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Explaining intention to reduce red and processed meat in the UK and Italy using the theory of planned behaviour, meat-eater identity, and the Transtheoretical model

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ABSTRACT

This study aimed to contribute to the growing literature investigating the psychosocial factors associated with intentions to reduce red and processed meat consumption, given the significant negative impact of meat on public health and in contributing to climate change. A framework combining the Theory of Planned Behaviour with meat-eater identity and the Transtheoretical Model was used to explain intention to reduce red and processed meat consumption across participant samples in the UK and Italy, to identify the factors involved in encouraging behaviour change whilst also considering differences in culinary practices. University students in the UK (n = 320) and Italy (n = 304) completed an online survey including measures from the Theory of Planned Behaviour and the Transtheoretical Model, as well as a measure of meat-eater identity. The results showed differences in the relative impact of subjective norm, perceived behavioural control, and meat-eater identity, on behavioural intention across the different stages of change and across the two countries. On the other hand, attitude remained a stable predictor across the different stages of change and in both countries. The results are discussed in relation to existing literature, with the goal of increasing understanding of how reduced meat consumption might be encouraged across different populations.

1. Introduction

The overconsumption of meat is associated with several negative health and environmental outcomes. For example, the production of meat is associated with biodiversity loss, land degradation, water pollution and considerable greenhouse gas emissions, contributing significantly to climate change (Bailey, Froggatt, & Wellesley, 2014; Gerber et al., 2013). Furthermore, red and processed meat consumption is associated with an increased risk of contracting non-communicable diseases including colorectal, colon and rectal cancers (Chan et al., 2011; Walker, Rhubart-Berg, McKenzie, Kelling, & Lawrence, 2005). Despite this, the demand for animal-based protein has increased rapidly over the last 50 years, with many people in high-income countries consuming high amounts of meat, exceeding nutritional needs (Sans & Combris, 2015; Tilman & Clark, 2014). Concerns about animal welfare and greenhouse gas emissions have resulted in public debates in Europe about eating fewer meat and dairy products (e.g. Freibauer et al., 2011; Garnett, 2011). Moreover, this has led to an increased number of studies investigating the motivations among those who have reduced or eliminated meat from their diet, in addition to studies investigating strategies to reduce meat consumption among individuals who consume meat (see Harguess, Crespo, & Hong, 2020 for a review). However, recent literature has highlighted the need to understand differences in motivations for reducing meat consumption across different populations, to facilitate more tailored strategies aimed at encouraging reduced meat diets (Aiking & de Boer, 2018; de Boer & Aiking, 2018; Stoll-Kleemann & Schmidt, 2017). Against this background, the aim of the present study was to investigate the different psychosocial factors determining intentions to reduce red and processed meat using key theories of behaviour change: the Theory of Planned Behaviour (TPB; Ajzen, 1991),

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expanded with meat-eater identity (Stryker, 1968) and the Transtheoretical Model (TTM; Prochaska & Velicer, 1997), with participant samples in two countries.

1.1. The Theory of Planned Behaviour and meat-eater identity

The TPB explains behaviour as being predicted by behavioural intention, which is in turn predicted by attitudes, subjective norms and perceived behavioural control (Ajzen, 1991). Attitude refers to the degree to which a behaviour is evaluated positively or negatively, subjective norm refers to the perceived social pressure from significant others to perform the behaviour, while perceived behavioural control refers to a person's perceived ability to perform the behaviour in question (Ajzen, 1991). Thus, the TPB is able to provide useful information on the different psychosocial factors associated with behaviour change, with a body of literature supporting the predictive ability of the TPB in relation to a range of different behaviours (see Armitage & Conner, 2001 for a review). Identifying the psychosocial variables associated with a behaviour can be useful in informing targeted interventions, as maximising positive attitudes, subjective norms and perceived behavioural control can encourage behaviour change (Fife-Schaw, Sheeran, & Norman, 2007). Following this, there has been an increased application of the TPB to understand meat-eating behaviour in recent years (e.g. Carfora, Caso, & Conner, 2017; Çoker & van der Linden, 2020; Lentz, Connelly, Mirosa, & Jowett, 2018; Povey, Wellens, & Conner, 2001). In terms of informing interventions, Carfora, Catellani, Caso, and Conner (2019) found that increasing positive attitudes towards reducing red and processed meat was effective in reducing subsequent meat consumption.

However, existing literature has also demonstrated that a significant amount of variance in intentions and behaviour are not explained by the TPB variables (e.g., Armitage & Conner, 2001; Webb & Sheeran, 2006). This has led some researchers to propose the inclusion of self-identity as an additional construct within the TPB to explain additional variance in behavioural intentions (e.g. Armitage & Conner, 1999; Conner & Armitage, 1998; Rise, Sheeran, & Hukkelberg, 2010). Self-identity refers to a salient and lasting aspect of an individual's self-perception (Sparks, 2000). Identity can be viewed as a social construct associated with different roles in different contexts, where each categorization of the self is associated with internalised expectations about role-appropriate behaviour and an increased intention to perform contextually relevant behaviours (Charng, Piliavin, & Callero, 1988; Stryker, 1968).

Self-identity has been found to predict behavioural intentions directly when controlling for attitudes, subjective norms and perceived behavioural control (e.g. Rise et al., 2010; Sparks & Shepherd, 1992; Whitmarsh & O'Neill, 2010). This is consistent with self-identity theory, which postulates that self-identity can provide a disposition or tendency to act in a given way that is consistent with one's self-perception, to maintain and affirm one's sense of self (Stets & Burke, 2000; Stryker, 1968; Terry, Hogg, & White, 1999). On the other hand, there is evidence that self-identity can influence behaviour indirectly through the formation of attitudes, perceptions of control, and subjective norms (Hagger, Anderson, Kyriakaki, & Darkings, 2007). Hagger et al. (2007) explain that self-identity acts as a source of information when people make deliberate plans to act, where a person with a strong self-identity will have more positive attitudes, stronger perceptions of control, and a stronger perceived pressure to perform a related behaviour. They found evidence to support an indirect effect of self-identity for different health behaviours and concluded that trait-like dispositions, such as identity, influence behaviour predominantly through their effect on the TPB variables (Hagger et al., 2007).

Identity is particularly relevant for meat-eating behaviour (de Boer, Scholser & Aiking, 2017; Povey et al., 2001). As such, past research has demonstrated that meat-eater identity positively predicts intentions to eat meat (e.g. Povey et al., 2001) and negatively predicts intentions and willingness to reduce one's meat consumption (e.g. Carfora et al., 2017; De Groeve, Bleys, & Hudders, 2019). Thus, meat-eater identity might act as a barrier towards reduced meat consumption as individuals seek to main consistency between their behaviour and self-identity. Meat-eater identity has also been negatively correlated with attitudes (Abrahamse, Gatersleben, & Uzzell, 2009) and perceived behavioural control related to reduced meat consumption (Carfora et al., 2017), and has been positively correlated with attitudes, perceived behavioural control, and subjective norms in relation to meat-eating (Cadel, 2013). Thus, it is possible that meat-eater identity might also indirectly influence intentions to eat less meat through the TPB variables, in accordance with Hagger et al. (2007).

1.2. The Transtheoretical Model

Static models like the TPB can be augmented by stage-based models to increase understanding of behaviour change (e.g. Weibel, Ohnmacht, Schaffner, & Kossmann, 2019). One of the most well-known and widely used stage-based models is the TTM (Prochaska & Velicer, 1997). The TTM provides a temporal understanding of behaviour change, focussing on a person's readiness to change from an unhealthy behaviour to a healthy one. The model suggests that behaviour change occurs through a series of five distinct stages: 1) precontemplation, 2) contemplation, 3) preparation, 4) action and 5) maintenance (Prochaska & Velicer, 1997). Precontemplation describes people who have not yet considered changing their behaviour; contemplation describes people who are thinking about changing their behaviour in the future; preparation describes those who plan to change their behaviour soon and might have already taken some steps towards achieving this goal; action describes those who have made specific changes to their behaviour already; and maintenance describes those who have successfully maintained the new behaviour for some period of time. The stages of change are useful in identifying a person's readiness to change their behaviour, meaning that behaviour change interventions can be tailored to the needs of that individual to increase their effectiveness (Krebs, Prochaska, & Rossi, 2010; Noar, Benac, & Harris, 2007). However, much less attention has been afforded to the motivational aspects of behaviour change in the context of the stages of change (Bledsoe, 2006).

1.3. Combining the TPB and TTM

The TPB and TTM can be combined to provide a more comprehensive framework of behaviour change, by examining the relative influence of the TPB variables at each of the TTM's stages of change. Specifically, the TPB can provide useful information on the relevant psychosocial factors associated with intentions to perform a behaviour, as a person progresses from having no immediate plans to change their behaviour, to taking action. Few studies have combined stage models with the TPB to understand people's willingness to reduce their meat consumption (Weibel et al., 2019; Wyker & Davison, 2010). These studies have shown that the valence of TPB variables tend to increase (e.g. more positive attitudes, stronger perceived social pressure, increased perceived behavioural control) as a person progresses from earlier to later stages of change (e.g. from precontemplation to action). However, these studies did not consider the relative impact of each TPB variable on predicting intentions towards eating less meat across the different stages, despite intention being the most proximal predictor of behaviour (Ajzen, 1991). Understanding differences in the relative impacts of TPB variables on predicting intentions across each stage of change can be useful in providing an understanding of how individuals at varying stages in their readiness to change might be differently motivated to reduce their meat consumption. Moreover, past studies applying the TPB and the TTM to understand reduced meat consumption have been conducted within a single population. On the other hand, comparing these models across different populations can provide useful insights to inform more targeted interventions towards reduced meat consumption.

