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Gauging attitudes and behaviours: Meat consumption and potential reduction

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ABSTRACT

The present study focused on adding to the understanding of meat consumption and potential drivers for its reduction in New Zealand. Using the Theory of Planned Behaviour (TPB) and the recently developed Meat-Attachment Questionnaire (MAQ), this study investigated New Zealand consumers' attitudes, motivations and behaviours in regards to meat consumption. Results derive from a questionnaire sent across New Zealand in March 2017, in which 841 responses were obtained from representative consumer panels. Consumer awareness of the severity of meat's environmental impacts was found to be quite low in comparison to other sustainable food behaviours. Motivations for reduction seem to shift across consumer groups, with different considerations rising and falling in importance depending on current meat consumption habits. Among the TPB components, only attitudes were found to accurately and consistently predict willingness and intentions to reduce personal meat intake, while both attitudes and subjective norms predicted agreement with proposed structural measures that would promote meat reduction and/or plant-based food consumption. In addition, the MAQ was found to provide explanatory power above and beyond that of the TPB components alone and this research supports its use as a tool to further understand meat consumption and potential motivations for reduction. The authors believe these results could be useful for governments or organizations wishing to implement meat reduction strategies, as well as providing a stepping stone for further research inquiry into motivations behind meat consumption and its potential reduction.

With the human population projected to reach 9.6 billion by 2050 (UN DeSA, 2017) and with stabilization improbable within the century (Gerland et al., 2014), feeding the world while retaining environmental integrity will be a challenge. Agriculture is already a key driver in a broad range of environmental issues, including loss of habitat and biodiversity, increased soil erosion and decreased soil fertility, soil and water pollution from pesticides and fertilisers, and greenhouse gas emissions (Tilman et al., 2001). The livestock sector, in particular, has been under recent scrutiny due to its contributions to a variety of environmental impacts, including greenhouse gas emissions (Bellarby, Foereid, Hastings, & Smith, 2008; Goodland & Anhang, 2009; Steinfeld, Gerber, Wassenaar, Castel, & de Haan, 2006), land footprints (Stehfest et al., 2009), water footprints (Mekonnen & Hoekstra, 2012), and various types of pollution (Bouwman et al., 2013; Liu, Xu, Liu, Wang, & Yu, 2016; Sutton et al., 2011). With global meat consumption projected to be 72% higher in 2030 when compared to year 2000 levels (Fiala, 2008), the associated impacts are only expected to increase. Implementation of the latest technologies and mitigation strategies are expected to reduce production-related environmental impacts by only 20% (Weidema et al., 2008), which has led many authors to suggest a reduction in the consumption of meat in order to promote environmental sustainability (Carlsson-Kanyama & González, 2009; McMichael, Powles, Butler, & Uauy, 2007; Pelletier & Tyedmers, 2010; Raphaely & Marinova, 2014; Tilman & Clark, 2014; Weber & Matthews, 2008).

Although the consumption of meat has been and can be a valuable source of protein, iron, B12, and other B vitamins in the human diet (Pereira & Vicente, 2013), overconsumption, like that seen currently in many Western nations, has been linked to obesity, heart disease, specific cancers, diabetes and other non-communicable diseases (Aston, Smith, & Powles, 2012; Aune, Ursin, & Veierød, 2009; Campbell & Campbell, 2006; Friel et al., 2009; Huang et al., 2012; Pan et al., 2012; Wang & Beydoun, 2009). Developed nations have consistently eaten the greatest amounts of animal products, including meat (Bellarby et al., 2013; Gerbens-Leenes, Nonhebel, & Krol, 2010), and are still projected to eat more than double the amount of meat per capita in 2050 when compared with developing nations (Garnett, 2009). Therefore, these nations' food-related environmental and public health impacts are quite

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high in comparison with other nations that eat considerably less meat per capita. Diets that are more plant-based have been suggested as an alternative by some, due to their associated environmental (Baroni, Cenci, Tettamanti, & Berati, 2007; Carlsson-Kanyama, 1998; Finnigan, Lemon, Allan, & Paton, 2010; González, Frostell, & Carlsson-Kanyama, 2011; Head, Sevenster, & Croezen, 2011; Marlow et al., 2009; Nonhebel & Raats, 2007; Reijnders & Soret, 2003) and health benefits (Esselstyn, Gendy, Doyle, Golubic, & Roizen, 2014; Ferdowsian et al., 2010; Hu, 2003; Ornish et al., 1998, 2005; Wright, Wilson, Smith, Duncan, & McHugh, 2017).

Although shifting to a more plant-based diet may bring environmental and/or public health benefits, there are multiple barriers that impede such a shift among consumers. First and foremost, meat plays a central role in the Western diet while also extending beyond mere sustenance, being associated with ideas of power (Fiddes, 1994; Gaard, 2002), masculinity (Kildal & Syse, 2016; Stevens, Kearney, & Maclaran, 2013; Stuart, 2006; Tobler, Visschers, & Siegrist, 2011), and wealth (i.e. status symbol tied to income) (Cronin, McCarthy, & Collins, 2014; Rozin, Hormes, Faith, & Wansink, 2012; Ruby, 2012; Schösler, De Boer, & Boersema, 2012). These associations may sound abstract, but they can have significant influence over a consumer's choice to eat meat. For example, due to meat's strong association with masculinity, men are less likely to reduce their meat intake, despite acknowledgment that it could lead to several health benefits (Bradbury & Nicolaou, 2012; Mróz, Chapman, Oliffe, & Bottorff, 2011; Rothgerber, 2013).

In addition to cultural and psychosocial attributes associated with the act of consuming meat, the behaviour has also become integrated into Western societies' basic understandings of meal structure, nutrition, and cooking to the point where it has become traditional and routine for consumers. Meat eating is seen as a standard practice, and a majority of Western meals have meat as a central component of the dish. Thus, any efforts that seek to promote meat reduction across Western society will have to overcome barriers that are both personal (e.g. associations and attitudes towards meat) and more systematic/cultural (e.g. meal structure, cooking skills and background, nutrition beliefs). The impact of these barriers can be seen in the current lack of willingness among consumers to reduce their meat consumption (Hoek, Pearson, James, Lawrence, & Friel, 2017; Macdiarmid, Douglas, & Campbell, 2016), which has driven authors to explore why consumers are so attached to meat and how shifts away from current 'meat-heavy' diets might occur.

