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Research report

Values, attitudes, and frequency of meat consumption. Predicting meat-reduced diet in Australians ☆

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ABSTRACT

Reduced consumption of meat, particularly red meat, is associated with numerous health benefits. While past research has examined demographic and cognitive correlates of meat-related diet identity and meat consumption behaviour, the predictive influence of personal values on meat-consumption attitudes and behaviour, as well as gender differences therein, has not been explicitly examined, nor has past research focusing on 'meat' generally addressed 'white meat' and 'fish/seafood' as distinct categories of interest. Two hundred and two Australians (59.9% female, 39.1% male, 1% unknown), aged 18 to 91 years ($M = 31.42$, $SD = 16.18$), completed an online questionnaire including the Schwartz Values Survey, and measures of diet identity, attitude towards reduced consumption of each of red meat, white meat, and fish/seafood, as well as self-reported estimates of frequency of consumption of each meat type. Results showed that higher valuing of Universalism predicted more positive attitudes towards reducing, and less frequent consumption of, each of red meat, white meat, and fish/seafood, while higher Power predicted less positive attitudes towards reducing, and more frequent consumption of, these meats. Higher Security predicted less positive attitudes towards reducing, and more frequent consumption, of white meat and fish/seafood, while Conformity produced this latter effect for fish/seafood only. Despite men valuing Power more highly than women, women valuing Universalism more highly than men, and men eating red meat more frequently than women, gender was not a significant moderator of the value–attitude–behaviour mediations described, suggesting that gender's effects on meat consumption may not be robust once entered into a multivariate model of MRD attitudes and behaviour. Results support past findings associating Universalism, Power, and Security values with meat-eating preferences, and extend these findings by articulating how these values relate specifically to different types of meat.

Introduction

Meat-reduced diets (MRDs) limit the frequency, type, and/or portion of meat in one's average diet. MRDs are inclusive of a continuum of diet practices including low-meat/plant-based diets (e.g., the Mediterranean diet), forms of semi-vegetarianism and 'flexitarianism', and pescetarianism, lacto-ovo-vegetarianism, and veganism (Beardsworth & Keil, 1991, Clifton, 2013; Ruby, 2012). MRDs are correlated with decreased consumption of harmful levels of animal fats, and increased consumption of protective foods such as fruit, vegetables, legumes, nuts/seeds, and, for some MRDs, fish protein and oils (Cade, Burly, Greenwood, & the UK Women's Cohort Study Steering Group, 2004; Clifton, 2013). As such, balanced MRDs have numerous positive health implications, and are associated with further protective health behaviours such as reduced alcohol and tobacco consumption (American Dietetic Association, 2003; Apostolopoulou, Michalakis, Miras, Hatzitolios, & Savopoulos, 2012; Barnard, Katcher, Jenkins, Cohen, & Turner-McGrievy, 2009; de Lorgeril et al., 1996; McEvoy, Temple, & Woodside, 2012; Phillips, 2005; Rees et al., 2013; Sofi, Abbate, Gensini, & Casini, 2010; Stitcher, Smith, & Davidson, 2010). However, despite the health benefits associated with eating less meat, individuals' beliefs about the ethicality and healthfulness of meat (including consumption of quantity or type) can vary (e.g., Beardsworth & Bryman, 1999; Beardsworth et al., 2002; Dyett, Sabaté, Haddad, Rajaram, & Shavlik, 2013), influencing whether or not they are motivated to engage in MRD. Given the health benefits of MRDs, determining the fundamental influences on MRD adoption and practice is an important contribution to health and well-being research.

Common motivations for MRD in Western samples include ethical concerns for animal rights, welfare, and suffering, and personal health concerns. The environmental impact of meat production, spiritual purity, and disgust at the sensory properties of meat are less common

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motivations (Dyett et al., 2013; Fessler, Arguello, Mekdara, & Macias, 2003; Forestell, Spaeth, & Kane, 2012; Fox & Ward, 2008; Rothgerber, 2014; Rozin, Markwith, & Stoess, 1997; Ruby, 2012). While nutrition knowledge does not differ between animal welfare and health oriented vegetarians, animal welfare focused vegetarians have been found to hold stronger convictions about their diet, to exhibit greater dietary restriction, and to remain vegetarian longer than do health vegetarians (Hoffman, Stallings, Bessinger, & Brooks, 2013; Ruby, 2012). These two primary motivations towards MRD suggest different value priorities, with health orientation being self-focused and animal welfare orientation being other-focused (Fox & Ward, 2008). Understanding how values explain these motivations and associated attitudes and behaviours may offer insight into how health advocates can more effectively encourage balanced and maintainable MRDs in individuals who could benefit from the diet's health outcomes.

The values–attitude–behaviour connection

Personal values are trans-situational goals or motivations that inform attitudes, and are expressed through behaviours (Bardi & Schwartz, 2003; Rohan, 2000; Rokeach, 1973). Attitudes are affective evaluations of psychological objects, such as people, institutions, actions, and abstract concepts, and are situation-specific (Ajzen & Gilbert Cote, 2008; Fishbein & Ajzen, 1975; Rohan, 2000). While one's attitude towards a psychological object can change from situation to situation, depending on the additional contextual factors of the situation, the values influencing one's attitude generally do not (Rohan, 2000). Values are considered fundamental to and more stable than attitudes, and so may be more consistent cognitive predictors of MRD behaviour than are attitudes. Homer and Kahle's (1988) cognitive hierarchy model (CHM) suggests a hierarchical relationship between cognitions and behaviour, where abstract values influence midrange attitudes, leading to specific behaviours (Homer & Kahle, 1988; Milfont, Duckitt, & Wagner, 2010). This model has been successfully applied to explore environmental sustainability and purchasing practices (e.g., Grunert & Juhl, 1995; McFarlane & Boxall, 2000; Milfont et al., 2010), and may be useful in explaining value-driven motivations relevant to MRD.