1.4. Differences across countries

Transitions to eating less meat may vary across countries, due to differences in cultural, culinary and economic factors (Aiking & de Boer, 2018; de Boer & Aiking, 2018; Rozin, 1990, 2007). For example, a recent study (de Boer & Aiking, 2018) found that individuals living in high-income Mediterranean countries (Italy and France) tended to consume on average a high amount of plant-based proteins (45.6 g per person per day), while individuals living in high-income Northern (Finland, Sweden and Denmark) and Western Central countries (Ireland, United Kingdom, Netherlands, Belgium, Luxembourg, Germany, and Austria) consumed a lower amount of plant-based proteins (38.9 g and 41.5 g respectively). Individuals living in high-income Mediterranean countries also appeared to be more willing to reduce their meat consumption compared to those living in high-income Northern and Western Central countries. For example, 55% of respondents in the Mediterranean countries stated that they would be willing to replace meat with vegetables compared to 38% of respondents in the Northern countries and 42% of respondents in the Western Central countries. Authors concerned with meat reduction have therefore emphasised the need to consider cultural differences in meat consumption and to tailor interventions accordingly, rather than relying on a 'one-size-fits-all' approach (e.g. de Boer & Aiking, 2018; IFPRI, 2016). Despite this, few studies have compared sustainable protein consumption, or the psychological factors associated with dietary shifts away from meat, across different countries.

1.5. The present study

This paper uses baseline data from a wider research project that tested the effectiveness of a randomised messaging intervention on reducing red and processed meat consumption in Italy (Carfora et al., 2019) and the UK (Wolstenholme, Poortinga, & Whitmarsh, 2020). The current paper combines data from the two participant samples to make cross-national comparisons, focussing specifically on the psychosocial factors associated with intentions to reduce red and processed meat, in Italy and the UK. While Italy adopts a Mediterranean diet, consisting mainly of fruits and vegetables with a low intake of animal products (e.g. Zamora-Ros et al., 2013), diet in the UK tends to be more meat-based, with meat as the main component of most meals, alongside potatoes or other carbohydrates and a small amount of vegetables (e.g. Douglas, 1972; Riley 2010). Thus, it was thought that intentions to eat less meat and the subsequent factors associated with meat reduction might differ across these countries. For example, past literature found that attitudes played a greater role in motivating meat consumption in the UK compared to Italy (Cadel, 2013).

In light of the literature reviewed above, the present study aimed to investigate the influence of TPB variables (attitudes, perceived behavioural control, subjective norms) and meat-eater identity on intentions to reduce one's red and processed meat consumption, considering participants' stage of change (precontemplation, contemplation, preparation and action) and country of residence (Italy and the UK). In doing so, we aim to add to existing literature by further investigating the role of meat-eater identity in predicting intentions to reduce one's red and processed meat consumption, considering the potential for both direct and indirect effects. Moreover, we provide a novel contribution to the literature by investigating the relative impact of different psychosocial factors (attitudes, subjective norms, perceived behavioural control and meat-eater identity) on predicting intentions to reduce red and processed meat across the different stages of change (pre-contemplation, contemplation, preparation and action). We are also not aware of any other research that has made this comparison using participant samples in two different countries. By establishing potential differences in the psychosocial factors associated with intentions to reduce one's meat consumption, we hope to contribute towards a greater understanding of how diets can be shifted to include less meat, considering the needs of different populations.

In accordance with the TPB and existing literature (e.g. Carfora et al., 2017; Povey et al., 2001), it was hypothesized that intentions to reduce red and processed meat would be predicted by attitudes, subjective norms, perceived behavioural control, and meat-eater identity (Hypothesis 1 – H1). Given that identity can explain additional variance in behavioural intentions (e.g. Armitage & Conner, 2001; Rise et al., 2010), it was also expected that including meat-eater identity in the model would significantly improve model capacity to predict intentions to eat less red and processed meat (Hypothesis 2 – H2). It was also predicted that meat-eater identity would have a significant negative influence on each of the TPB variables: attitudes, subjective norms and perceived behavioural control (Hypothesis 3 – H3), as well as a significant negative indirect effect on behavioural intention via each of these variables (Hypothesis 4 – H4). This would be in line with evidence that identity can act as a source of information influencing upon the formation of attitudes, subjective norms, perceived behavioural control and subsequent behavioural intentions, as individuals try to main consistency between their identity and actions (e.g. Hagger et al., 2007).

We also proposed two more exploratory research questions (RQs). First, we investigated how the TPB variables (attitudes, subjective norms, perceived behavioural control) and meat-eater identity might differently influence intentions to reduce red and processed meat in Italy and the UK (RQ1). Second, we investigated how these differences would also vary according to a person's stage of change (RQ2).

2. Methods

2.1. Sample and procedure

The present study was conducted after receiving ethical approval from Cardiff University School of Psychology Research Ethics Committee and from Catholic University of the Sacred Heart (Milan). We first ran a statistical power analysis to determine the required sample size. Using A-priori Sample Size Calculator for Structural Equation Models, we conducted a sample size estimation considering a medium size (ES = 0.30). With power = 0.80, number of latent variables = 5, number of observed variables = 14, and $p = 0.05$, the projected sample size needed with this effect size was approximately $N = 232$ in each country. On this basis, we chose to have a minimum initial sample of approximately 300 participants in each country, which would be more than adequate for the main objective of the study whilst allowing for expected attrition.

In 2018, approximately 350 Italian and 350 UK university students were invited to participate in a study on dietary behaviour. Inclusion criteria were implemented so that only students who consumed on average at least three portions of red or processed meat each week, and did not follow any specific diet plan, qualified for participation. This was to ensure that participants were regular meat-eaters. The study consisted of an online questionnaire created on the Qualtrics platform. Participants were first asked to report their age and gender, followed by measures from the TPB, the TTM and meat-eater identity. Among the eligible participants, 320 participants from the UK and 304 participants from Italy provided written consent and fully completed the study questionnaire (mean age = 20, $SD = 2.15$; age range: 18–29; female = 510; male = 114). UK participants were awarded course credit or cash payment for their participation.

2.2. Measures

Below, we report the measures employed in the present study. The standardized factor loadings of each item, composite reliability, and average variance extracted (AVE) are shown in Table 1.

2.2.1 Intention

Intention to reduce red and processed meat consumption was measured with three items using a 7-point Likert scale (INT1: "I intend

Table 1
Standardized factor loadings, composite reliability, average variance extracted (AVE).

Model	Standardized Factor Loadings		Composite Reliability		AVE	
	UK	Italy	UK	Italy	UK	Italy
Attitude			0.74	0.74	0.50	0.50
ATT1	0.84	0.86				
ATT2	0.78	0.76				
ATT3	0.75	0.75				
Subjective Norm			0.86	0.89	0.75	0.80
SN1	0.84	0.90				
SN2	0.86	0.82				
Perceived Behavioural Control			0.89	0.86	0.74	0.67
PBC1	0.65	0.55				
PBC2	0.96	0.88				
PBC3	0.85	0.87				
Meat-eater Identity			0.82	0.85	0.69	0.74
MEI1	0.65	0.67				
MEI2	0.93	0.82				
Intention to Reduce Red and Processed Meat			0.94	0.93	0.83	0.82
INT1	0.93	0.92				
INT2	0.94	0.95				
INT3	0.92	0.94				

Note. ATT = Attitude; SN = Subjective Norm; PBC = Perceived Behavioural Control; MEI = Meat-eater Identity; INT = Intention.

to reduce my weekly red/processed meat consumption …", INT2: "I plan to reduce my weekly red/processed meat consumption …", and INT3: "I will reduce my weekly red/processed meat consumption …") from (1) strongly disagree to (7) strongly agree. This measure was adapted from previous literature (see Carfora et al., 2017).

2.2.2 Attitude

Attitude towards reducing red and processed meat consumption was assessed with three items using a semantic differential scale. Based on past literature (Abrahamse et al., 2009; Wyker & Davison, 2010), participants were asked to indicate the extent to which they thought reducing their red/processed meat consumption would be: "bad-good" (ATT1), "unhealthy-healthy (ATT2)" and "not environmentally-friendly-environmentally-friendly (ATT3)". Each pair was presented in the form of a 7-point Likert scale (e.g. 1 = bad, 7 = good).

2.2.3 Subjective norm

Subjective norm was measured through two items on a 7-point Likert scale (SN1: "Most people who are important to me think that I should reduce my weekly red/processed meat consumption …" and SN2: "Most people who are important to me would approve if I reduce my weekly red/processed meat consumption …") from (1) strongly disagree to (7) strongly agree (Carfora et al., 2017).