Demographics offer some insight, as studies have found that consumers who are younger, female, more educated, and less conservative are more likely to reduce their meat intake (Cramer et al., 2017; Dhont & Hodson, 2014; Pfeiler and Egloff, 2018a, 2018b; Rothgerber, 2013; Ruby, 2012; Schösler, de Boer, Boersema, & Aiking, 2015). In addition to sociodemographic trends, specific motivations have been identified that commonly lead individuals towards meat reduction and these motivations can change in both form and intensity depending on the individual's current level of meat intake. Firstly, religion can play an important role in choosing the types and amounts of meat to consume. Vegetarianism is heavily incorporated into certain religions, such as Hinduism and Buddhism, while being more sporadic (or specific to animal) in others such as Christianity or Judaism (e.g. In Christianity, the holiday known as "Lent" is a time when some Christians may not consume meat for at least one day of the week). Recent studies have found health concerns, high costs of meat and weight control seemed to be the primary motivators for meat reducers (i.e. those who have reduced but not completely eliminated meat from their diet) while health and/or animal welfare concerns often provided the main motivation for the adoption of a meatless diet among vegetarians (Fox & Ward, 2008; Hoffman, Stallings, Bessinger, & Brooks, 2013; Jabs, Devine, & Sobal, 1998; Penny, Swift, & Salter, 2015; de Boer, Schösler, & Aiking, 2017). Penny et al. (2015) found that health concerns were the most prevalent motivation for reducing meat consumption across all consumer groups; however, meat reducers were more concerned with high prices of meat and weight control, while vegetarians and vegans were more likely to endorse more ethical motivations such as environmental and animal welfare concerns. So although health concerns tied to meat consumption were more ubiquitous among consumers, environmental and animal welfare concerns regarding meat production and consumption seemed to be more concentrated among those who most consistently reduced meat in their diets (Hoffman et al., 2013). It is important to note that some of these motivators acted as catalysts for dietary change while others were supplementary, helping solidify the decision to continue a reduced meat or vegetarian/vegan diet (Fox & Ward, 2008).

In addition to demographic trends and motivations tied to meat consumption, some studies have gone further and even applied behavioural models, more specifically, the Theory of Planned Behaviour (TPB; Ajzen, 1991) in order to better understand drivers behind meat consumption. The theory identifies intention (i.e. an individual's plans, or lack thereof, to perform a behaviour) as the precursor of behaviour, which is affected (either positively or negatively) by three components: attitudes (i.e. evaluation of the pros and cons of performing the behaviour), subjective norms (i.e. beliefs about how others would perceive the behaviour if acted upon), and perceived behavioural control (PBC, i.e. perception of control over performing the behaviour or not) (Please see Ajzen, 1991 for more information on TPB components). The three TPB components, along with the resulting intentions they form, have been shown to accurately predict both the frequency and quantity of meat consumed; however, attitudes were found to be the strongest predictor, followed by PBC and subjective norm, respectively (Berndsen & Van der Pligt, 2004; Graca, Calheiros, & Oliveira, 2015a; Povey, Wellens, & Conner, 2001; Saba & Di Natale, 1998).

These components have been further expanded upon with the recent creation of the Meat-Attachment Questionnaire (MAQ) (developed by Graca et al., 2015a). The MAQ is comprised of 16 questions, which are grouped into four first-order dimensions, including hedonism, entitlement, affinity and dependence, as well as one second-order dimension, meat attachment. Hedonism refers to pleasure gained from consuming meat, affinity to positive attributes associated with meat, entitlement to the idea of having a right to consume meat, and dependence to the feeling of meat being a necessity in the diet. These four first-order factors combine to create the second-order factor, meat attachment, which is how committed a person is to the act of consuming meat. The MAQ has been shown to predict intentions and willingness (i.e. openness to possibly performing the behaviour) to reduce meat consumption above and beyond the predictive power of the TPB components alone, making it a useful addition to the core TPB components when studying potential meat reduction. The current study is only the second to utilize the MAQ in efforts to understand the potential for reduced meat consumption, adding to its validity as both an explanatory and predictive tool.

Although progress has been made in understanding meat attachment and motivations for reduction (i.e. studies on vegetarianism and its drivers), the literature is still nascent and evolving. The current research answers calls for more population based studies that seek to explore and understand the motivational aspects involved in shifting consumers toward more sustainable plant-based diets (Hartmann & Siegrist, 2017). By studying motivations for reduction across the entire consumer spectrum, from those who do not eat meat to those who consume it regularly, this study offers insight into how a typical transition towards meat reduction might occur. Additionally, this type of information could be vital in guiding meat reduction campaigns aimed at encouraging the public to reduce their meat intake, whether it be for sustainability, health, or any other reason.

Most studies on meat consumption and motivations for its reduction have been concentrated in the United States and the United Kingdom (Corrin & Papadopoulos, 2017), with only two studies (to the author's knowledge) conducted in New Zealand (Allen, M.Wilson, Ng, & Dunne, 2000; Potts & White, 2008). Both New Zealand based studies contributed to understanding the social aspects of vegetarianism (e.g.

treatment of vegetarians by peers, opposing political views, etc.), but information on motivations for meat consumption and its potential reduction among the broader consumer base is still absent. New Zealand is an important place to study meat reduction for multiple reasons: one, New Zealand has the 6th highest per capita meat consumption rate in all the world (FAO, 2013), meaning that reductions in meat intake could result in significant environmental and public health benefits; and two, that the raising of livestock is seen as an integral piece in the national economy, resulting in meat consumption being associated with ideas of national pride and support (Potts & White, 2008). This makes New Zealand not only an appropriate, but also interesting location to study meat consumption and its potential reduction.