Schwartz's (1992) theory of universal values complements the CHM by reinforcing the mediating role of attitudes between values and behaviour. Schwartz (1992, p. 4) defines values as "concepts or beliefs, pertaining to desirable end states or behaviours, transcendent of specific situations, guiding selection or evaluation of behaviour and events, and. . .ordered by relative importance". Values, as trans-situational goals, are ranked by relative importance to the individual and motivate ideal behaviours.

Ten universal values are theorised by Schwartz. These values – Self-direction, Stimulation, Hedonism, Achievement, Power, Security, Conformity, Tradition, Benevolence, and Universalism – fall within two higher-order and orthogonally opposed value dimensions, Openness to Change-Conservation, and Self-Enhancement-Self-Transcendence (see Fig. 1; for a complete description of each universal value, refer to Schwartz, 1994; Schwartz et al., 2012). Despite the extensive application of Schwartz' model to other areas of values research in psychology, and the high cross-cultural validity and reliability of its measures (Schwartz, 1992; Schwartz et al., 2001), the theory of universal values has been used to only a limited extent in MRD research to explain relationships between values and diet identity, attitudes, and behaviour.

Past research on values, attitudes, and meat-reduced diet behaviour

An overall assessment of the empirical literature relating Schwartz' values to MRD attitudes and behaviour suggests that people who are motivated to engage in MRD are likely to value

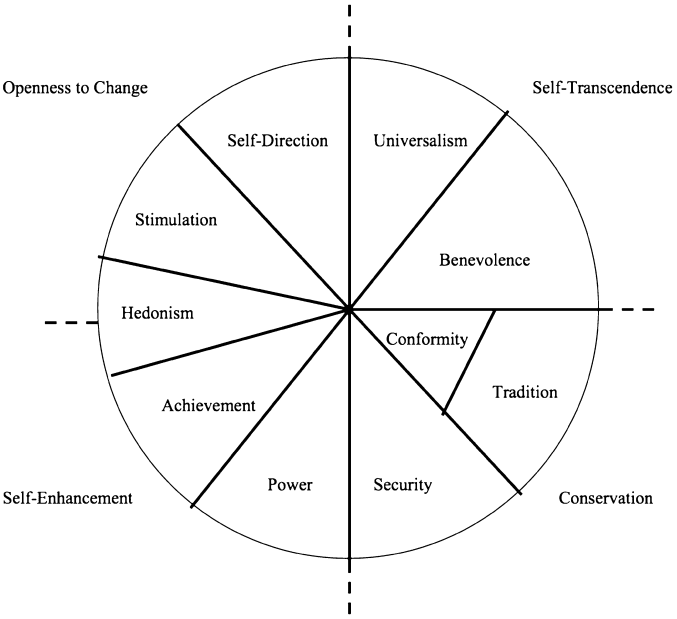

Fig. 1. Model of the theoretical structure of universal values. Reproduced from Schwartz et al., 2001

Universalism (Lea & Worsley, 2001; Ruby, Heine, Kamble, Cheng, & Waddar, 2013), and be sympathetic to Self-Transcendence and Openness to Change values generally (Allen & Ng, 2003; Lindeman & Sirelius, 2001; Ruby et al., 2013). Conversely, those preferring red meat, with its symbolism of masculinity and social dominance (e.g., Allen, Wilson, Ng, & Dunne, 2000; Rozin, Hormes, Faith, & Wansink, 2012; Ruby & Heine, 2011), are likely to hold higher Self-Enhancement values (especially Power) and Conservation values (such as Security), as well as lower Universalism values (Allen & Ng, 2003). However, past research has not addressed how these values (particularly Power and its associations of symbolic masculinity) might relate to consumption of white meat and fish/seafood. Consumer attitudes and behaviours with a health orientation, be they MRD-related or not, also appear to be influenced by Conservation values, particularly Security (Aertsens, Verbeke, Mondelaers, & van Huylenbroeck, 2009; Lee, Lusk, Mirosa, & Oey, 2014; Lindeman & Sirelius, 2001), although 'purity' oriented health concerns are associated with Universalism rather than Security (Brunsø, Scholderer, & Grunert, 2004; Dreezens, Martijn, Tenbült, Kok, & de Vries, 2005). Conservation values thus appear to be associated with both attitudes for and against consumption of types of food, depending on the individual's beliefs about the healthfulness of that food. However, the relationship between Conservation and food preference, particularly in the case of meat, remains unclear.

Gender differences between value priorities in a general context have been investigated cross-culturally as well as in Australia to some extent, with research suggesting that women tend to prioritise Self-Transcendence (and perhaps Achievement) values, while men prioritise Self-Enhancement and Openness to Change values, with Conservation values equally important to each gender (e.g., Feather, 2004; Schwartz & Rubel, 2005). However, these differences are quite small, explaining less variance between genders than age or cultural/socialisation factors. Furthermore, research by Prince-Gibson and Schwartz (1998) failed to find a significant difference between values by gender, weakening the reliability of previous studies.