2.2.4 Perceived behavioural control

Perceived behavioural control was measured through three items on a 7-point Likert scale (PBC1: "It is entirely up to me if I reduce my weekly red/processed meat consumption …", PBC2: "I believe I have enough opportunities to reduce my consumption of red/processed meat …", and PBC3: "I feel able to reduce my consumption of red/processed meat …") from (1) strongly disagree to (7) strongly agree (Carfora et al., 2017).

2.2.5 Meat-eater identity

Meat-eater identity was measured through two items adapted from Blake, Bell, Freedman, Colabianchi, and Liese (2013; MEI1: "I am a meat eater …" and MEI2: "I am someone who likes meat with every meal …") on a 7-point Likert scale from (1) strongly disagree to (7) strongly agree.

2.2.6 Stage of change

Participants' readiness to reduce their red/processed meat intake was measured by a stage of change instrument adapted from Klöckner and Ofstad (2017). Participants were asked which statement best described their views on their red and processed meat consumption from the following: (1) "I am satisfied with my weekly red/processed meat consumption and do not see any need to change it", (2) "I would like to reduce weekly my red/processed meat consumption but at the moment feel this is impossible for me", (3) "I would like to reduce my weekly red/processed meat consumption and plan to do this in the near future", (4) "I have reduced my weekly red/processed meat consumption already but feel this will be impossible to maintain", (5) "I have reduced my weekly red/processed meat consumption already and am satisfied with my current level of consumption" and (6) "I have reduced my weekly red/processed meat consumption already but plan to reduce my consumption even further". Statement 1 was coded as the precontemplation stage, statement 2 was coded as the contemplation stage, statement 3 was coded as the preparation stage and statements 4, 5 and 6 were coded as the action stage.[1]

2.3. Data analysis

Structural equation modelling (SEM) analysis was conducted with Mplus using maximum-likelihood estimates (Byrne, 2001). Fig. 1 shows the hypothesized relationships among study variables. In the preliminary analyses, we ran descriptive statistics and *t*-test comparisons between UK and Italian samples on each study variable. Then, 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. The overall fit of the tested models was assessed using the following goodness-of-fit indices: comparative fit index (CFI), Tucker-Lewis fit index (TLI) and root mean square error of approximation (RMSEA). CFI and TLI values greater than 0.90 are considered acceptable for the model. A RMSEA value less than 0.05 indicates a good fit (Byrne, 2001; Hu, Bentler, & Kano, 1992).

3. Results

3.1. Preliminary analyses

Analysis was first conducted to test whether the participant samples were of similar demographics in each country. Chi-square analysis showed no significant differences in the two samples for gender ($p = 0.19$), and *t*-test comparisons showed no significant differences in age ($p = 0.10$), indicating the samples had similar compositions.

Next, the study variables of interest were compared. Table 2 shows the means and standard deviations of the study variables in each sample, across the four stages of change. The descriptive statistics show that participants from the UK and Italy had positive attitudes towards reducing red and processed meat consumption, yet low perceived pressure from significant others to reduce their red and processed meat intake. Generally, participants neither agreed nor disagreed with the intention measure, indicating that they did not intend to reduce their red and processed meat consumption, but were also not reluctant to do so. Interestingly, the UK sample showed a higher perception of control for

[1] Action was originally separated into action dissatisfied (statement 4), action satisfied (statement 5) and further action required (statement 6), for exploratory purposes. However, these stages were collapsed after the results showed that only a very small portion of participants fell into each stage. The maintenance stage was not included as this study focussed on encouraging behaviour change among participants who regularly consumed meat.

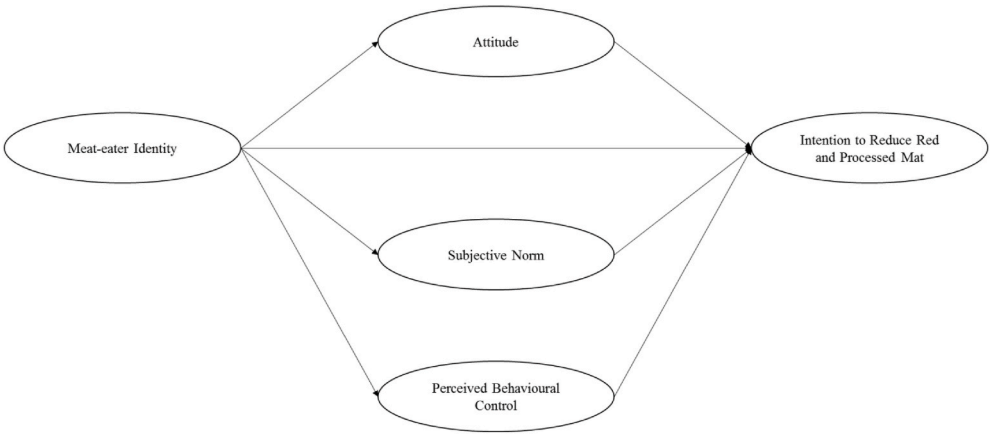

Fig. 1. Hypothesized extended TPB-Identity model to predict participants' intention to reduce red and processed meat consumption.

Table 2
Means and standard deviations of the study variables in the UK and Italian samples.

	Total		Precontemplation Stage		Contemplation Stage		Preparation stage		Action stage	
	UK Sample ($N = 320$)	Italian Sample ($N = 304$)	UK Sample ($N = 131$)	Italian Sample ($N = 107$)	UK Sample ($N = 49$)	Italian Sample ($N = 33$)	UK sample ($N = 92$)	Italian sample ($N = 55$)	UK Sample ($N = 48$)	Italian Sample ($N = 109$)
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Attitude	4.70 (1.23)	4.75 (1.26)	3.75 (0.95)	3.80 (1.21)	4.82 (0.84)	4.93 (0.76)	5.47 (0.81)	5.21 (0.88)	5.69 (1.08)	5.40 (1.01)
Subjective Norm	2.92 (1.31)	2.80 (1.45)	2.18 (0.98)	2.24 (1.36)	3.15 (1.22)	3.38 (1.53)	3.59 (1.19)	3.52 (1.37)	3.41 (1.46)	2.82 (1.43)
Perceived Behavioural Control	5.26 (1.08)	4.75 (1.30)	5.07 (1.15)	4.46 (1.45)	4.66 (1.03)	3.50 (1.06)	5.52 (0.85)	4.81 (1.04)	5.90 (0.86)	5.39 (0.93)
Meat-eater Identity	4.78 (1.53)	3.67 (1.50)	5.09 (1.37)	4.28 (1.37)	5.05 (1.42)	4.65 (1.50)	4.62 (1.54)	3.50 (1.25)	3.96 (1.69)	3.88 (1.32)
Intention to reduce RPMC	3.93 (1.57)	3.90 (1.69)	2.71 (1.15)	2.58 (1.27)	3.82 (1.13)	4.18 (1.18)	5.05 (0.88)	4.99 (.79)	5.24 (1.38)	4.56 (1.70)

Note. RPMC = Red and Processed Meat Consumption.

reducing red and processed meat intake and a higher meat-eater identity, compared to the Italian sample. These differences were statistically significant in *t*-test comparisons (perceived behavioural control: $t = 10.99$; $p = 0.001$; meat-eater identity: $t = 6.99$; $p = 0.001$). T-test comparisons did not find any significant differences in the other variables (all $ps > 0.10$).

Chi-square analysis showed significant differences for participants' stage of change in the two samples (X^2 (3) = 38.17, $p = 0.001$; *phi effect size* = 0.25). As shown by Fig. 2, significantly more UK participants were in the preparation stage as compared to Italian participants, while significantly more Italian participants were in the action stage as compared to UK participants. Therefore, several participants in the UK were preparing to reduce their intake, while several participants in Italy had already reduced their meat consumption to some extent.

3.2. Main analysis

3.2.1. Goodness-of-fit of the hypothesized TPB-Identity model

As a first step of our main analysis, a confirmatory factor analysis (CFA) model was estimated, to assess the relationship between the indicators (items) and the latent variables (attitudes, subjective norms, perceived behavioural control, meat-eater identity and intention), with data combined from both samples. As shown in Table 2, the results revealed that all the composite reliability values ranged from 0.73 to 0.94, and were therefore greater than the minimum threshold of 0.60 (Bagozzi & Yi, 1988). Thus, the reliability of the measurement model was confirmed. The standardized item loadings of all observed variables on their corresponding latent constructs ranged from 0.55 to 0.96, thus being highly significant. The AVE from latent constructs ranged from 0.50 to 0.83. Thus, all AVE values were above the recommended threshold of 0.05 (Anderson & Gerbing, 1988; Fornell & Larcker, 1981). These initial findings showed that all measurement items presented a high convergent validity. Discriminant validity also confirmed this, as all AVEs were higher than squared correlations between latent constructs (Fornell & Larcker, 1981).

To test the acceptability of the extended structural model including meat-eater identity as predictor of the TPB variables, we ran two models. First, the traditional TPB model (Model 1) was run, with attitude, subjective norm, and perceived behavioural control as predictors of intention to reduce red and processed meat consumption. Second, the extended TPB-Identity model (Model 2) was computed, including meat-eater identity as additional predictor of attitude, subjective norm, perceived behavioural control and intention to reduce red and processed meat consumption.