Furthermore, this is the first study to utilize the TPB components and MAQ to better understand how each affects agreement with proposed structural meat reduction measures, which include public policy or institutional changes (e.g. meat taxes, plant based food subsidies, more plant based meal options in public institutions). Other studies have found that structural measures, like public procurement, can be an effective tool for bringing food-related issues into public discourse, while also promoting positive shifts in consumptive behaviour (Kleine & das Graças Brightwell, 2015); however, for such systematic changes to be proposed, let alone implemented, political will must be present (Smith et al., 2016), which often relies upon awareness and support from the citizenry (Testa, Annunziata, Iraldo, & Frey, 2016). This is important, as the implementation of strategies to reduce meat consumption at more systematic levels would likely to lead to larger and quicker shifts in consumption behaviour, but lack of political will and public acceptance currently act as impediments to change (Edjabou & Smed, 2013; Nordgren, 2012; Säll & Gren, 2015). Thus, understanding what factors influence acceptance and support for such measures could act as a starting point for more impactful and widespread changes in eating behaviours, both at the individual and societal scale. This study provides important insights into consumer agreement with these proposed structural measures in addition to willingness and intentions to reduce personal meat intake, connecting individual and public action that can be taken in order to reduce meat consumption rates. Linking individual and public efforts is seen as vital for making significant social change (Berkes, Folke, & Colding, 2000), meaning that substantial alterations in such a prevalent societal behaviour (i.e. meat consumption) will likely require efforts in both the public and private realms.

Given the need for more studies on consumer attitudes towards meat reduction and the particular lack of information on New Zealand consumers specifically, four principal questions were investigated:

RQ1. Do consumers place ‘eating less meat’ below other sustainable food behaviours in terms of environmental benefit?
RQ2. Are there any significant differences in motivations to reduce meat consumption between consumer groups?
RQ3. Can any of the TPB components (attitudes, subjective norms, PBC) accurately predict willingness and intentions to reduce meat consumption? Can they also predict current meat reduction behaviour and agreement with proposed structural measures?
RQ4. As initially found by Graca et al. (2015a), does the MAQ provide further predictive power for these phenomena above and beyond that of the TPB in the New Zealand context?

1. Methods

1.1. Study design and participants

Cross-sectional data from across New Zealand was acquired through an online questionnaire designed using Qualtrics software during the months of March and April, 2017. A random representative sample of adults was acquired from ResearchNow (online marketing organization), who distributed the supplied survey link to panellists. Participants were offered monetary compensation for completing the survey and were told that they could remove themselves from the study at any time without any disadvantage to themselves, as in accordance with University ethics approval.

A sample of 843 responses were received, with two participants being removed due to the age criteria for the survey (both were under the age of 18 and therefore, not adults), leaving 841 valid responses. The sample had a 49:50 male to female gender ratio (close to expected 49:51) (stats.govt.nz), had a median age in the range of 36–40 (expected 38) (stats.govt.nz), and matched expected ethnicity profiles except for slightly underrepresented Maori (6.5%) and Pacific Islanders (3.2%) (expected 15% and 7%, respectively) (stats.govt.nz) (see Table 1). The sample was biased towards individuals with higher education (41% compared to expected 20% with a Bachelor's degree or higher qualification) (stats.govt.nz).

1.2. Questionnaire

Perceived environmental friendliness of sustainable food behaviours. When devising the scales for the survey, the authors wanted to ensure that enough points were provided in order for respondents to answer with enough precision, but also not overwhelm the participants or provide too many points to where answer options closer to the centre of the scale became less meaningful. A seven point scale, in the authors' opinions, offered a well-balanced and meaningful scale, and this style was kept consistent throughout the questionnaire in order to limit confusion for participants.

Participants were first asked, “On a scale from 1 to 7, rate how you

Table 1
Demographic information.

Sex	n	%
Female	424	50.4
Male	413	49.1
Gender diverse	4	0.5
Age		
18–30	269	32.0
31–40	203	24.1
41–50	169	20.1
51–60	141	16.8
61–70	59	7.0
Ethnicity		
European	599	71.2
Maori	55	6.5
Pacific Islander	27	3.2
Asian	101	12
Mixed	45	5.4
Other	12	1.4
Undisclosed	2	0.2
Income		
Less than $20,000	125	14.9
$20,000 to $49,999	213	25.3
$50,000 to $99,999	306	36.4
$100,000 to $199,999	163	19.4
$200,000 or more	34	4
Education/Qualifications		
No qualification	57	6.8
Completed NCEA levels 1–3 or equivalent	259	30.9
Apprenticeship or trade certification	176	21
Bachelor's degree or higher	346	41.3
Undisclosed	3	0.4
Area of Residence		
Inner city	195	23.2
Outer city	358	42.6
Town	199	23.7
Rural	89	10.6

believe each of the following eating behaviours affects the environmental friendliness of your diet." The sustainable food behaviours participants were asked to rate included 'buying foods with less packaging material', 'eating seasonal fruits and vegetables', 'buying locally sourced foods', 'avoiding foods that are transported by air', 'buying organic foods', and 'eating less meat' (modelled after Tobler et al., 2011). The bottom anchor (i.e. 1) was labelled 'very small environmental benefit', while the top anchor (i.e. 7) was labelled 'very large environmental benefit'.

Meat consumption habits with willingness, intentions and motivations to reduce. Before being asked any questions about meat-related habits and attitudes, participants were given a definition of meat, as defined by the researchers: "Please keep in mind when answering questions, that the word "meat" refers to red and white meats (e.g. beef, lamb, pork, chicken, turkey, fish, seafood etc.) that are either unprocessed (e.g. chicken breast, steak, fish filet) or processed (e.g. sausage, salami, meat mince, chicken nuggets, crab cakes)." After reading this short definition, participants were asked, "On average how often do you consume meat or products that include meat?", and the provided answer options included 'never', 'rarely', 'several times a week', 'daily', and 'several times a day'. Next, participants were asked, "Have you already or are you currently making any efforts to reduce your personal meat consumption?", with the answer options of 'yes' or 'no'. Answers from these two questions were used in order to break the respondents into three consumer groups (abstainers, reducers, and standard). Abstainers (n = 25) were defined as those who answered 'never' to the question of "On average how often do you consume meat or products that include meat?", reducers (n = 312) were defined as those who answered 'yes' to "Have you already or are you currently making any efforts to reduce your personal meat consumption?", and standard consumers (n = 504) were all remaining participants who answered that they consumed meat but have not reduced.