However, gender has proven to be a key variable determining beliefs, attitudes, and behaviour regarding MRDs, particularly forms of vegetarianism (Ruby, 2012). Western women eat less meat than do men (Beardsworth & Bryman, 1999; Beardsworth et al., 2002),

are more likely than men to decrease their meat consumption (Beardsworth et al., 2002; Worsley & Skrzypiec, 1998), and are more likely to believe in the unethicality of consuming animals for various reasons, particularly animal welfare concerns (Beardsworth et al., 2002; Kalof, Dietz, Stern, & Guagano, 1999). Women also report less positive attitudes towards the taste and health benefits of meat compared to men (Beardsworth et al., 2002), and are more likely to promote or endorse MRD lifestyle practices and have friends who also follow MRDs (e.g., Lea & Worsley, 2001; Ruby, 2012).

Research specifically examining gender differences between values associated with MRD is minimal, often due to the overrepresentation of women in the convenience samples used (e.g., Dyett et al., 2013; Hoffman et al., 2013; Lindeman & Sirelius, 2001). The clearest gender difference appears to concern men's preference for and identification with red meat based on its symbolic masculinity, which is associated with prioritising Power as a personal value (Allen & Ng, 2003; Rothgerber, 2013; Ruby & Heine, 2011). However, whether gender differences exist in how personal values relate to attitudes towards MRD, and to frequency of consumption of meats other than red meat, requires further exploration. Also of particular note is the negligible research available on the relationship between personal values and MRD attitudes and behaviour relating to fish and seafood consumption. Despite the common consumption of fish and seafood in the Western diet, its health benefits according to the literature previously cited, and its relevance to animal and environmental concerns, knowledge about individuals' attitudes towards and consumption of fish and seafood remains relatively unexplored and so requires further research.

Aims and hypotheses of the present study

This study therefore had two aims: to explore gender differences in values, attitudes to, and actual MRD behaviour for three common types of meat (red meat, white meat, and fish/seafood); and to model the values–attitude–behaviour connection to better understand cognitive predictors of MRD for each common meat type.

Based on the literature reviewed, and relating to the first research aim, it was hypothesised that: (H1) women would rate Self-Transcendence values more highly than men would; (H2) men would rate Self-Enhancement values more highly than women would; (H3) women would be more likely than men to hold positive attitudes towards reducing consumption of each type of meat; and (H4) women would be more likely than men to consume less of each type of meat.

Relating to the second research aim, with reference to the CHM's (Homer & Kahle, 1988) approach to the values–attitude–behaviour connection and past findings in the MRD literature, it was hypothesised that, for any type of meat: (H5) Self-Transcendence values and (H6) Openness to Change values would predict lower frequency of self-reported meat consumption, with these relationships mediated by positive attitudes towards reduced meat consumption; and (H7) Self-Enhancement values and (H8) Conservation values would predict higher frequency of self-reported meat consumption, with these relationships mediated by negative attitudes towards reduced meat consumption. Assuming gender differences were found to support H1, H2, H3, and/or H4, and simple mediation effects analyses supported H5, H6, H7, and/or H8, it was also hypothesised that gender would moderate the indirect effect of personal values on frequency of consumption of meat, via attitude, for each meat type (H9).

Material and methods

Participants

While an initial convenience sample of 410 individuals completed the online questionnaire, only 49.3% of the questionnaires contained sufficient data relevant to the values, attitudes, and meat consumption variables to be included in the analyses. The final sample ($N = 202$) consisted of 121 women (59.9%) and 79 men (39.1%), with two unknown (1%). Participants were aged between 18 and 91 years old ($M = 31.42$, $SD = 16.18$), and all were Australian citizens or permanent residents. Highest level of education completed by participants included at least some secondary education (38.2%), some tertiary education at university or TAFE (15.9%), or at least a university Bachelor's degree (46.1%).

Measures and procedure

Ethics approval was obtained from the Deakin University Human Ethics Advisory Group – Health prior to conducting the study. Participants were recruited via snowballing and by paid advertisements on the social networking site Facebook. The advertisement on Facebook initially featured an image of a question mark '?' made of raw meat against a white background, with the statement: "Beef or veggie burger? Tell us what's good or bad about eating meat. Participate in this Deakin uni survey now!" As data collection progressed, the online advertisement was targeted towards men only to address gender skew forming in the sample; an image of a man with an uncertain expression biting into a raw steak replaced the earlier image to encourage male identification with the survey topic. An overall click-through rate of 0.029% was achieved over 14 days using the Facebook advertisement, equalling 944 clicks overall. Participants accessed the online questionnaire via the advertisement or by directly clicking on the provided URL, depending on their method of recruitment.

The questionnaire took each participant approximately 20 minutes to complete, and assessed a number of variables associated with MRD. For the present study, only items assessing participant demographics, personal values, diet identity, attitudes towards reducing meat consumption by type, and frequency of meat consumption by type, were utilised in analyses.

Demographics

Age, gender, Australian citizenship/residency status, and highest level of education completed were assessed.

