMC reduction is  
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37 becoming a social trend in Italy. This suggests that a public communication aimed at reducing  
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39 excessive RPMC by targeting related social norms might be successful (e.g., Sparkman & Walton,  
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41 2017; Stea & Pickering, 2019). Finding out that many consumers have successfully reduced their  
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43 RPMC to protect the environment might activate individuals' desire to adhere to societal standards  
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45 and might stimulate a critical thinking both on why the majority of people is reducing RPMC and  
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47 whether their own contribution may be relevant.  
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51 Finally, the present study showed that participants feel a moral obligation to protect the  
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53 environment from the damages associated with excessive RPMC (i.e., the ascription of  
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55 responsibility) when they can control their food choice (i.e., perceived behavioral control). This is  
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57 line with past studies showing that personal responsibility is perceived or attributed to others when  
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3 an outcome is considered as controllable (Alicke, Buckingham, Zell & Davis, 2008). Thus, public  
4 policy should stress the presence of alternative food choices that can substitute the nutritious values  
5 of meat, as well as it should allow people to have an easier access to more plant-based food.  
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### 9 10 *Limitation and Methodological Issues*

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12 The present research has three main limitations (which also affect much similar research in  
13 this area). First, the findings related to a small self-selected sample of Italian participants and,  
14 therefore, they are not generalizable to other populations. Second, past behavior was assessed with  
15 self-report measures. Third, we proposed a low significant relationship between the awareness of  
16 the environmental consequences of excessive RPMC and participants' attitude towards reducing  
17 RPMC. This low direct effect may be attributable to the fact that attitude has also affective and  
18 conative dimensions, which we did not address here. Future studies may attempt to overcome these  
19 limitations, controlling whether our model produces similar results both when it is tested in  
20 different countries and when it considers a more complex and exhaustive definition of attitude.  
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33 Finally, most of our constructs were assessed as behavior-specific measurements and  
34 respected the recommendation on how to include more elements in the TPB, that is the principle of  
35 compatibility (Fishbein & Ajzen, 2011). However, universalism and general pro-environmental  
36 beliefs are constructs that refer to general values and beliefs that are independent from the behavior  
37 in question. In their measurement, therefore it was not possible to address the four aspects (Target,  
38 Action, Context and Time, TACT) that ensure the matching of specificity of a behavior in all TPB  
39 measurements. That said, as already demonstrated for general personality traits and motivations  
40 (Conner & Abraham, 2001; Lombardi et al., 2017), our results suggested that research on value and  
41 general pro-environmental beliefs can be integrated with research on the TPB and that their addition  
42 can provide a more sufficient model to explain intention in the case of the sustainable food choices.  
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60 If the effectiveness of such integration would be confirmed in other pro-environmental studies, this  
could enrich research into cognitive determinants of intention to act pro-environmentally by

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clarifying which individual values and general beliefs may persist across different sustainable behavioural domains.

To conclude, our findings contribute to a better understanding of the psychosocial aspects related to people's intention to reduce RPMC. They suggest that focusing on attitude, subjective norm and personal moral norm, as well as providing information about the environmental impact of excessive RPMC, can be fruitful strategies to encourage people to change their eating behavior regarding red and processed meat. In devising public campaigns, authorities should not only focus on pro-environmental and value-based motives, as they have mainly done so far. They could usefully also stress a series of rational motives related to a reduced RPMC, such as health and well-being benefits (Bertolotti, Carfora, & Catellani, 2019), utilitarian and hedonic motivation (Lombardi et al., 2017), or social norms (Sparkman & Walton, 2017; Stea & Pickering, 2019).

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## RATIONAL AND MORAL MOTIVES