Willingness, intention and motivations to reduce were all measured on seven point scales. For willingness, participants were asked, "On a scale from 1 to 7, how willing would you be to consider reducing your meat consumption sometime in the near future?" and for intentions, "Specifically, in the next six months do you intend to reduce your meat consumption?". Willingness had the anchors 'not at all willing' and 'extremely willing' while intentions had 'do not intend at all' and 'fully intend'. For motivations to reduce, participants were asked one of two questions depending upon how they answered previous questions. Standard consumers who said they eat meat and have not reduced its consumption were asked, "How important, if at all, would each of the following factors be in strengthening your consideration to reduce your overall meat intake?", while reducers and abstainers were shown an alternate question, "Please think back to when you first decided to reduce your meat consumption. How important were each of the following factors in influencing your initial decision to lower your overall meat intake?" Six potential motivations to reduce meat consumption (with an optional 'other' box) were provided to participants in order to gauge what already has or hypothetically would motivate them to reduce their meat intake. These answer options included 'health benefits', 'more environmentally friendly', 'animal welfare concerns', 'high cost of meat', 'taste preferences', and 'weight control'. The anchors included 'not at all important' and 'extremely important', with an additional middle anchor 'moderately important'.

TPB components. The third part consisted of questions aimed to understand each TPB component (i.e. attitudes, subjective norms, PBC) in regards the participant's meat consumption (as consistent with Berndsen & Van der Pligt, 2004; Graca et al., 2015a). Participants were asked, "On the scales provided, please choose what most closely aligns with your thoughts and attitudes towards the act of consuming meat. NOTE: Scores closer to 1 mean you agree more with the attribute on the left and scores closer to 7 mean you agree more with the attribute on the right." Five sematic differential scales followed, each ranging from 1 to 7 for each set of items: 'bad to good', 'unpleasant to pleasant', 'against to for', 'unfavourable to favourable', 'negative to positive'. Each negatively associated term was placed as a bottom anchor (i.e. 1), while each positively associated term was placed as a top anchor (i.e. 7). Internal consistency for the scale was high ($\alpha = 0.94$) and all five scales were averaged to produce an 'attitude' score for each participant.

Subjective norm was determined with two scalar questions: "People who are important to me think that I should eat meat", with the anchors 'strongly disagree' to 'strongly agree', and "In regards to people who are important to you, how much do they influence your actions to either consume or not consume meat?", with the anchors 'not at all' to 'a lot' ($r = 0.38$). The scores on these two scales were expected to have a multiplicative rather than additive effect, and were therefore multiplied together to produce a subjective norm score, as consistent with Graca et al. (2015a). To clarify, the overall subjective norm score is the product of how much others care about an individual eating meat crossed with how much the individual cares about these others' thoughts, opinions, and judgements. So for example, even if others strongly wished for an individual to eat meat, if the individual does not care at all about these outside opinions, the influence of these outside opinions is expected to be lessened and possibly even nullified (i.e. stronger effect than simply additive, hence multiplicative effect), making the overall subjective norm score much lower in comparison with an individual who cares more about the thoughts and opinions of others. Thus, the product (rather than sum) of the scores for these two statements provided the overall subjective norm score.

PBC was measured with three scalar questions, which were prefaced with the statement, "In regards to your current meat consumption habits …". These questions included, "I am confident I could change my habits if I wanted to", "Whether I change my habits is entirely up to me", and "Changing my habits is not something that is under my control". Each statement had the anchors 'strongly disagree' to 'strongly agree'. Internal consistency was poor ($\alpha = .59$), however, lower alpha values are common in scales with only two or three items (Tavakol & Dennick, 2011), in which case composite reliability can be used as an alternative. Composite reliability for the three item scale was 0.79 (reliability above 0.7 is considered acceptable; Hair & Lukas, 2014).

MAQ. The fourth section contained 16 statements (consistent with Graca et al., 2015a) intended to measure meat attachment. Participants were asked, "On a scale from 1 to 7, please rate your agreement with the following group of statements." with the anchors 'strongly disagree', 'strongly agree', and middle anchor 'neither agree nor disagree'. Four statements comprised the hedonism subscale: "A good steak is without comparison", "To eat meat is one of the good pleasures in life", "I love meals with meat", and "I'm a big fan of meat". The affinity subscale was also comprised of four statements, which were all reverse coded for analyses: "I feel bad when I think of eating meat", "To eat meat is disrespectful towards life and the environment", "Meat reminds me of diseases", and "By eating meat I'm reminded of the death and suffering of animals". The entitlement subscale was comprised of three statements: "According to our position in the food chain, we have a right to eat meat", "To eat meat is an unquestionable right of every person", and "Eating meat is a natural and indisputable practice". Lastly, the dependence subscale was comprised of five statements: "Meat is irreplaceable in my diet", "I would feel fine with a meatless diet", "If I couldn't eat meat I would feel weak", "If I was forced to stop eating meat I would feel sad", and "I can't picture myself not eating meat regularly". The statement, "I would feel fine with a meatless diet" was reverse coded for analyses. Each group of statements was averaged to create a subscale score, while all statements were averaged to create a global scale score. The four subscales, hedonism ($\alpha = .91$), affinity ($\alpha = 0.87$), entitlement ($\alpha = 0.81$) and dependence ($\alpha = 0.84$) in addition to the global scale ($\alpha = 0.93$) all had high internal consistency. Composite reliability (CR) and average variance extracted (AVE) were both calculated (CR = 0.92; AVE = 0.73) and both were above accepted thresholds (0.7 and 0.5, respectively; Hair, Black, Babin, & Anderson, 2010). Correlations between MAQ subscales and global scale

Table 2
Correlations of MAQ global and subscales.

Scale	M	SD	1	2	3	4	5
1. Hedonism	5.1	1.4	–				
2. Affinity	5.2	1.5	.56*	–			
3. Entitlement	4.8	1.4	.67*	.47*	–		
4. Dependence	4.2	1.4	.77*	.44*	.65*	–	
5. Global	4.8	1.2	.90*	.74*	.80*	.88*	–

Note. M = mean, SD = standard deviation.
*p < .05.

show strong associations (Table 2), indicating strong internal consistency and reliability.

Structural measures. The fifth part contained six statements regarding potential 'top-down' actions that governments could take in order to promote meat reduction, which were organized into two sets of three questions each based upon framing of the policy (i.e. either for public health or environmental concerns). The policy measures proposed to participants in order to address environmental concerns included, 'To reduce food-related environmental impact, an 'environmental tax' should be placed on meat and meat products to make them more expensive.', 'To reduce food-related environmental impact, an 'environmental subsidy' should be applied to plant-based foods to make them more affordable.', and 'Public institutions like universities should reduce the environmental impact of their food catering by providing more meatless meals.'. The policy measures proposed to participants in order to address public health concerns included, 'To promote improved public health, a 'health tax' should be placed on meat and meat products to make them more expensive.', 'To promote improved public health, a 'health subsidy' should be applied to plant-based foods to make them more affordable.', 'Public institutions like universities should promote public health by providing more meatless meals among their food options'. The public health and environmental frames were included in order to determine if support for the proposed measures differed depending upon the justification provided (i.e. framing of the policy). Respondents were asked to rate these different proposed measures on scales from 1 to 7 with the respective anchors of 'strongly disagree' to 'strongly agree'. The scores between the two frames (i.e. health and environment) were also averaged for each policy proposal (i.e. subsidies, procurement, taxes) in order to determine overall agreement with each measure without focusing on differences in framing.