The comparison between the traditional TPB model (Model 1) and the extended model (Model 2) was tested by considering the first model as a nested model of the other. Thus, in Model 1 the regression weights of the paths between meat-eater identity and TPB variables were fixed to 0. To test the acceptability of the extended model, an analysis to test the hypothesized significant difference in the Chi-square value was run. A significant Chi-square difference ($\Delta\chi 2$) would indicate that Model 2 (the larger model with more parameters and less degrees of freedom) could be accepted as a better model than Model 1 (the smaller model). The comparison between Model 1 and Model 2 ($\Delta\chi 2$ (3) = 77.47, $p < 0.001$) indicated that Model 2 had a better explanatory power concerning behavioural intention and higher goodness of fit indices [χ^2 (1) = 5.82, $p < 0.001$; RMSEA = 0.08, CFI = 0.99, TLI = 0.93] than the more parsimonious Model 1 [χ^2 (4) = 83.296, $p < 0.001$; RMSEA = 0.17, CFI

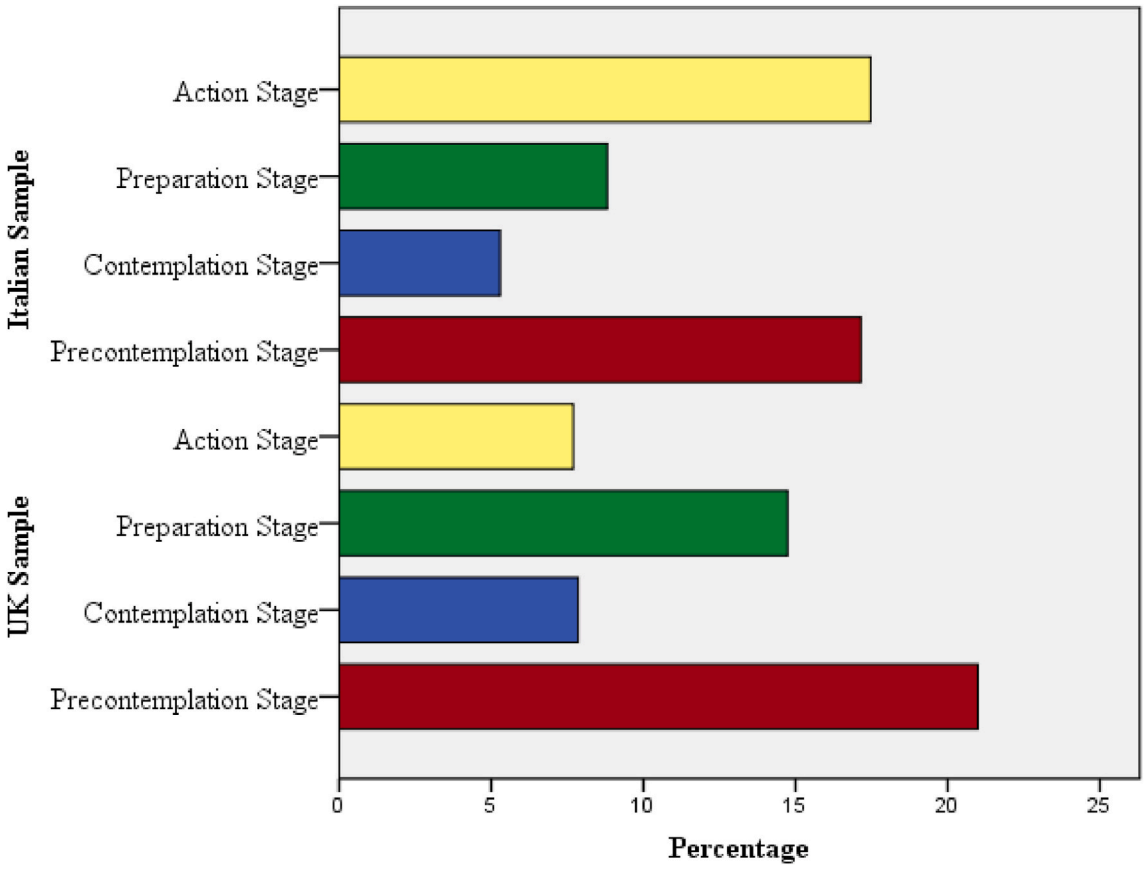

Fig. 2. Stage of change by country.

= 0.80, TLI = 0.70], supporting the expected role of meat-eater identity in improving the model. Thus, the results supported H2, according to which including meat-eater identity would significantly improve the TPB model capacity to explain intentions to reduce red and processed meat. Based on this, in the remaining analyses we used Model 2.

3.2.2. *Contribution of the TPB and meat-eater identity in explaining intention to reduce red and processed meat consumption*

With regard to the contribution of the study variables in explaining intention to reduce red and processed meat consumption, the results of Model 2 confirmed that participants' attitude ($\beta = 0.52$; $p < 0.001$), subjective norm ($\beta = 0.24$; $p < 0.001$) and perceived behavioural control ($\beta = 0.06$; $p = 0.04$) predicted intention to reduce red and processed meat. However, meat-eater identity only marginally contributed to explaining participants' intention and was not a significant predictor ($\beta = -0.05$; $p = 0.09$). The percentage of intention variance explained by study variables was high ($R^2 = 0.47$). Thus, H1 was partially supported, demonstrating that intention to reduce red and processed meat was significantly predicted by attitude, subjective norm and perceived behavioural control, but not meat-eater identity.

Meat-eater identity had a significant negative effect on attitude ($\beta = -0.28$; $p < 0$ 0.001; $R^2 = 0.08$) and perceived behavioural control ($\beta = -0.24$; $p < 0.001$; $R^2 = 0.06$). The path of meat-eater identity on subjective norm ($\beta = -0.00$; $p = 0.94$) was not significant. Thus, H3 was partially supported. Mediation analyses showed that meat-eater identity had a significant indirect effect on intention to reduce red and processed meat via attitude (*Indirect Effect* $= -0.15$; $p < 0.001$) and perceived behavioural control (*Indirect Effect* $= -0.02$; $p < 0.001$), but did not have an indirect effect through subjective norm (*Indirect Effect = -0.00, p =* 0.94*)*, partially supporting H4.

In sum, the results showed that the strongest predictor of participants' intention to reduce red and processed meat consumption was attitude, followed by subjective norm, and then perceived behavioural control. Thus, participants who viewed reducing their red and processed meat consumption positively, felt a strong pressure to reduce their meat consumption from significant others, and felt more capable of reducing their consumption, intended to do so. Meat-eater identity did not have a direct impact on behavioural intention, but had a significant indirect effect through attitudes and perceived behavioural control. Thus, participants who strongly identified as a meat-eater viewed reducing their red and processed meat more negatively and felt a lower sense of control over reducing their meat consumption, resulting in lower intentions to do so. This suggests that meat-eater identity can act as a barrier towards reduced meat consumption through the formation of negative attitudes and a low perceived behavioural control over reducing one's consumption.

3.2.3. *Measurement and structural invariance test for cross-national comparisons*

Following success of the TPB-identity model in predicting intention to reduce red and processed meat consumption, a further analysis was conducted to compare the model between the UK and Italian samples. To test for the differences across the UK and Italian samples, we first conducted measurement and structural invariance tests. Measurement invariance was assessed to ensure that the models and related measures developed in one country could be appropriately used to assess participants from a different country (Chen, Sousa, & West, 2005; Cheung & Rensfold, 2002). Only after establishing measurement invariance can a test for latent mean differences be interpreted meaningfully (Vandenberg & Lance, 2000).

A CFA model was estimated for the UK and Italian sample based on the study constructs. Both models showed adequate results as demonstrated by the standardized factor loadings in Table 3, and fit indices in Table 4 (UK sample: CFI = 0.96; TLI = 0.95; RMSEA = 0.05; Italian

Table 3
Factor loadings of the Extended TPB-Identity Model in the UK and Italian samples.

	Hypothesized Extended Model in Both samples	Hypothesized Extended Model in UK Sample	Hypothesized Extended Model in Italian Sample
Attitude → Intention to Reduce RPMC	0.52**	0.54**	0.49**
Subjective Norm → Intention to Reduce RPMC	0.24**	0.23**	0.26**
Perceived Behavioural Control → Intention to Reduce RPMC	0.06*	0.07*	0.04
Meat-eater Identity → Intention to Reduce RPMC	−0.05	−0.06	0.06
Meat-eater Identity → Attitude	−0.28**	−0.24	−0.35**
Meat-eater Identity → Subjective Norm	−0.00	−0.13**	0.09*
Meat-eater Identity → Perceived Behavioural Control	−0.24**	-.025**	−0.42*
Meat-eater Identity → Attitude → Intention to Reduce RPMC	−0.15**	-.019**	−0.17**
Meat-eater Identity → Subjective Norm → Intention to Reduce RPMC	−0.00	−0.03*	−0.00
Meat-eater Identity → Perceived Behavioural Control → Intention to Reduce RPMC	−0.02**	−0.00	−0.01

Note. RPMC = Red and Processed Meat Consumption. *$p < 0.05$; **$p < 0.001$.