Personal values

Participants' personal values were measured using the 57-item Schwartz Values Survey (SVS; Schwartz, 1992). For each item, participants rated how important the value assessed was as "a guiding principle in their life", using a 9-point scale where –1 = *opposed to my values*, 0 = *not important to my values*, and 7 = *of supreme importance*. Each item included a description explaining the meaning of the value assessed (e.g., *pleasure = gratification of desires*). Centred mean scores were calculated for items assessing each of the 10 values, such that the higher the score, the more important that value was as a guiding principle in the participant's life.

Attitudes towards reducing consumption of meat

Participant attitudes towards reducing red meat, white meat, and fish/seafood were assessed, with measures based on theory of planned behaviour questionnaire development guidelines (Francis et al., 2004). Definitions and examples, based on common everyday and Australian National Health and Medical Research Council (2013) usage, were provided for participants for each broad type of meat. Red meat was defined as "meat from mammals, such as beef and veal, pork and ham and bacon, lamb and mutton, goat, venison, rabbit, and kangaroo". White meat was defined as "meat from poultry (birds) such as chicken, duck, turkey, and quail". Fish/seafood was defined as "meat from any animal found in fresh or salt water, including fish, squid, octopus, crabs, oysters, scallops, eels, yabbies, and jellyfish". Amphibian, reptilian, and insect food sources

Table 1
Univariate Analyses of Variance for Self-Reported Meat Consumption, Attitude towards Reduced Consumption of Meat, and Schwartz's Value Priority Dimensions, by Gender.

Dependent variable	*F*	*p*	η^2 partial	Men		Women	
				M (SD)	95% CI	*M (SD)*	95% CI
Self-reported meat consumption							
Red meat	17.78	.000[a]	.084	34.38 (2.57)	[29.31, 39.46]	20.44 (2.08)	[16.35, 24.54]
White meat	3.73	.055	.019	30.48 (2.63)	[25.30, 35.66]	23.96 (2.12)	[19.78, 28.15]
Fish/seafood	0.68	.411	.004	16.09 (1.63)	[12.88, 19.30]	14.36 (1.32)	[11.77, 16.96]
Attitude towards reducing meat consumption							
Red meat	22.59	.000[a]	.102	3.97 (0.21)	[3.57, 4.38]	5.23 (0.17)	[4.91, 5.56]
White meat	8.87	.003[a]	.043	3.79 (0.21)	[3.37, 4.20]	4.60 (0.17)	[4.26, 4.93]
Fish/seafood	0.40	.528	.002	3.59 (0.23)	[3.14, 4.04]	3.78 (0.19)	[3.41, 4.14]
Self-Transcendence values							
Universalism	6.51	.011[b]	.032	0.53 (0.12)	[0.30, 0.76]	0.91 (0.09)	[0.72, 1.09]
Benevolence	0.58	.445	.003	0.84 (0.08)	[0.68, 1.00]	0.92 (0.07)	[0.79, 1.05]
Self-Enhancement values							
Power	7.27	.008[a]	.035	–1.95 (0.14)	[–2.23, –1.68]	–2.43 (0.11)	[–2.65, –2.21]
Achievement	0.14	.708	.001	0.20 (0.11)	[–0.03, 0.42]	0.14 (0.09)	[–0.04, 0.33]
Hedonism	0.36	.631	.001	–0.09 (0.11)	[–0.37, 0.19]	–0.01 (0.11)	[–0.23, 0.22]
Conservation values							
Tradition	2.93	.089	.015	–1.32 (0.13)	[–1.57, –1.07]	–1.60 (0.10)	[–1.80, –1.40]
Conformity	4.36	.038	.022	0.01 (0.11)	[–0.22, 0.23]	–0.30 (0.09)	[–0.48, –0.12]
Security	1.32	.253	.007	–0.05 (0.10)	[–0.26, 0.15]	–0.20 (0.08)	[–0.37, –0.04]
Openness to Change values							
Stimulation	0.14	.714	.001	–0.18 (0.15)	[–0.47, 0.11]	–0.25 (0.12)	[–0.49, –0.02]
Self-Direction	0.94	.334	.005	0.79 (0.09)	[0.61, 0.97]	0.90 (0.07)	[0.76, 1.05]

Note: For all F-tests, $df = 1, 198$, except for meat consumption variables, where $df = 1, 193$. Bonferroni adjusted alpha levels were used for significance testing, with gender difference significant where $a = p < .017$, $b = p < .025$. 95%CI = confidence interval for mean differences.

were not included in the meat questions, given the rarity of these foods in Australian diets.

Participants' attitude towards reducing their consumption of each of the three types of meat was measured (e.g., "I think that reducing or restricting the amount of fish and seafood I eat in my everyday diet would be/is . . . "), with responses for each measure provided on four 7-point bipolar semantic differential scales (*harmful–beneficial, good–bad, pleasant–unpleasant, worthwhile–pointless*). Individuals' scores for attitude to reducing each type of meat were calculated by averaging the relevant four attitude items.

Consumption of meat

Participants were asked to indicate how often they ate each meat in a meal (*7 days a week; at least 5 days a week; at least 3 days a week; at least 1 day a week; at least once a month; never/zero days a week*). A meal was defined for participants as "a substantial amount of food which is prepared and consumed with the purpose of providing energy and nutrition for a set amount of time. A substantial meal can include breakfast, lunch, and/or dinner, as well as brunch, afternoon tea, and supper, depending on your eating habits". Participants also reported, on the days that they did eat meat, how many meals in that day usually contained each type of meat (e.g., *usually more than three meals a day contain meat; usually three meals a day; usually two meals a day; usually one meal a day; sometimes one of my meals; my meals never contain meat*). Finally, participants indicated how many meals a day they ate on average (*less than 1, 1, 2, 3, 4, 5 or more*). Participants' overall consumption of red meat, white meat, and fish/seafood was calculated as a percentage derived from the fraction of days per week the meat type was eaten multiplied by the fraction of average meals consumed each day that contained that meat type – i.e., $[a/b] \times [c/d]$), where a = number of meals eaten per day containing relevant meat type divided by b = average number of meals eaten per day, multiplied by c = number of days relevant meat type is eaten per week divided by d = 7 (number of days per week).