Demographics. The sixth and final section of the questionnaire contained demographic questions (e.g. "What is your age?", "How many adults live in your household?") in order to elucidate any trends in meat consumption within the population.

1.3. Statistical analysis

Before any analysis took place, data from the questionnaire was checked for missing and/or incomplete values. The survey design required participants to answer each question before advancing and as expected, no missing values were detected in the data. Data was analysed using SPSS 23 (SPSS Inc., Chicago, IL) and descriptive statistics were used to report means and standard deviations.

For the first research question, means and 95% confidence intervals were used in order to determine if consumers believed the environmental benefit of eating less meat was significantly lower than other sustainable food behaviours. In addition to determining statistical significance, the researchers also wished to understand how large these differences were and therefore, effect size (e.g. Cohen's *d*) between eating less meat and the sustainable behaviour rated to be most environmentally beneficial was calculated.

The second research question, exploring whether there were significant differences in motivations to reduce meat consumption between consumer groups, was determined using a one-way ANOVA and Tukey HSD post hoc test. The ANOVA determined whether there were significant differences in mean motivation scores between consumer groups, while the Tukey HSD post hoc test would provide directionality and additional details on exactly how consumer groups differ (or not) for each motivation. To ensure an adequate sample size, G*Power software was used to perform an a-priori power analysis for the proposed ANOVA analysis. To achieve a power of 90% with a Cohen's f effect size of 0.18 (small to medium effect) and type 1 error rate of 0.05, the required sample size was 396 which is well below the realised sample size of 841.

Before further research questions involving the TPB and MAQ were explored, the researchers wished to confirm the conceptual structure of the MAQ, since this was only the second study to the authors' knowledge to utilise the construct. Structural equation modelling would be needed in order to determine the MAQ's validity and therefore, the AMOS 23 program, an SPSS extension module, was utilized. A confirmatory factor analysis was performed in order to confirm that statements loaded onto their designated subscale latent factors (e.g. hedonism, affinity) and that these resulting latent factors loaded strongly onto the global scale of overall meat attachment. For external validity, standard Pearson correlation coefficients were calculated in order to determine the strength of linear relationships between MAQ scores and additional variables that are expected to be associated with the construct of meat attachment (e.g. respondents' current meat intake, attitudes towards meat, etc.).

Once the validity of the MAQ was verified, the third and fourth research questions were explored in order to determine whether the TPB and/or the MAQ could accurately predict willingness and intentions to reduce meat intake as well as agreement with proposed structural measures aimed at reducing meat consumption on a wider societal scale. Although simple linear regressions would have provided the relationship between the entire theoretical construct of meat attachment and the dependent variables studied (e.g. willingness to reduce), understanding how each component of meat attachment interacts with these variables would be even more insightful. Therefore, hierarchical multiple regressions were utilized in order to test the constructs and their respective components with a specified dependent variable, allowing the researchers to understand the explanatory powers of the TPB and meat attachment constructs *as well as* their individual components. An a-priori power analysis was performed for the regressions to ensure that an adequate sample size would be attained for these analyses. With a power of 90%, Cohen's f^2 effect size of 0.02 (small effect), and type 1 error rate of 0.05 the required sample size was 776 which is below the realised sample size of 841.

2. Results

2.1. Perceived environmental friendliness of sustainable food behaviours (RQ1)

Concerning the six sustainable food behaviours, consumers believed that buying foods with less packaging had the greatest positive impact on the environment, followed by eating seasonally, buying local, avoiding air-transported foods, buying organic, and eating less meat (see Fig. 1). The environmental benefit of consuming less meat was rated significantly lower by respondents in comparison to all other sustainable food behaviours, as shown with the non-overlapping confidence intervals in Fig. 1. Cohen's *d* was calculated using results from a paired samples *t*-test and effect size between buying foods with less packaging and eating less meat was large ($d = 0.77$) ($d \sim 0.80$ is considered large; Sawilowsky, 2009). Descriptive statistics for the sustainable food behaviours are presented in Table 3.

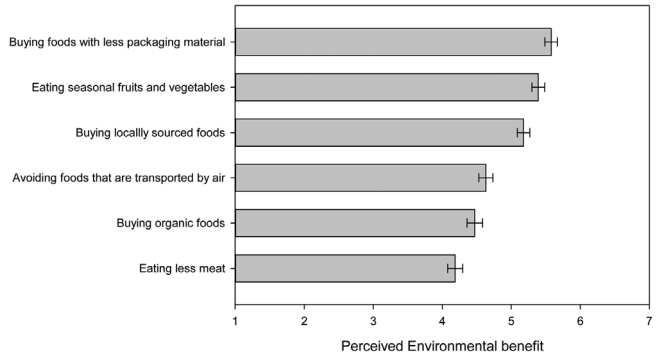

Fig. 1. Means and 95% CI for perceived environmental benefit of six sustainable food behaviours.

2.2. Motivations for reduction (RQ2)

Across the entire sample, high cost of meat was the strongest motivational factor in reducing meat consumption (M = 4.9), followed by health benefits (M = 4.8), taste preferences (M = 4.4), animal welfare concerns (M = 4.3), weight control (M = 4.2) and more environmentally friendly (M = 4.1). These values were more influenced by standard consumers (n = 504), less so by reducers (312), and hardly at all by abstainers (n = 25) due to sheer numbers in each consumer group. Descriptive statistics for the motivations for reduction are presented in Table 3.