Table 4
Goodness of fit statistics and standardized parameter estimates for the confirmatory factor analyses (CFA) and structural equation model (SEM) of the extended TPB-identity model for UK and Italian samples.

Model	χ^2	*df*	*CFI*	p ($\Delta\ \chi^2$)
Single-group analyses				
UK sample				
CFA	148.03	55	0.96	–
SEM	7.52	1	0.98	–
Italian sample				
CFA	113.79	55	0.97	–
SEM	1.08	1	0.99	–
Multi-group analyses				
CFA				
Configural Model	261.77	110	0.97	–
Metric Model	283.92	118	0.97	0.004
Scalar Model	495.78	131	0.93	0.001
Strict Model	919.37	154	0.90	0.001
Factor Variance	386.24	133	0.95	0.001
Factor Mean	512.27	138	0.92	0.001
SEM				

Notes: χ^2 = goodness-of-fit statistics, df = degrees of freedom of chi-square statistics, CFI = comparative fit index, p ($\Delta\ \chi^2$) p-value for the differences in chi-square relative to previous model.

sample: CFI = 0.97; TLI = 0.96; RMSEA = 0.05). This finding confirmed the adequacy of the study measures in representing their hypothesized constructs (latent variables). Given that the adequacy of CFA models was confirmed for both samples, we tested the invariance for the CFA models (Byrne, 2001).

We ran a multi-group analysis, testing the generalizability of the measurement model and the invariance of the structural parameters across the two samples. We initially specified a configural invariance model. In this case, single-factor models were estimated simultaneously within each group; the factor mean was fixed to 0 and the factor variance was fixed to 1 for identification within each group. Equality of the unstandardized item factor loadings across groups was then examined in a metric invariance model. In the metric invariance model, the factor variance was fixed to 1 in the UK sample but was freely estimated in the Italian sample; the factor means were fixed to 0 in both samples. Equality of the unstandardized item intercepts across groups was then examined in a scalar invariance model. In the scalar invariance model, the factor mean and variance were fixed to 0 and 1, respectively, for identification in the Italian sample but the factor mean and variance were then estimated in the UK sample. Equality of the residual variances across groups was then examined in a factor variance invariance model. In the factor variance invariance model, the factor mean and variance were fixed to 0 and 1, respectively, for identification in the Italian sample, but the factor mean and variance were still estimated in the UK sample. All factor loadings, item intercepts, and all residual variances were constrained to be equal across samples. All models demonstrated only small decreases in the model fit (Table 4). The significant chi-square differences between the baseline CFA and the subsequent models with equality indicated invariance of the CFA model (Cheung & Rensfold, 2002; Vandenberg & Lance, 2000). Thus, measurement invariance was established for the hypothesized models, which allowed us to compare the two samples for cross-national differences based on the respective structural models.

Structural invariance was then tested with two additional models. First, the factor variance in the UK sample (which had been estimated freely) was constrained to 1 (i.e., to be equal to the factor variance in the Italian sample), resulting in a non-significant decrease in fit relative to the residual invariance model. Thus, the UK and Italian sample had equivalent amounts of individual differences in all study variables. Second, the factor mean in the Italian sample (which had been estimated freely) was constrained to 0 (i.e., to be equal to the factor mean in UK sample), resulting in a non-significant decrease in fit relative to the factor variance invariance model (Table 4). This result indicated that the UK and Italian samples had comparable values on average in each study variable.

In sum, these analyses showed that measurement invariance was obtained between the UK and Italian sample, meaning the relationships of the items to the latent factor of the study variables were equivalent in both groups. These analyses also showed that full structural invariance was obtained between UK and Italian sample, such that both groups had the same levels on the study variables and interindividual variation in them, as measured by the related items. The fact that both the factor variances and item residual variances could be constrained equal across groups also indicates equal reliability of the items across groups. Thus, based on our hypotheses, we further investigated the relationships of study variables within each of the UK and the Italian SEMs.

3.2.4. Comparison of the TPB-Identity model in UK and Italian samples

Proceeding with the SEM analyses, again a baseline model was used to set all parameters as free to vary across the two groups. The baseline model fitted the data well. Subsequent models with equality constraints imposed on the factor loadings, path coefficients, and factor variances did not result in substantial deterioration of the model fit. The structural model was therefore concluded to be equivalent across the two groups. Following confirmation of the invariances of measurement and structural models, we ran SEMs to test the hypothesized extended TPB-Identity model, to predict participants' intention to reduce red and processed meat (see Fig. 1). Both models obtained acceptable fit: (UK sample: CFI = 0.98; RMSEA = 0.08; Italian sample: CFI = 0.88). Fit

indices were good in both samples (UK sample: $\chi^2 = 7.52$, $df = 1$; CFI = 0.98; RMSEA = 0.08; Italian sample: $\chi^2 = 1.08$, $df = 1$; CFI = 0.99; RMSEA = 0.02; Table 4). The percentage of intention variance was high (51.7% in the UK sample and 43.7% in the Italian sample). All standardized factor loadings are reported in Table 3.

In the UK sample, attitude ($\beta = 0.54$; $p < 0.001$), subjective norm ($\beta = 0.23$; $p < 0.001$) and perceived behavioural control ($\beta = 0.07$; $p = 0.05$) predicted intention to reduce red and processed meat consumption. Meat-eater identity did not predict intention ($\beta = -0.06$; $p = 0.15$), but had a significant negative effect on attitude ($\beta = -0.24$; $p = 0.05$), subjective norm ($\beta = -0.13$; $p = 0.01$) and perceived behavioural control ($\beta = -0.25$; $p < 0.001$). In addition, meat-eater identity had a significant negative indirect effect on intention via attitude (*Indirect Effect* = −0.19; $p < 0.001$) and subjective norm ($\beta = -0.03$; $p = 0.05$). No indirect effect was found via perceived behavioural control (*Indirect Effect* = −0.02, $p = 0.09$).

In the Italian sample, intention to reduce red and processed meat was significantly predicted by attitude and subjective norm ($\beta = 0.49$; $\beta = 0.26$; $p < 0.001$), but was not predicted by perceived behavioural control or meat-eater identity ($\beta = 0.04$, $p = 0.41$; $\beta = 0.06$, $p = 0.22$). Meat-eater identity had a significant negative effect on attitude ($\beta = -0.35$; $p < 0.001$) and perceived behavioural control ($\beta = -0.42$; $p < 0.001$) and a significant positive effect on subjective norm ($\beta = 0.09$; $p = 0.01$). Finally, meat-eater identity had a significant negative indirect effect on intention via attitude (*Indirect Effect* = −0.17; $p < 0.001$). No indirect effect was found via subjective norm (*Indirect Effect* = −0.00; $p = 0.18$) or perceived behavioural control (*Indirect Effect* = −0.01; $p = 0.41$). In sum, the results showed that participants in both Italy and the UK were motivated to reduce their red and processed meat when they viewed reducing their consumption positively and felt a strong social pressure to do so. Having a strong perceived control over reducing one's consumption was also an important motivation for participants in the UK, but not for those in the Italian sample. Meat-eater identity appeared to act as a barrier towards a reduced meat consumption, as participants in both the UK and in Italy who identified strongly as a meat-eater viewed reducing their red and processed meat consumption more negatively and subsequently had lower intention to reduce their consumption. Participants in the UK who identified strongly as a meat-eater also felt a lower perceived social pressure to reduce their meat consumption from significant others, and so had lower intentions to do so. On the other hand, participants in Italy who identified strongly as a meat-eater felt a stronger social pressure to reduce their consumption, though this did not have an effect on behavioural intention.

3.2.5. Comparison of the TPB-Identity and stage of change model in UK and Italian samples

Multigroup SEM analysis was used to investigate differences in the relative impacts of the TPB and meat-eater identity on predicting intention to reduce red and processed meat, across each stage of change (precontemplation, contemplation, preparation and action), in both UK and Italian samples. All TPB variables (attitude, subjective norm, perceived behavioural control) and meat-eater identity were listed as predictors of participants' intention to reduce red and processed meat. Moreover, meat-eater identity was included as a predictor of attitude, subjective norm, and perceived behavioural control. The multi-group models obtained acceptable fit (UK sample: CFI = 0.98; RMSEA = 0.08; Italian sample: CFI = 0.88; Table 4). Fit indices were good in both samples (UK sample: $\chi^2 = 20.43$, $df = 4$; CFI = 0.98; RMSEA = 0.08; Italian sample: $\chi^2 = 2.73$, $df = 4$; CFI = 0.99; RMSEA = 0.02). In the UK sample, the percentage of intention variance explained by study variables was at least 20% in all groups: stage 1 (precontemplation; $R^2 = 0.20$), stage 2 (contemplation; $R^2 = 0.30$), stage 3 (preparation; $R^2 = 0.20$), stage 4 (action; $R^2 = 0.44$). In the Italian sample, the percentage of intention variance explained by study variables was at least 21% in all groups: stage 1 (precontemplation; $R^2 = 0.36$), stage 2 (contemplation; $R^2 = 0.21$), stage 3 (preparation; $R^2 = 0.34$), stage 4 (action; $R^2 = 0.24$). All standardized factor loadings are shown in Table 5.