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Table 1

*Results of the confirmatory factor analysis*

Construct	Mean	Standard Deviation	Items	Standard loadings	Composite reliability	AVE
Attitude (ATT)	4.96	1.26	ATT1	.82	.80	.57
			ATT2	.65		
			ATT3	.78		
Subjective Norm (SN)	3.21	1.39	SN1	.86	.89	.73
			SN2	.74		
			SN3	.87		
Perceived Behavioral Control (PBC)	4.99	1.19	PBC1	.64	.83	.62
			PBC2	.90		
			PBC3	.61		
Universalism (UN)	4.92	.62	UN1	.62	.76	.53
			UN2	.60		
			UN3	.67		
General Pro-environmental Beliefs (GPB)	5.95	.81	GPB1	.81	.84	.64
			GPB2	.81		
			GPB3	.80		
Awareness of Consequences (AC)	4.76	1.12	AC1	.89	.90	.76
			AC2	.89		
			AC3	.91		
Ascription of Responsibility (AR)	4.62	1.23	AR1	.87	.70	.53
			AR2	.90		
Personal Moral Norm (PN)	3.43	1.40	PN1	.77	.84	.64
			PN2	.91		
			PN3	.82		
Intention to Reduce Red/Processed Meat Consumption (INT)	4.07	1.60	INT1	.89	.91	.78
			INT2	.96		
			INT3	.93		
Self-reported Past Red/Processed Meat Consumption (PB)	3.74	1.80	PB1	.70	.79	.66
			PB2	.61		

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Table 2

*Convergent and discriminant validity*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Attitude towards RPMC	<b>.57</b>	.35*	.24*	.12	.17*	.39*	.36*	.44*	.56*	-.20*
2. Subjective Norm		<b>.73</b>	.04	.08	.03	.09	.08	.11	.44*	-.16*
3. Perceived Behavioral Control			<b>.62</b>	.08	.06	.08	.22*	.23*	.13*	-.26*
4. Universalism				<b>.53</b>	.43*	.20*	.27*	.23*	.06	-.01
5. General Pro-environmental Beliefs					<b>.64</b>	.26*	.27*	.25*	.05	.03
6. Awareness of Consequences						<b>.76</b>	.65*	.53*	.28.*	-.17*
7. Ascription of Responsibility							<b>.53</b>	.52*	.34*	-.29*
8. Personal Moral Norm								<b>.62</b>	.36*	-.27*
9. Intention to Reduce RPMC									<b>.66</b>	-.16*
10. Past RPMC										<b>.78</b>

Note: The values in the diagonal row (bold) are the average variance extracted by each latent

construct. The numbers above diagonal are the squared correlation coefficients between the

constructs. \* $p < .001$ . RPMC = Red/Processed Meat Consumption

Table 3

*Comparison between the original and the extended TPB model*

	<b>Model 1</b>	<b>Model 2</b>
	<b>(TPB model plus past behaviour)</b>	<b>(TPB and VBN model plus past behavior)</b>
$\chi^2$ (df)	448.27 (38); $p = .001$	25.63 (19) $p = .14$
RMSEA	.22	.04
CFI	.26	.99
TLI	.24	.97
SRMR	.21	.05

Note: TPB = Theory of Planned Behaviour; VBN = Value Belief Norm Model.

Table 4

*Mediating paths from VBN predictors to intention via personal norm*

	Indirect Effect	<i>p</i>
AR → PN → INT	.10	.03
AC → AR → PN → INT	.04	.03
GPB → AC → AR → PN → INT	.01	.05
UN → GPB → AC → AR → PN → INT	.01	.07

Note: AR = Ascription of Responsibility; PN = Personal Moral Norm; INT = Intention to Reduce Red/Processed Meat Consumption; AC = Awareness of Consequences; GPB = General Pro-environmental Beliefs; UN = Universalism.