Strength of motivations to reduce were statistically different between consumer groups (abstainer, reducer, standard), except for taste preferences based upon one-way ANOVA results: high cost of meat [$F(2, 838) = 44.9$, $p < .001$], health benefits [$F(2, 838) = 47$, $p < .001$], taste preferences [$F(2, 838) = 0.2$, $p = .809$], animal welfare concerns [$F(2, 838) = 29$, $p < .001$], weight control [$F(2, 838) = 28.6$, $p < .001$], more environmentally friendly [$F(2, 838) = 50.3$, $p < .001$]. Health benefits, environmental concerns and taste preferences all failed Levene's Test of homogenous variances, so the more robust Welch statistic was used in place of the ANOVA values for those three motivations. In addition to the ANOVA, a Tukey HSD post hoc test was performed in order to compare all consumer groups with one another for each of the six motivations. To supplement the post hoc test, a bar graph was created in order to aid visualization of the differences between groups (Fig. 2).

Based upon the post hoc analysis, all non-overlapping confidence intervals between consumer groups indicated a significant difference, while overlapping confidence intervals were found to be non-significant (see Fig. 2), except for the difference between abstainers and standard consumers on the 'more environmentally friendly' motivation which was found to be significant despite overlap ($p = .043$). As shown, ranking of motivations to reduce meat consumption differ depending upon consumer group. For reducers, the 'health benefits' motivation is statistically higher when compared to standard consumers, even outweighing the motivation of 'high cost of meat'. The motivations 'more environmentally friendly', 'animal welfare concerns', and 'weight control' are also statistically higher among reducers when compared to standard consumers. Among abstainers, the 'weight control' and 'high cost of meat' motivations are statistically lower, while the 'animal welfare concerns' motivation is statistically higher when compared to reducers and standard consumers. In addition, the 'more environmentally friendly' motivation is statistically higher among abstainers when compared to standard consumers, but not reducers.

2.3. MAQ validity

Pearson correlation was used in order to determine associations

Table 3
Descriptive statistics for all dependent variables.

	All Groups n = 841		Abstainer n = 25			Reducers n = 312			Standard n = 504		
	M	SD	M	SD	Min Max	M	SD	Min Max	M	SD	Min Max
Behaviours											
Less packaging	5.6	1.4	6.0	1.4	2, 7	5.7	1.3	1, 7	5.5	1.4	1, 7
Eating seasonal	5.4	1.4	5.5	1.6	2, 7	5.7	1.3	1, 7	5.2	1.4	1, 7
Eating local	5.2	1.4	5.6	1.4	2, 7	5.5	1.1	1, 7	4.9	1.4	1, 7
Avoiding air transported	4.6	1.5	5.8	1.2	3, 7	5.0	1.4	1, 7	4.4	1.5	1, 7
Eating organic	4.5	1.7	5.2	1.6	2, 7	4.9	1.6	1, 7	4.2	1.6	1, 7
Eating less meat	4.2	1.6	6.3	1.5	2, 7	5.0	1.5	1, 7	3.6	1.4	1, 7
Motivations											
High cost of meat	4.9	1.5	2.2	1.7	1, 7	5.0	1.4	1, 7	4.9	1.5	1, 7
Health benefits	4.8	1.6	3.9	2.4	1, 7	5.4	1.3	1, 7	4.5	1.5	1, 7
Taste preferences	4.4	1.6	4.2	2.7	1, 7	4.4	1.6	1, 7	4.4	1.5	1, 7
Animal welfare	4.3	1.8	5.9	1.6	1, 7	4.6	1.7	1, 7	3.9	1.7	1, 7
Weight control	4.2	1.7	2.7	2.0	1, 7	4.7	1.7	1, 7	4.0	1.6	1, 7
Environmental concerns	4.1	1.6	4.4	2.4	1, 7	4.7	1.5	1, 7	3.7	1.5	1, 7
Meat Reduction Variables											
Willingness to reduce	3.0	1.5	–	–	–	–	–	–	3.0	1.5	1, 7
Intentions to reduce	2.4	1.4	–	–	–	–	–	–	2.4	1.4	1, 7
Agreement with measures	3.9	1.3	5.8	1.0	3, 7	4.4	1.2	1, 7	3.5	1.1	1, 6

Note. M = mean, SD = standard deviation, and Min/Max = minimum and maximum. Some variable names are shortened in order to fit the table. Please refer to the main sections these dependent variables are discussed for more detail. "Agreement with measures" is an average based on the six scalar questions for gauging agreement with proposed structural measures: three focused on public health and three focused on environmental sustainability. Abstainers and reducers have no values for willingness and intentions to reduce because they have already reduced their meat consumption. Minimum and maximum values for the "All Groups" category follow that seen for "Reducers", with all values ranging from one to seven.