Results

Preliminary analyses

Data were cleaned, meeting assumptions of normality. The internal reliability of composite measures was assessed using Cronbach's α; all scales had good to excellent internal reliability (SVS scales, α = .63 to .83; measures of attitudes, α = .95 to .96). Participants consumed higher proportions of white meat (11.07%) and red meat (11%) than fish/seafood (3.16%). Pearson correlations between centred SVS scale scores were assessed to confirm appropriate relationships as per Schwartz's theoretical model, with these conditions satisfied. On average, participants rated the following values as most important to least important as guiding principles in their everyday lives: Benevolence ($M = 0.88$, $SD = 0.72$); Self-Direction ($M = 0.85$, $SD = 0.81$); Universalism ($M = 0.76$, $SD = 1.03$); Achievement ($M = 0.17$, $SD = 1.01$); Hedonism ($M = –0.03$, $SD = 1.24$); Security ($M = –0.14$, $SD = 0.91$); Conformity ($M = –0.19$, $SD = 1.03$); Stimulation ($M = –0.22$, $SD = 1.32$); Tradition ($M = –1.49$, $SD = 1.12$); and Power ($M = –2.24$, $SD = 1.24$).

Assessment of gender differences

A series of one-way MANOVAs were performed to determine gender differences in values, attitude towards reduced future consumption of different types of meat, and self-reported consumption of each type of meat. All multivariate and univariate assumptions for the following analyses were met, including significant positive correlations between dependent variables within sets ($r = .16–.79$, $p < .01$, one-tailed). Multivariate results are not included in this report.

Univariate analyses (see Table 1) showed a small significant gender difference on Universalism, with women rating Universalism more highly as a value priority compared to men. There was also a small significant gender difference on Power, with men rating Power more highly than did women, but no significant gender

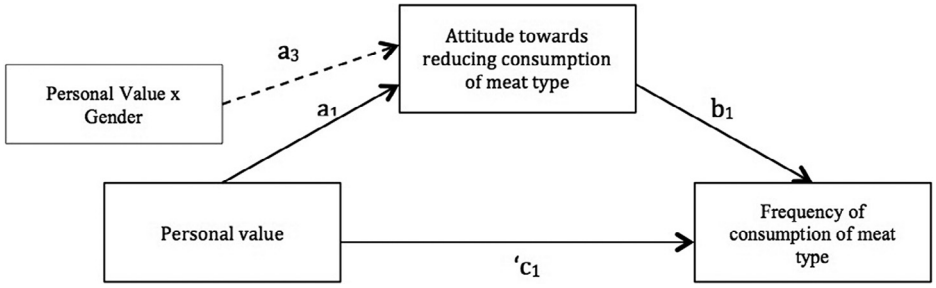

Fig. 2. Conceptual model representing simple mediation and moderated mediation pathways. Combined a_1b_1 pathways represent the simple mediation route (indirect effect of values on consumption via attitude), while combined a_3b_1 pathways represent the moderated mediation route of interest (indirect effect of the personal value and gender interaction on consumption via attitude). In this model, the a_2 pathway (effect of Gender on Attitude) is not shown.

differences on Conservation or Openness to Change values. There were moderate and small but significant gender differences on attitude towards red meat and white meat, respectively; women held more positive attitudes towards reducing each of red and white meat consumption than did men. No significant gender differences on attitude towards reducing consumption of fish/seafood emerged. There was a moderate significant gender difference on red meat consumption, with men consuming a significantly higher proportion of red meat compared to women, but no significant gender differences in consumption of white meat and fish/seafood.

Associations between values, attitudes, and behaviours

Two-tailed Pearson correlation tests were performed to assess relationships between participants' personal values, attitudes towards reducing meat consumption, and frequency of meat consumption. As Hayes (2012) argues that an independent association between the independent variable (value priority) and dependent variable (frequency of consumption of meat type) is not required for mediation analyses using the product of pathway coefficients, this meant that potentially 30 mediation models could be run (10 value priorities by three meat types). To avoid running unnecessary analyses, a model was deemed viable if there was a significant association between the independent variable (value priority) and mediator (attitude towards reduced consumption of meat type), and between the mediator and dependent variable (frequency of consumption of meat type). Statistical significance was assessed using a Bonferroni corrected alpha of $\alpha = .004$ to control for familywise error.