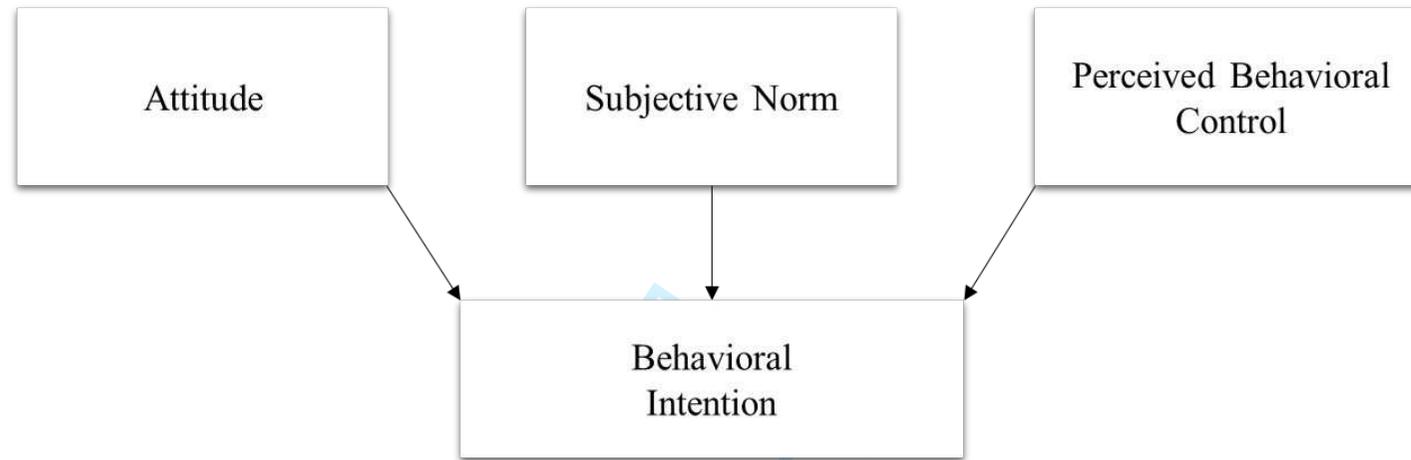
Table 5

*Mediating paths from VBN predictors to intention via attitude.*

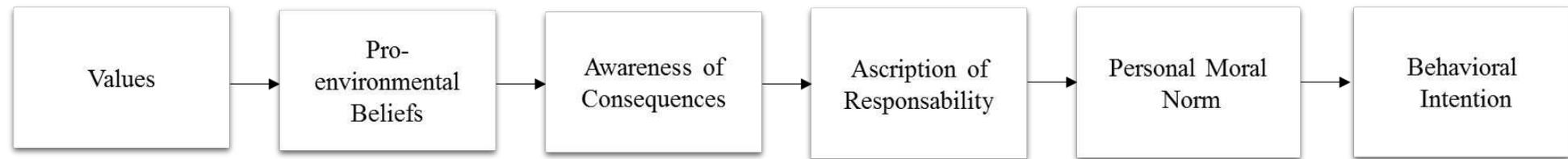
	Indirect Effect	<i>p</i>
PN → ATT → INT	.14	.001
AC → ATT → INT	.10	.001
AR → PN → ATT → INT	.08	.001
AC → AR → PN → ATT → INT	.04	.001
GPB → AC → AR → PN → ATT → INT	.01	.02
UN → GPB → AC → AR → PN → ATT → INT	.01	.02

Note: Note: AR = Ascription of Responsibility; PN = Personal Moral Norm; ATT = Attitude toward reducing RPMC; INT = Intention to Reduce Red/Processed Meat Consumption; AC = Awareness of Consequences; GPB = General Pro-environmental Beliefs; UN = Universalism.

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2 *Figure 1. Theory of planned behaviour (Ajzen, 1991)*  
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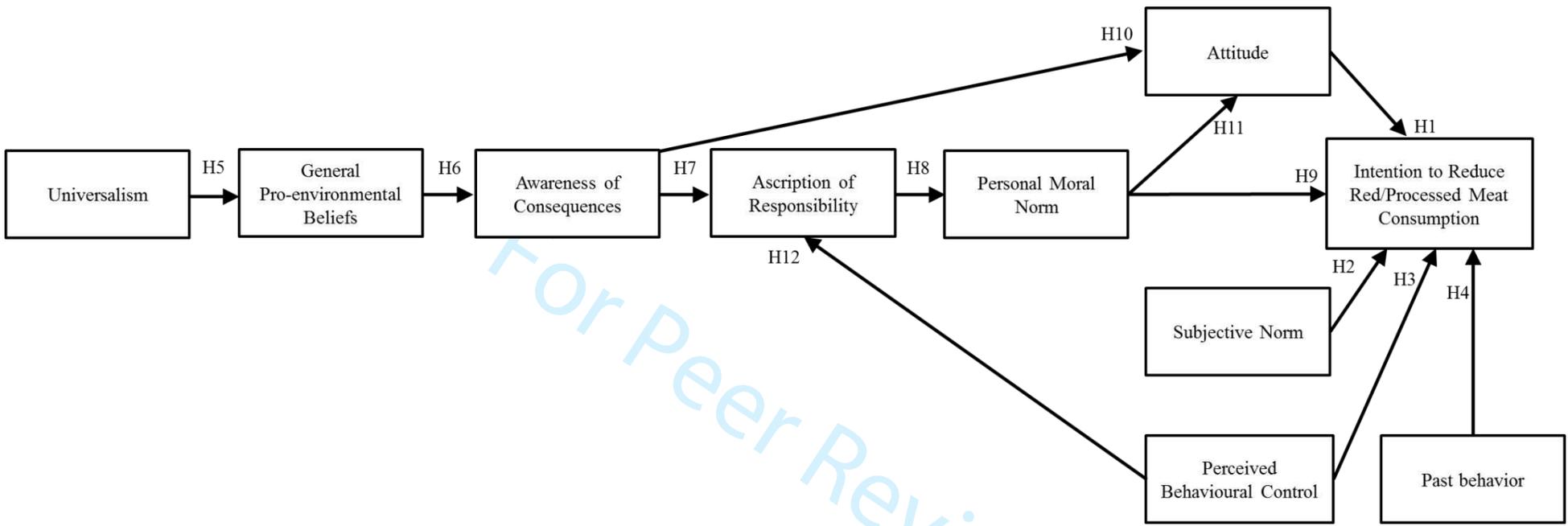