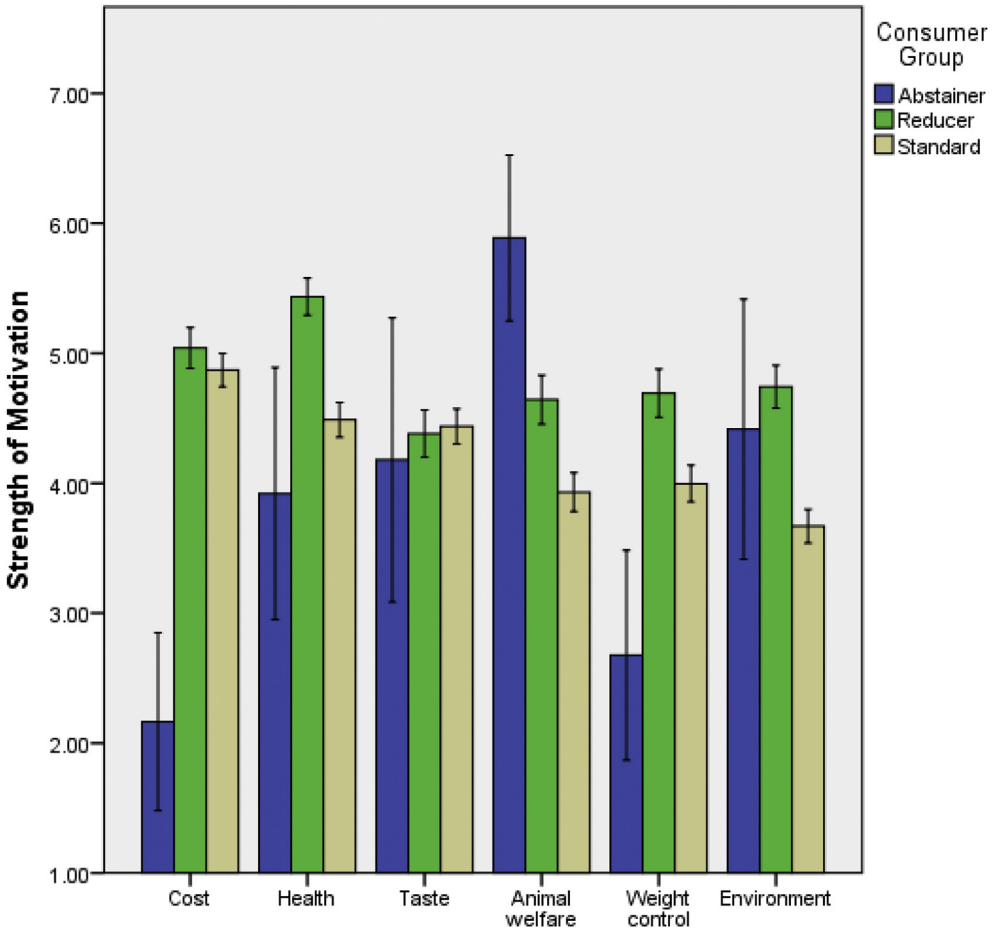

Fig. 2. Strength of motivations to reduce meat intake (means with 95% confidence intervals) by consumer category (abstainer, reducer, standard). Cost = high cost of meat, Health = health benefits, Taste = taste preferences, Animal welfare = animal welfare concerns, Weight control = weight control, Environment = more environmentally friendly. For those viewing the figure without colour, the three groups for each motivation are organized as follows: Abstainer (Left), Reducer (Center), Standard (Right)

Table 4
Pearson correlations for MAQ with TPB components and meat intake.

Scale	Attitudes	Subjective norm	PBC	Meat intake
1. Hedonism	.76**	.13**	.09*	.53**
2. Affinity	.54**	-.15**	.29**	.30**
3. Entitlement	.61**	.12**	.09**	.39**
4. Dependence	.66**	.19**	-.08*	.48**
5. Global	.77**	.09**	.11**	.51**

*p < .05; **p < .01.

between the MAQ subscales and global scale with the TPB components and meat intake level. All variables had skewness values (between −0.89 and 0.84) and kurtosis values (between −0.55 and 0.74) that fell within acceptable ranges for normality (± 2; George & Mallery, 2016) As seen in Table 4, the MAQ subscales and global scale were moderately and strongly correlated with attitudes and meat intake level, while correlations were much weaker with subjective norm and PBC. This was expected, as Graca et al. (2015a) found attitudes to be heavily correlated with the MAQ subscales and global scale, with weaker correlations for subjective norm and PBC observed. Subjective norm and PBC showed statistically significant positive correlations with each subscale, except for affinity and dependence, respectively. All four subscales and the global scale showed positive correlations with actual meat intake.

A *t*-test was performed in order to determine if meat-attachment scores differed depending on gender of the respondent. A statistically significant difference in scores was found between men (M = 5.06, SD = 1.08) and women (M = 4.54, SD = 1.23); t (835) = 6.50, p = .000. This adds further support to the validity of the MAQ, as studies in the past have shown women to be less attached to meat when compared with their male counterparts (Rothgerber, 2013; Ruby et al., 2016; Schösler et al., 2015).

MAQ confirmatory factor analysis. A confirmatory factor analysis (CFA) was performed with maximum likelihood estimation method using AMOS 23 (Arbuckle, 2013) in order to assess model fit for the MAQ theoretical structure (See Fig. 3). The chi-square value ($x^2/df = 5.92$) was higher than the accepted standard ($x^2/df \leq 3$); however, chi-square is known to be overly sensitive to larger sample sizes (N ≥ 200) (Schermelleh-Engel, Moosbrugger, & Müller, 2003; Vandenberg, 2006). Therefore, alternative fit indices were utilized as additional indicators for adequate model fit (CFI = 0.95, TLI = 0.93, RMSEA = 0.08 [0.07, 0.08]) and all indices performed within accepted standards (CFI ≥ 0.90, TLI ≥ 0.90, RMSEA ≤ 0.08; Hoe, 2008). Hence, the theoretical model for meat attachment was accepted as having good fit. Correlated error variances were included between the questions 'According to our position in the food chain, we have a right to eat meat' (Q3) and 'To eat meat is an unquestionable right of every person' (Q7) due to their similar wording and ideas (i.e. right to eat meat). Correlated error variances were also included between the questions 'Meat is irreplaceable in my diet' (Q2), 'If I couldn't eat meat I would feel weak' (Q11), and 'If I was forced to stop eating meat I would feel sad' (Q12) due to their relatedness on the subject of meat no longer being present in the diet (hypothetically). Including these correlated error variances based on theoretical backing allowed for improved model fit (Brown, 2014), and fit indices, factor loadings and R^2 coefficients all had similar values and/or followed similar patterns as those seen in previous work by Graca et al. (2015a).