Overall, 11 significant sets of value priority by meat type associations were found (all $p < .004$). Strong negative relationships were found between attitude towards reduced consumption and actual consumption of each of red meat, white meat, and fish/seafood ($r = -.66$, $r = -.70$, and $r = -.58$, respectively), meeting our requirement that the mediator and dependent variable of viable models be significantly associated. Universalism, Power, and Security were each correlated with attitude towards reduced consumption of each of red meat, white meat, and fish/seafood. For Universalism, these were strong to moderate positive correlations ($r = .50$, $r = .41$, and $r = .33$ for red meat, white meat, and fish/seafood, respectively), while for Power and Security these were moderate to small negative correlations (Power: $r = -.30$, $r = -.27$, and $r = -.21$ for red meat, white meat, and fish/seafood, respectively; Security: $r = -.22$, $r = -.30$, and $r = -.32$ for red meat, white meat, and fish/seafood, respectively). Conformity had small, negative correlations with each of attitude towards reducing white meat and fish/seafood consumption ($r = -.22$ and $r = -.21$, respectively).

Testing gender-moderated mediation models for values, attitudes, and behaviour

Eleven mediation models were tested using SPSS with Hayes's (2012) PROCESS macro. To test for simple mediation, PROCESS model four criteria were applied. Given that gender differences on key variables had emerged from the ANOVA analyses, moderated mediation was also assessed (using PROCESS model 8 criteria), to determine whether gender acted as a moderator of the indirect effect of personal values on meat consumption (see Fig. 2 for details of these conceptual models). To control for familywise error rate, statistical significance was again assessed using a Bonferroni corrected alpha of $\alpha = .004$.

According to Hayes (2012), mediation can be presumed if the a_1 and b_1, or a_3 and b_1, pathways of a model are significant, so for each model we first examined these pathways. Significant a_1 pathways were found for the majority of models tested (except models 7 and 10, see Table 2), and b_1 pathways for all models were also significant, suggesting simple mediation effects for 9 of the 11 models tested. However, there were no significant a_3 pathways across models, suggesting that gender did not interact with personal values and so did not moderate the indirect effect of any personal value on frequency of consumption of any meat type. Following Hayes' recommendation, the product of the a_1b_1 coefficients was assessed for each viable model, and z scores were calculated to determine the statistical significance of indirect effects, given the strict critical value being applied, as shown in Table 2.

There was a moderate indirect effect of Universalism on red meat consumption, accounting for 9% of the variance associated with said consumption; holding Universalism more highly as a personal value was associated with more positive attitude towards reducing red meat consumption, and less frequent consumption of red meat (see Model 1 in Table 2). This indirect effect was also significant for white meat and fish/seafood, although the indirect effect of Universalism on white meat consumption was small (explaining 3% of variance; see Model 2) and negligible for fish/seafood (see Model 3).

Holding Power more highly as a personal value was associated with more negative attitudes towards reducing red meat, white meat, or fish/seafood consumption, and more frequent consumption of these meats (see Models, 4, 5, and 6). These positive indirect effects were small, accounting for 2–6% of the variance in consumption of these meats. Prioritising Security or Conformity were each also predictive of more negative attitudes towards reducing fish/seafood consumption, and higher consumption of fish/seafood (see Models 9 and 11, respectively), with Security explaining 4% and Conformity explaining 2% of variance respectively in fish/seafood consumption. There was also an indirect effect of Security on consumption of white

Table 2
Gender-moderated mediation models for the effect of value priorities on frequency of meat consumption by type via attitude towards reduced meat consumption by meat type.

Predictor	Criterion		Red meat		White meat		Fish and seafood	
			B (SE)	t	B (SE)	t	B (SE)	t
			Model 1[a]		Model 2[a]		Model 3[a]	
		Constant	4.74 (.12)	38.57**	4.28 (.13)	32.74**	3.70 (.15)	25.49**
Universalism	Attitude toward Reducing	a_1	.58 (.10)	5.74**	.43 (.11)	4.06**	.38 (.12)	3.16*
Universalism × Gender	Consumption	a_3	–.04 (.20)	–.19	–.01 (.21)	–.03	.02 (.23)	.08
		Constant	61.23 (3.83)	15.99**	63.90 (3.05)	20.94**	30.72 (1.79)	17.15**
Attitude toward Reducing Consumption	Frequency of Consumption	b_1	–7.46 (.76)	–9.82**	–8.68 (.66)	–13.22**	–4.21 (.42)	–9.90**
Universalism	Frequency of Consumption via Attitude	a_1b_1	–5.07 (.77)	z = –6.59**	–4.18 (.90)	z = –4.66**	–1.55 (.49)	z = –3.18*
		R^2 med	.09 (.04)		.03 (.03)		.00 (.02)	
			Model 4[a]		Model 5[a]		Model 6[a]	
		Constant	4.73 (.13)	36.71**	4.27 (.13)	32.24**	3.65 (.14)	25.85**
Power	Attitude toward Reducing	a_1	–.30 (.10)	–3.10*	–.35 (.11)	–3.19*	–.38 (.11)	–3.59*
Power × Gender	Consumption	a_3	–.07 (.19)	–.39	–.02 (.21)	–.10	–.54 (.21)	–2.58
		Constant	61.21 (3.61)	16.98**	62.64 (3.00)	20.89**	29.90 (1.79)	16.68**
Attitude toward Reducing Consumption	Frequency of Consumption	b_1	–7.35 (.71)	–10.31**	–8.36 (.64)	–12.99**	–3.93 (.43)	–9.09**
Power	Frequency of Consumption via Attitude	a_1b_1	2.62 (.78)	z = 3.35*	2.90 (.82)	z = 3.55*	1.42 (.46)	z = 3.07*
		R^2 med	.04 (.03)		.06 (.03)		.02 (.02)	
			Model 7		Model 8[a]		Model 9[a]	
		Constant	4.73 (.13)	36.62**	4.27 (.13)	33.10**	3.71 (.14)	26.40**
Security	Attitude toward Reducing	a_1	–.20 (.11)	–1.85	–35 (.11)	–3.19*	–.45 (.12)	–3.82*
Security × Gender	Consumption	a_3	–.23 (.23)	–.99	–.35 (.23)	–1.53	–.16 (.25)	–.62
		Constant	60.96 (3.55)	17.16**	62.59 (3.02)	20.72**	29.74 (1.81)	16.45**
Attitude toward Reducing Consumption	Frequency of Consumption	b_1	–7.34 (.70)	–10.47**	–8.39 (.65)	–12.89**	–3.94	–9.12**
Security	Frequency of Consumption via Attitude	a_1b_1	1.63 (.91)	z = 1.80	3.14 (.91)	z = 3.46*	1.86 (.49)	z = 3.76**
		R^2 med	.02 (.02)		.04 (.03)		.04 (.03)	
					Model 10		Model 11[a]	
		Constant	–	–	4.26 (.13)	32.45**	3.69 (.14)	25.81**
Conformity	Attitude toward Reducing	a_1	–	–	–.21 (.10)	–2.03	–.27 (.11)	–2.44
Conformity × Gender	Consumption	a_3	–	–	–.32 (.22)	–1.43	–.32 (.24)	–1.33
		Constant	–	–	63.13 (2.98)	21.16**	29.82 (1.78)	16.76**
Attitude toward Reducing Consumption	Frequency of Consumption	b_1	–	–	–8.51 (.64)	–13.25**	–3.94 (.42)	–9.28**
Conformity	Frequency of Consumption via Attitude	a_1b_1	–	–	2.10 (.80)	z = 2.63	1.21 (.42)	z = 2.89*
		R^2 med	–	–	.02 (.02)		.02 (.02)	