3.2.5.1. Precontemplation. In the precontemplation stage, participants' intention to reduce red and processed meat was significantly predicted by attitude and subjective norm in both the UK and Italian samples (UK model: $\beta = 0.21$, $\beta = 0.28$; Italian model: $\beta = 0.36$, $\beta = 0.30$; all *ps* < 0.001). In both samples, the path coefficient of perceived behavioural control was not significant (UK sample: $\beta = 0.03$, $p = 0.67$; Italian sample: $\beta = 0.10$, $p = 0.20$). Similarly, the path coefficient of meat-eater identity on intention was not significant (UK sample: $\beta = -0.13$, $p = 0.11$; Italian sample: $\beta = -0.09$, $p = 0.26$). In both samples, meat-eater identity had a significant negative effect on perceived behavioural control and attitude (UK sample: respectively $\beta = -0.29$, $p < 0.001$, $\beta = -0.17$, $p = 0.04$; Italian sample: respectively, $\beta = -0.26$, $p = 0.01$, $\beta = -0.31$, $p = 0.01$), but did not have a significant effect on subjective norm (UK sample: $\beta = -0.11$, $p = 0.18$; Italian sample: respectively, $\beta = -0.04$, $p = 0.69$). Meat-eater identity had a significant negative indirect effect on intention via attitude in both the UK and Italian samples (*Indirect effect* = −0.03, $p = 0.01$; *Indirect effect* = −0.12, $p = 0.01$, respectively). Meat-eater identity did not have a significant indirect effect via perceived behavioural control or subjective norm in both the UK sample (*Indirect effect* = −0.01, $p = 0.61$; *Indirect effect* = −0.03, $p = 0.21$, respectively) and Italian sample (*Indirect effect* = −0.03, $p = 0.25$; *Indirect effect* = −0.01, $p = 0.67$, respectively).

These results show that for participants who had not previously considered reducing their red and processed meat consumption, positive attitudes and an increased perceived social pressure towards reducing one's consumption were important drivers of behavioural intentions, in both Italy and the UK. Meat-eater identity appeared to act as a barrier towards reduced red and processed meat consumption through the formation of negative attitudes and then lower behavioural intentions, for participants in both samples. Meat-eater identity also decreased participants' perceived control to reduce their red and processed meat consumption, however this did not influence behavioural intention in either sample.

3.2.5.2. Contemplation. In the contemplation stage, intention to reduce red and processed meat was significantly predicted by attitude ($\beta = 0.36$, $p < 0.001$) and subjective norm ($\beta = 0.25$, $p = 0.05$), but not perceived behavioural control ($\beta = 0.15$, $p = 0.22$) in the UK sample. On the other hand, intention was significantly predicted by attitude and perceived behavioural control (respectively, $\beta = 0.33$, $p = 0.02$; $\beta = 0.30$; $p = 0.05$), but not subjective norm ($\beta = 0.15$, $p = 0.61$) in the Italian sample. There was no significant direct effect of meat-eater identity on intention in either sample (Italian sample: $\beta = 0.22$, $p = 0.18$; UK sample: $\beta = 0.04$, $p = 0.75$). However, meat-eater identity significantly negatively predicted attitude and subjective norm in the UK sample ($\beta = -0.27$, p = 0.04, $\beta = -0.31$, $p = 0.01$), but did not have an effect on perceived behavioural control ($\beta = -0.24$, $p = 0.07$). In the Italian sample, meat-eater identity did not have any significant effect on attitude ($\beta = -0.03$, $p = 0.83$) or perceived behavioural control ($\beta = -0.27$, $p = 0.09$) but had a significant positive effect on subjective norm ($\beta = 0.33$; $p = 0.03$). Both in the UK and Italian sample, the indirect effect of meat-eater identity on intention through attitude (UK sample: $\beta = -0.09$, $p = 0.11$; Italian sample: $\beta = -0.01$, $p = 0.84$), subjective norm (UK sample: $\beta = -0.08$, $p = 0.14$; Italian sample: $\beta = -0.02$, $p = 0.63$) and perceived behavioural control (UK sample: $\beta = -0.04$, $p = 0.31$; Italian sample: $\beta = -0.08$, $p = 0.22$) was not supported.

These results show that for those who were contemplating reducing their red and processed meat consumption, positive attitude was the most important factor motivating intentions to change, for participants both in the UK and Italy. The social expectations of significant others increased intention for participants in the UK but not those in Italy, and the perceived ability to control one's red and processed meat consumption increased the intention of those in Italy, but not in the UK.

Table 5
Factor loadings of the Model for the Stage of Change Comparison.

	Precontemplation Stage		Contemplation Stage		Preparation Stage		Action Stage	
	UK Sample	Italian Sample	UK Sample	Italian Sample	UK Sample	Italian Sample	UK Sample	Italian Sample
Attitude → Intention to Reduce RPMC	0.21**	0.36**	0.36**	0.33*	0.39**	0.52**	0.58*	0.32**
Subjective Norm → Intention to Reduce RPMC	0.28**	0.30**	0.25*	0.15	0.05	0.04	0.08	0.31**
Perceived Behavioural Control → Intention to Reduce RPMC	0.03	0.10	0.15	0.30*	0.04	0.04	0.28*	0.01
Meat-eater Identity → Intention to Reduce RPMC	−0.13	−0.09	0.04	0.22	0.07	0.18	0.02	−0.01
Meat-eater Identity → Attitude	−0.17*	−0.31*	−0.27*	−0.03	0.12	−0.02	0.08**	−0.16
Meat-eater Identity → Subjective Norm	−0.11	−0.04	−0.31*	0.33*	0.14	0.28**	−0.01	0.22**
Meat-eater Identity → Perceived Behavioural Control	−0.29**	−0.26*	−0.24	−0.27	0.10	−0.32**	−0.11**	−0.34**
Meat-eater Identity → Attitude → Intention to Reduce RPMC	−0.03*	−0.12**	−0.09	−0.01	−0.01	−0.01	−0.16*	−0.05**
Meat-eater Identity → Subjective Norm → Intention to Reduce RPMC	−0.03	−0.01	−0.08	−0.02	−0.01	0.01	−0.00	0.07**
Meat-eater Identity → Perceived Behavioural Control → Intention to Reduce RPMC	-.001	−0.03	−0.04	−0.08	−0.02	−0.01	−0.10*	0.00

Note. RPMC = Red and Processed Meat Consumption. *$p < 0.05$; **$p < 0.001$.

Meat-eater identity predicted more negative attitudes and lower perceived social pressure to eat less red and processed meat in the UK, and a higher perceived social pressure in Italy, but these effects did not influence behavioural intention in either sample. Therefore, meat-eater identity did not appear to act as a barrier towards meat reduction for participants who were contemplating reducing their red and processed meat consumption.

3.2.5.3. Preparation. In the preparation stage, UK participants' intention to reduce red and processed meat was significantly predicted only by attitude ($\beta = 0.39$, $p < 0.001$); there was no significant effect of subjective norm ($\beta = 0.05$, $p = 0$ 0.68) or perceived behavioural control ($\beta = 0.04$, $p = 0.75$). Meat-eater identity did not have a direct effect on intention or any of the other TPB variables ($ps > 0.18$). A similar pattern of results was found for those in the Italian sample; only attitude significantly predicted participants' intention to reduce red and processed meat ($\beta = 0.52$, $p < 0.001$). There was no significant effect of subjective norm ($\beta = 0.04$, $p = 0.68$) or perceived behavioural control ($\beta = 0.04$, $p = 0.75$). Meat-eater identity did not have a significant direct effect on intention ($\beta = 0.18$, $p = 0.11$). However, in contrast with UK participants, meat-eater identity significantly positively predicted subjective norm and significantly negatively predicted perceived behavioural control (respectively, $\beta = 0.28$, $\beta = -0.32$; all $ps < 0.001$) in the Italian sample. There was no significant effect of meat-eater identity on attitude ($\beta = -0.02$, $p = 0.88$). There was no indirect effect of meat-identity on intention through any of the TPB variables in the UK sample (*Indirect effect*: attitude = −0.05, $p = 0.27$; subjective norm = −0.01, $p = 0.46$, perceived behavioural control = −0.02, $p = 0.86$) or in the Italian sample (*Indirect effect*: attitude = −0.01, $p = 0.88$; subjective norm = 0.01, $p = 0.68$, perceived behavioural control = −0.01, $p = 0.76$).

These results show that for participants preparing to reduce their red and processed meat consumption, positive attitude was the key factor motivating intentions to change, for participants in both in Italy and the UK. Social expectations and perceived behavioural control did not effect intentions to reduce one's meat consumption in either sample. Meat-eater identity predicted lower perceived behavioural control in relation to reducing red and processed meat, and higher perceived social pressure to reduce red and processed meat, in the Italian sample. However, these effects of participants' meat-eater identity did not influence their intention to eat less red and processed meat. Thus, meat-eater identity did not appear to act as a barrier towards a reduced red and processed meat consumption for participants who were preparing to reduce their red and processed meat consumption.