1  
2 *Figure 2. Value-Belief-Norm Theory (Stern et al., 1999)*  
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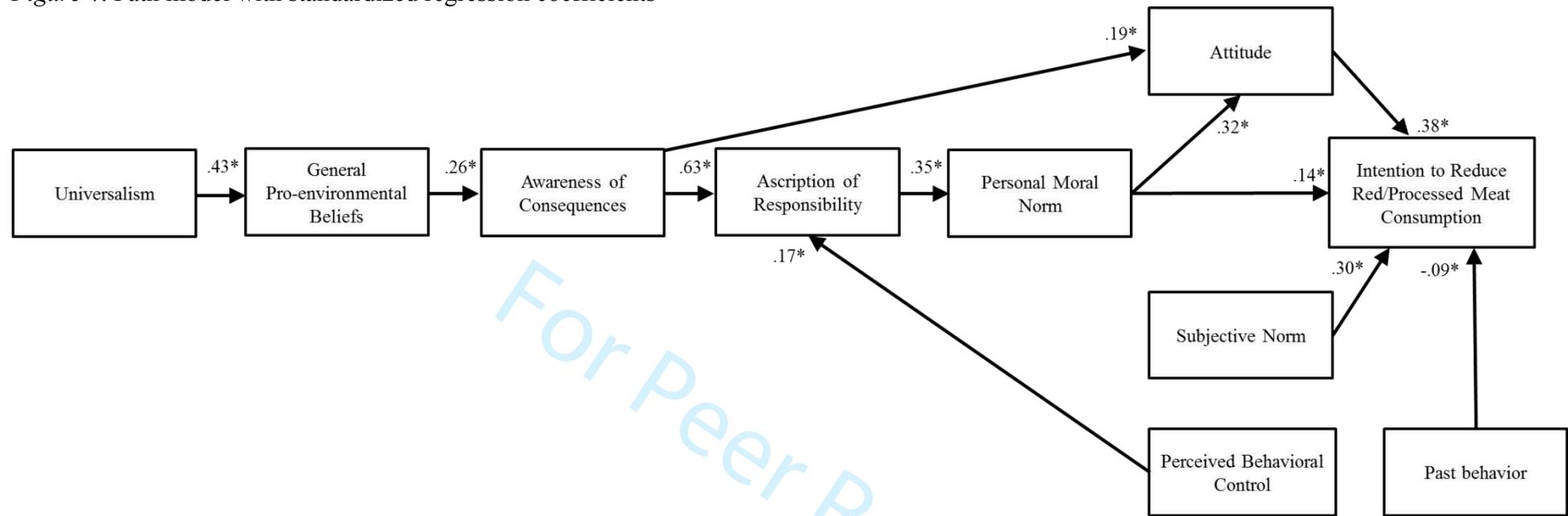
For Peer Review

Figure 3. Hypothesised paths among TPB, VBN and past behaviour



For Peer Review

Figure 4. Path model with standardized regression coefficients



Note: \* $p < .001$ .