Note: Bonferroni corrected alpha level of $\alpha = .004$ used for regression analyses, and for one-tailed *z* score significance testing (i.e., critical *z* value of ±2.65). B = unstandardised regression coefficient.
* $p < .004$.
** $p < .0001$.
[a] Significant mediation model.

meat, explaining 4% of variance in consumption (see Model 8). Statistically significant results were not found for Model 7 (indirect effect of Security on red meat consumption) or Model 10 (indirect effect of Conformity on white meat consumption).

Discussion

The aims of this study were twofold: to assess gender differences in values and MRD attitudes and behaviour for three types of meat; and to model the values–attitude–behaviour connection relative to each MRD type.

Gender differences did emerge for value priorities, attitudes, and behaviour: women prioritised Universalism more highly than men, supporting H1, while men prioritised Power more highly than women, supporting H2. Although these differences were small, these findings are consistent with previous Australian and cross-cultural research (Feather, 2004; Schwartz & Rubel, 2005). Women were also more likely than men to hold a positive attitude towards reducing consumption of each of red meat and white meat; however, genders did not differ in their attitudes towards reduced consumption of fish/seafood, hence H3 was only partially supported. Women's stronger attitudes towards reducing consumption of red and white meat is consistent with previous studies showing that overall women are more likely to endorse and follow MRDs (e.g., Beardsworth & Bryman, 1999; Beardsworth et al., 2002; Worsley & Skrzypiec, 1998). Finally, while men and women did not differ in the amount of white meat or fish/seafood they consumed, there was a moderately sized significant difference in their self-reported frequencies of red meat consumption, with men consuming around 9% more red meat than women, partially supporting H4 and also consistent with past research (e.g., Beardsworth & Bryman, 1999; Beardsworth et al., 2002). Given the higher priority allocated to Universalism by women, and/or the higher priority attributed to Power by men, it could be argued that these gender differences in values may influence subsequent MRD attitudes towards red meat and white meat, and actual consumption of red meat, as was predicted in H9. However, the lack of significant gender-moderation of the indirect effect of values on frequency of consumption of meat, via attitude, for each meat type, contrary to H9, suggests that while there may be gender effects on

these independent constructs, gender effects are less robust once incorporated into a full values–attitude–behaviour model.

Four value priorities – Universalism, Power, Security, and Conformity – were indirect predictors of self-reported frequency of meat consumption. Universalism, a Self-Transcendence value, motivates goals and behaviours prioritising the appreciation, welfare, and protection of the Other, be these humans, animals, or the natural environment (Schwartz, 1992). Prioritising Universalism had a negative indirect effect on self-reported frequency of consumption of red meat, white meat, and fish/seafood, although this effect was negligible for the latter. These findings are consistent with past research by Ruby et al. (2013), who found evidence that Universalism was positively associated with attitude towards animals and animal welfare, and found that participants identifying as vegetarians scored higher on Universalism than omnivores. They are also consistent with Lindeman and Sirelius (2001), who found that vegetarians and semi-vegetarians endorsed an ecology ideology valuing Universalism and motivated by concerns for ecological and animal welfare; and also with work by Allen et al. (2000) and Allen and Ng (2003). Our findings show that Universalism is associated with not only more positive attitudes towards MRD regardless of meat type, but also predicts a lower frequency of overall meat consumption, supporting H5.

Stimulation and Self-Direction are Openness to Change values, and, respectively, prioritise goals and behaviours aimed at novel experience and independent thought. Past research by Lindeman and Sirelius (2001) associated Stimulation and Self-Direction with vegetarianism and concern for ecological welfare; however, in our study these values were not significantly associated with any type of meat attitude or consumption, and so were not tested for mediation, failing to support H6.