3.2.5.4. Action. In the action stage, intention to reduce red and processed meat was explained by attitude and perceived behavioural control for participants in the UK (respectively, $\beta = 0.58$, $p < 0.001$; $\beta = 0.28$; $p = 0.02$), while subjective norm did not have a significant effect ($\beta = 0.08$, $p = 0.47$). For participants in Italy, intention was predicted by attitude and subjective norm (respectively, $\beta = 0.32$, $\beta = 0.31$; $ps < 0.001$), while perceived behavioural control did not have a significant effect ($\beta = 0.01$, $p = 0.87$). Meat-eater identity did not have a significant direct effect on intention in either sample (UK sample: $\beta = 0.02$, $p = 0.51$; Italian sample: $\beta = -0.01$, $p = 0.88$). In the UK sample, meat-eater identity had a significant positive effect on attitude and a significant negative effect on perceived behavioural control (respectively, $\beta = 0.08$, $\beta = -0.11$; $ps < 0.001$), but did not have a significant effect on subjective norm ($\beta = -0.01$; $p = 0.67$). In the Italian sample, meat-eater identity had a significant positive effect on subjective norm and a significant negative effect on perceived behavioural control (respectively, $\beta = 0.22$, −0.34; $ps < 0.001$), but had no significant effect on attitude ($\beta = -0.16$; $p = 0.09$). Differences between the two samples also emerged when considering the indirect path of meat-eater identity on intention. In the UK model, there was a significant negative indirect effect of meat-eater identity on intention through attitude and also through perceived behavioural control (respectively, *Indirect effect: attitude* = −0.16, $p = 0.05$; perceived behavioural control = −0.10; $p = 0.05$), but not through subjective norm (*Indirect effect* = −0.00; $p = 0.71$). In the Italian model, there was a significant negative indirect effect of meat-eater identity on intention through attitude (*Indirect effect* = −0.05, $p = 0.05$). An indirect effect of meat-eater identity was also found on intentions through subjective norm, however this effect was positive (*Indirect effect* = 0.07; $p < 0.001$). There was no significant indirect effect through perceived behavioural control (*Indirect effect* = 0.00; $p = 0.87$).

These results indicate that having a positive attitude towards reducing one's red and processed meat consumption was a key motivational aspect in predicting intention to further reduce one's consumption, for participants who had already made some effort to reduce their meat consumption, in both the UK and in Italy. However, the perceived ability to control one's consumption was also important for participants in the UK, while a strong perceived social pressure to reduce one's consumption was important for participants in Italy. Meat-eater identity reduced intention to limit one's red and processed meat through the formation of negative attitudes, in both the UK and in Italy. Meat-eater identity was also associated with lower intention to reduce red and processed meat through lower perceived control for participants in the UK. On the other hand, meat-eater identity was associated with higher behavioural intention through increased subjective norm, for participants in Italy. Thus, meat-eater identity appeared to act as a barrier towards meat-reduction through the formation of negative attitudes in both samples, and also through reduced perceived control in the UK sample. On the other hand, meat-eater identity might increase intentions to reduce one's consumption for those in Italy through an

increased perceived social pressure from significant others.

4. Discussion

This study contributes to a greater understanding of the psychosocial factors motivating red and processed meat reduction. First, the results partially supported H1, demonstrating the role of the TPB in predicting intentions to reduce red and processed meat. The initial model including both UK and Italian samples indicated that intention was most strongly predicted by positive attitudes towards red and processed meat reduction, followed by social pressure to reduce one's consumption, and a strong perceived control over reducing one's consumption. This adds to emerging literature and supports the application of the TPB to explain intentions to reduce one's meat consumption (e.g. Carfora et al., 2017; Çoker & van der Linden, 2020; Lentz et al., 2018; Povey et al., 2001). Adding meat-eater identity significantly improved the TPB model to explain intentions to reduce red and processed meat, supporting H2. This supports the usefulness of self-identity within the TPB to explain behavioural intentions (e.g. Armitage & Conner, 1999; Conner & Armitage, 1998; Rise et al., 2010), and specifically supports the importance of considering meat-eater identity when investigating intentions to reduce one's meat consumption (Carfora et al., 2017; De Groeve et al., 2019; Povey et al., 2001). Meat-eater identity impacted upon attitude and perceived behavioural control and had a negative indirect effect on behavioural intention through these variables, partially supporting H3 and H4. This builds on to past literature which has demonstrated a negative association between meat-eater identity and attitudes (Abrahamse et al., 2009), as well as perceived behavioural control (Carfora et al., 2017) related to meat-reduction. Our findings add to this literature by demonstrating that this effect can subsequently impact upon behavioural intention, potentially acting as a barrier towards meat-reduction.

Second, this study contributes uniquely to the literature by demonstrating cross-national differences in the relative importance of TPB variables in predicting intention to reduce red and processed meat. While positive attitude and subjective norm predicted intentions in both the UK and Italian sample, having a strong perceived behavioural control only predicted intention to reduce red and processed meat for participants in the UK. A speculative explanation for this finding can be drawn by considering the culinary practices of each country. Specifically, UK participants might perceive there to be fewer opportunities to reduce their red and processed meat consumption given that meat plays a central role in UK meal structure (Douglas, 1972; Riley, 2010). Thus, having a high perceived control over one's meat consumption might be an important factor for UK participants. On the other hand, the Mediterranean diet is predominantly plant-based (Zamora-Ros et al., 2013), meaning perceived behavioural control might be less relevant for participants in Italy as participants have more opportunities to reduce their meat consumption. This suggests that focussing on promoting positive attitudes and social pressures to reduce one's red and processed meat consumption might be effective in reducing meat consumption in the UK and Italy, while strategies in the UK should also focus on fostering a strong sense of control and perceived opportunities for people to reduce their meat consumption.

The results further showed an indirect effect of meat-eater identity on intention via attitudes in both Italy and the UK, where a strong meat-eater identity was associated with negative attitude towards reducing red and processed meat, resulting in lower behavioural intention. This suggests that promoting positive attitude towards reducing one's red and processed meat consumption could be important to mitigate potentially negative effects of meat-eater identity on behavioural intention. Interestingly, cross-national differences were found with regards to the role of meat-eater identity on subjective norm. For participants in the UK, a strong meat-eater identity was associated with a low social pressure to reduce one's red and processed meat intake and subsequently lower behavioural intention. This supports past literature which has evidenced the role of subjective norm in motivating diets that include meat in the UK (Povey et al., 2001) and indicates that efforts to reduce red and processed meat in the UK should focus on promoting social pressures to reduce red and processed meat, so that individuals are not dissuaded from reducing their meat consumption even if they identify strongly as a meat-eater. However, for participants in Italy, meat-eater identity was associated with an increased (rather than decreased) perceived social pressure to reduce one's red and processed meat consumption. A possible speculative explanation for this finding is that Italian participants who identified strongly as a meat-eater might have viewed a discrepancy between their own self-perception as a meat-eater and the behaviour of others around them, given that the Italian population follows a predominantly plant-based Mediterranean diet. This in turn, could have led to an increased perceived social pressure to reduce one's meat consumption via subjective norm, in order to act in accordance with this wider social identity (e.g. Christensen, Rothgerber, Wood, & Matz, 2004; Rosenfeld & Burrow, 2017; Tajfel & Turner, 1979). This would be in line with evidence that social-identity (as well as self-identity) can influence the formation of subjective norms related to health behaviours (Hagger et al., 2007). However, in this case there was no indirect effect on behavioural intention. Thus, although Italian participants who identified strongly as a meat-eater felt a stronger social pressure to reduce their red and processed meat consumption, this did not lead to an increased intention to do so.

Past literature has indicated a general increase in the strength of attitudes, perceived behavioural control, subjective norms and intentions, as a person shows an increased readiness to reduce their meat consumption or to adopt a plant-based diet (Weibel et al., 2019; Wyker & Davison, 2010). The descriptive statistics in the present study show a similar pattern, whilst also demonstrating a decrease in meat-eater identity from pre-contemplation to action, as individuals progress in their readiness to reduce their red and processed meat consumption. However, this study provides a novel contribution to the literature by demonstrating differences in the relative impact of these variables on predicting intention to reduce red and processed meat when considering a person's readiness to change, as well as their country of residence. The results showed cross-national differences across almost every stage of change, indicating that different psychosocial factors might be relevant for persuading individuals to reduce their red and processed meat consumption, depending on their country of residence and their readiness to change. These findings support that transitions to eating less meat may vary across different countries with different cultural and culinary backgrounds, as also suggested by other authors (e.g. de Boer & Aiking, 2018). On the other hand, it should be noted that attitudes had a consistent positive effect on predicting intentions to reduce red and processed meat across every stage of change in the UK and Italy. This highlights the role of attitudes in driving behaviour change related to meat consumption, as demonstrated by studies conducted in different countries (e.g. Lentz et al., 2018; Povey et al., 2001; Zur & Klöckner, 2014).

4.1. Practical implications

Within healthcare communication, there is an ever-increasing demand for creating content that can promote healthy behaviours, by capturing the attention of the intended audience. Healthcare professionals must be able to communicate health messages that cater for the audience's needs, interests and beliefs. This can be achieved by identifying and clearly defining the target audience, so that interventions can be tailored accordingly. This is especially true when interventions focus on deeply ingrained behaviours such as meat consumption, which may be difficult to change. The results of the present study can be useful for policy makers and marketers by providing information on how communications on reducing meat consumption can be tailored based on the differences in consumer's country of residence and readiness to change, as discussed below.