Power, a Self-Enhancement value, motivates goals and behaviours associated with attainment of social status, prestige, and dominance (Schwartz, 1994). Supporting H7, greater prioritising of Power was associated with less positive attitudes towards reducing consumption of each meat type, which led to higher consumption of each meat type. Research has primarily associated meat consumption with symbolic masculinity and social dominance (e.g., Allen et al., 2000; Ruby & Heine, 2011), which are characteristic of valuing Power (Allen & Ng, 2003; Schwartz, 1994); and Rozin et al. (2012) found that of all types of meat, red meat was most symbolic of masculinity. It therefore could have been expected that Power would have had the strongest relationship with red meat consumption, which was not the case in the present study. Our findings suggest the need for a deeper understanding of how Power influences MRD behaviour specific to white meat and fish/seafood, as distinct from consumption of 'meat' in general, the term utilised most often used in previous studies exploring this issue. For example, fresh fish and seafood can be expensive in Australia, and so its consumption may be symbolic of wealth and hence social status, a different aspect of Power compared to the symbolic masculinity of red meat.

Security, a Conservation value, motivates goals and behaviours prioritising personal health, community safety, and protection of resources (Schwartz, 1994). Conformity, another Conservation value, motivates goals and behaviours prioritising self-restraint, but also the maintenance of social norms and expectations, minimising social conflict. Prioritising Security had a positive indirect effect on white meat and fish/seafood consumption, being associated with more negative attitudes towards reducing consumption of these meats, and these attitudes in turn associated with consumption of these meats. Conformity also had a positive indirect effect on consumption, but only for fish/seafood.

Our findings support H8, as well as past work by Lindeman and Sirelius (2001), who found that omnivores scored higher than semi-vegetarians and vegetarians on Conservatism values, and that these values were associated with health motivations and higher meat consumption. Our research extends Lindeman and Sirelius' work, by focusing on the relationship between these Conservation values and self-reported frequency of consumption rather than between these values and diet identity. That Security did not have an effect on red meat consumption is surprising, however, given the widespread belief held by people following non-MRDs that red meat is necessary for personal health (e.g., Beardsworth et al., 2002; Lea & Worsley, 2001). That Conformity predicted higher consumption of fish/seafood alone is equally unexpected, but could be interpreted in several ways. It may be that those higher in Conformity are motivated to engage in self-restraint, where eating fish/seafood is a less indulgent form of meat eating which provides perceived health and taste benefits but minimises the negatives associated with more indulgent red or white meat eating. It could also be that some individuals prefer not to consume fish/seafood, but do so as a socially acceptable compromise in group situations when the social group is not supportive of MRD generally.

The mediation of the values–behaviour relationship via attitudes that emerged in 9 out of 11 models supports the CHM model proposed by Homer and Kahle (1988), confirming that personal values are key variables when predicting health- and ethical-oriented lifestyle choices (e.g., Grunert & Juhl, 1995; McFarlane & Boxall, 2000; Milfont et al., 2010). Incorporating the standardised measurement of personal values (such as Schwartz' theory of universal values) in future research may improve the explanatory power of similar and more commonly used models for predicting health behaviour generally and MRD specifically, such as the theory of planned behaviour (Ajzen, Albarracin, & Hornik, 2007; Wyker & Davison, 2010).

Limitations

The present study was limited in several ways. Approximately 50% of submitted questionnaires missed data on essential variables, which was attributed to the overall length and cognitive demands of the larger questionnaire from which the variables were drawn. It is thus possible that participants who comprehensively completed questionnaires were motivated by stronger beliefs regarding the everyday consumption of meat, and may therefore not represent the values, attitudes, and behaviours of the broader Australian population, limiting the generalisability of results. A further limitation of this study was the use of self-reported recalled general behaviour instead of behavioural observation or a self-reported longitudinal diet diary. While we improved on past proxy measures of recalled behaviour (e.g., Allen et al., 2000; Lea & Worsley, 2001), recalled behaviour is nonetheless still subject to misremembering and misestimating, in addition to social desirability and image management biases. It should also be noted that although our mediation models suggest a clear direction of influence from values to attitudes to recalled behaviours, these models nonetheless ignore the role of various additional cognitive and situational influences that shape actual behaviour.

Future research

The outcomes of this study suggest three future research directions. Firstly, the roles of Security and Universalism, in motivating 'health' perspectives respectively justifying more and less meat consumption, require further exploration. It may be that those high in Universalism perceive a healthy diet as one free from moral and actual contaminants, while those who are high in Security view a healthy diet as a varied and animal protein-heavy diet. Secondly, exploring the relationship between valuing Power and consumption of white meat and fish/seafood is important, since our results suggest that something other than symbolic masculinity (which has

been shown to be specific to red meat) may motivate consumption of these less-masculine meats. Thirdly, understanding beliefs, values, attitudes, and behaviour associated with consumption of fish/seafood specifically, and compared to red and white meat, requires more targeted exploration by future MRD research, particularly given the high status attributed to fish/seafood by health and nutritional research (e.g., Apostolopoulou et al., 2012; Barnard et al., 2009; de Lorgeril et al., 1996). Future research in this area will strengthen researchers' understanding of MRD and its social and cognitive determinants.

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