First, the present study showed a predominant role of positive attitude towards reducing red and processed meat consumption in determining Italian and UK participants' intention, across all of the stages of change (i.e., precontemplation, contemplation, preparation and action stages). This result suggests that promoting positive attitudes towards eating less meat could be an effective strategy for encouraging behaviour change in Italy and the UK, regardless of a person's readiness to change their behaviour. According to Fishbein (1967a, 1967b), attitude can be modified by persuasive messages that change the perceived likelihood of the expected outcomes from a behaviour, propose new relevant outcomes of the behaviour, and change the evaluation of those outcomes. Attitude towards reduced meat consumption is strongly associated with a rational evaluation of its health outcomes (Carfora, Conner, Caso, & Catellani, 2020). Thus, policy makers might provide informational messages about both the negative health outcomes related to an overconsumption of meat and the positive health outcomes deriving from its reduction. The proposed outcomes of eating or reducing meat might be formulated in a prefactual ("If … then") style, that is, proposing the future outcome related to meat consumption in hypothetical terms. This can be effective in altering attitude through changing the perceived likelihood of positive and negative outcomes of reducing one's meat consumption, as indicated by Fishbein (1967a; 1967b). Recent literature has found this prefactual formulation (e.g., "If you reduce red and processed meat consumption, you will protect your health") to be effective in changing attitudes (Carfora, Di Massimo, Rastelli, Catellani, & Piastra, 2020) and behaviour (Carfora, Di Massimo, et al., 2020; Wolstenholme et al., 2020) relating to meat consumption.

Second, the present study demonstrates the potential for a strong meat-eater identity to act as a barrier towards reduced meat consumption via attitudes for both UK and Italian participants in the precontemplation stage (i.e who have not considered reducing their meat consumption) and for those in the action stage (i.e. who have already reduced their meat consumption to some extent). In these cases, individuals evaluate meat reduction less positively as this is perceived as dissonant with their identity. Thus, in addition to promoting positive attitudes towards reduced meat consumption, communications should also focus on other aspects of identity that could be equally important for the individual but that are more consistent with a reduced meat diet. For instance, persuasive messages might emphasise a coherence between the positive health outcomes of reducing meat and a person's identity as a healthy-eater. Indeed, health has been found to be an important motivation for reducing meat consumption among meat-eaters (e.g. de Boer, Schösler, & Aiking, 2017; Lentz et al., 2018), while Povey et al. (2001) found that meat-eaters who had a strong self-identity as a healthy eater were more likely to consider changing to a vegetarian diet compared to those with a weaker health identity.

Third, our findings showed an important role of subjective norm in motivating intentions to reduce one's red and processed meat consumption for participants who had not considered reducing their meat consumption (i.e. precontemplation stage) in Italy and the UK, for those who were contemplating reducing their meat consumption (i.e. contemplation stage) in the UK, and for Italian participants who had recently reduced their meat consumption (i.e. action stage). Thus, targeting subjective norms might be an effective strategy for motivating reduced meat consumption for individuals in these stages. For example, it is possible that increased percieved social pressure to eat less meat provided a reason to reduce one's meat consumption for those in the precontemplation stage (Italy and UK), while making UK participants in the contemplation stage feel that their new intention to eat less meat was in line with social expectations, and providing social approval for Italians who had recently reduced their meat consumption (i.e. action stage), helping keep their motivation high. In the latter case, this was true even for those who identified strongly as a meat-eater.

Consistent with the above, future public campaigns might portray messages that eating less red and processed meat is 'normal' or commonplace, motivating a desire to adhere to social standards and stimulating thought as to why the majority of people are reducing their meat consumption, and whether one's own contribution may be relevant. For example, Amiot, Boutros, Sukhanova, Karelis (2018) successfully reduced meat consumption among male Canadian participants by using a multi-component intervention which included information on the negative impacts of meat, an appeal to fear, a mind attribution induction, goal setting, self-monitoring, and a social norms component in which participants were informed that there has been a significant decrease in meat eating in Canada over recent years. Moreover, Stea and Pickering (2018) provided information on the environmental impacts of meat framed differently in terms of social norms and/or place attachment. They found that the messages framed in terms of social norms, highlighting that people throughout the world are changing their diets due to the environmental impacts of meat, were the most effective in encouraging participants to reduce their red meat intake. Another method to increase perceived social pressure to reduce one's meat consumption could be to use endorsements from celebrities and other role models. Celebrities can play an important role in climate relevant consumer behaviour through social norms (Gössling, 2019), and many celebrities have previously successfully raised awareness for issues relating to animal welfare and meat consumption (Garnett, Mathewson, Angelides, & Borthwick, 2015). Future intervention strategies could draw on these methods with an emphasis on subjective norms to motivate reduced meat consumption.

Fourth, our results showed that perceived behavioural control was an important motivation for Italian participants who were considering to reduce their meat consumption (i.e. contemplation stage) and for UK participants who had recently reduced their meat consumption (i.e. action stage). Thus, tailored interventions could focus on increasing perceptions of control, for individuals in these stages. In light of the results, increasing perceptions of control might also be especially important to mitigate the potential negative impacts of meat-eater identity on intentions to reduce one's meat consumption, for those in the UK who have already taken action towards reducing their meat consumption. Increasing perceptions of control to reduce one's consumption could be achieved by making alternative meat dishes more accessible and by providing information on possible food alternatives and recipes to replace meat dishes. For example, communications could provide different options for reducing one's meat consumption such as reducing portion sizes of meat, substituting meat with alternatives, eating more vegetarian meals (e.g. de Boer, Schösler, & Aiking, 2014; Klöckner & Ofstad, 2017). Moreover, making vegetarian dishes more accessible by emphasising vegetarian options on restaurant menus (Kurz, 2018), and including more meatless options in canteens (Verfuerth, Gregory-Smith, Oates, Jones, & Alevizou, 2021) can be effective strategies for reducing meat consumption, by increasing the perceived opportunities to make this change.

In sum, our results demonstrate which psychosocial factors are important in motivating reduced meat consumption, whilst considering a person's readiness to change their behaviour as well as their country of residence. Based on these differences, we suggest tailoring interventions and communications accordingly, to maximize their effect on motivating reduced meat consumption. At the same time, our findings suggest that promoting positive attitudes towards meat reduction could be a promising blanket approach for encouraging reduced meat diets. Indeed, it is worth noting that this paper reports on the baseline data from a wider research project in which it was found that delivering information on the health and environmental benefits of reducing one's meat consumption was effective in significantly reducing red and processed meat consumption among participants in both Italy and the UK (Carfora et al., 2019; Wolstenholme et al., 2020). This supports that while intentions to reduce red and processed meat may be motivated by different psychosocial factors in different countries, strategies focussing on increasing positive attitudes could have far-reaching effects.

4.2. Limitations and future directions

It is important to note the limitations of this study. We present only a first attempt at comparing cross-national differences in the role of different psychosocial factors on predicting intention to reduce red and processed meat consumption. This study should therefore be seen as a useful starting point rather than an end result, as future research is needed to replicate and validate the presented findings. Related to this, the explanations provided for the cross-national differences are speculative and warrant further investigation. Moreover, we suggest that tailoring interventions could be a useful way to increase intentions to reduce red and processed meat consumption. Future research could address this by comparing the effectiveness of interventions either matched or unmatched to a person's needs based on their country of residence and stage of change, to establish the effectiveness of tailored vs. untailored or blanket interventions on encouraging reduced meat consumption. Finally, attention should be drawn to the limitations of the sample used. A student sample was used for convenience, which limits the generalizability of these findings to other populations. Furthermore, the number of participants within each stage of change was relatively small. Thus, it would be worth replicating the present study with a larger sample size. Finally, the majority of participants were female, meaning the results might not be generalisable to explain intentions to reduce red and processed meat among males, considering gender differences in meat consumption and meat reduction (e.g. Beardsworth et al., 2002; Rosenfeld, 2020; Ruby, 2012). Thus, future studies might consider a more diverse sample, to increase generalizability.

5. Conclusion

This study contributes to a greater understanding of the psychosocial factors associated with the intention to eat less red and processed meat, in two different countries with distinct dietary profiles. At first glance, intention appears to be predicted by the traditional TPB variables, with some indirect effects also shown through meat-eater identity. However, a more complex picture appears when considering participants' readiness to change their diet and in addition to their country of residence, with differences shown in the psychosocial factors found to predict behavioural intention when considering these factors. This supports recent arguments that a 'one-size fits all' approach might not be the most effective strategy for encouraging a reduction in meat consumption. On the other hand, promoting positive attitudes towards a reduced meat diet could provide a promising alternative, in the absence of a more tailored approach.

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Author contributions

EW and VC designed and conducted the research, VC analysed the data and EW took the lead in writing the manuscript. PC, WP and LP advised on the study design and provided comments and edits to the manuscript. All authors contributed to the article and approved the submitted version.

Data availability statement

The raw data supporting the conclusion of this article will be made available by the authors, without undue reservation.

Declaration of competing interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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