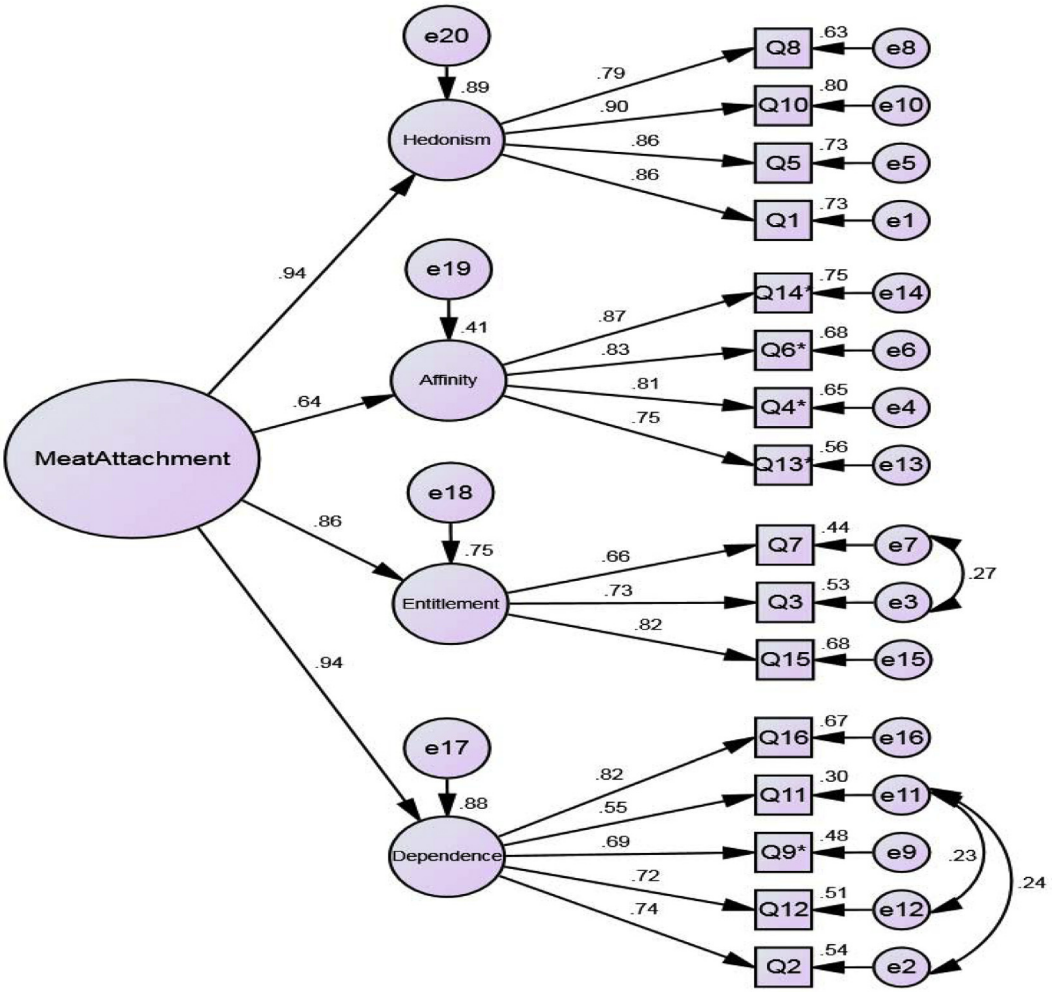

Fig. 3. Confirmatory factor analysis of the Meat Attachment Questionnaire theoretical structure. Model included four latent factors (subscales) and one second order dimension (global scale). Standardized coefficients for both factor loadings (e.g. 0.94 for Hedonism and MeatAttachment) and R^2 values (e.g. 0.88 for Dependence) are presented. * Reverse coded items.

2.4. TPB and MAQ prediction of willingness, intentions, and support of structural measures (RQ3 and RQ4)

TPB and MAQ predictive power. In order to determine the predictive ability of the TPB components and MAQ subscales and global scale, eleven hierarchical regressions were performed: five for willingness to reduce, five for intention to reduce, and one for agreement with proposed structural measures. Step 1 involved inputting the TPB components (i.e. attitudes, subjective norms, PBC), while Step 2 included either one of four MAQ subscales (e.g. Hedonism) or the global scale. As shown in Tables 5 and 6, attitudes consistently held the highest beta weights in comparison to subjective norm and PBC, which were statistically non-significant in all of the regression analyses except for subjective norm with the dependence subscale for predicting intentions. For each regression analysis, significance values were adjusted using the sequentially rejective Bonferroni test, which controls for both type I and type II errors, proposed by Holm (1979).

Willingness and Intentions to Reduce. Skewness (between 0.41 and 0.80) and kurtosis (between −0.49 and −0.72) values for both willingness and intentions were within acceptable ranges for normality (± 2; George & Mallery, 2016). Multicollinearity was not observed to be an issue within the regression analyses, as variance inflation factor (VIF) values ranged from 1.06 to 2.00 with tolerance values between 0.50 and 0.94 (VIF < 10 and tolerance > 0.10 considered acceptable; O'brien, 2007). Additional explained variance offered by the MAQ subscales and global scale were all significant, ranging from 4% (Affinity) to 13% (Global) for willingness to reduce and 2% (Hedonism and Entitlement) to 7% (Global) for intentions to reduce. Explained variance overlap occurred between attitudes and the MAQ, as beta weights for attitudes dropped drastically when MAQ subscales or global scale were included in the regression analyses. Dependence shared almost complete explanatory variance with the global scale in regards to willingness to reduce meat consumption, and explained variance offered by the global scale for intentions to reduce was almost half that of the explained variance for willingness to reduce.

Structural measures. Based upon paired sample t-tests, agreement with plant-based food subsidies (Health frame (HF): M = 4.94, SD = 1.83; Environmental frame (EF): M = 4.89, SD = 1.78) was significantly higher than agreement with plant-based friendly public food procurement practices (HF: M = 3.95, SD = 1.70; EF: M = 3.92, SD = 1.66) for both the health: t (840) = 14.14, p < .001; and environmental: t (840) = 15, p < .001; frames. In addition, agreement with plant-based friendly public food procurement practices was higher than agreement with taxes on meat and meat products (HF: M = 2.64, SD = 1.72; EF: M = 2.85, SD = 1.79) for both the health: t (840) = 23, p < .001 and environmental: t (840) = 19.51, p < .001 frames. The disparities in agreement level between proposed measures were therefore all significant; however, the reason for implementation (i.e. for improved public health or environmental sustainability) only had a statistically significant impact on respondents' agreeableness to the meat tax proposal, in which the

environmental frame had an increased agreement level when compared to the public health frame; t (840) = 5.34, p < .001.

A hierarchical regression was performed in order to determine the predictive ability of the TPB components and MAQ global scale. Positive attitudes towards meat along with high attachment were found to have strong negative relationships with overall agreement towards proposed measures (score averaged across all six proposals) (Table 6). Skewness (−0.15, SE = 0.08) and kurtosis (0.14, SE = 0.17) values of summed proposal scores were both within the acceptable range of ± 2 for normality. Multicollinearity was not observed to be an issue within the regression analyses, as variance inflation factor (VIF) values ranged from 1.05 to 2.54 with tolerance values between 0.39 and 0.95.

Table 5
Hierarchical regressions: TPB and MAQ predicting willingness and intentions to reduce.

Predictor Variables	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6
Willingness						
TPB components						
Attitudes	-.50***	-.27***	-.36***	-.37***	-.26***	-.15*
Subjective norm	.07	.07	.05	.08	.11	.08
PBC	.05	.06	.10	.07	.00	.07
MAQ scales						
Hedonism		-.35***				
Affinity			-.26***			
Entitlement				-.25***		
Dependence					-.41***	
Global						-.51***
R^2	.24	.30	.28	.28	.36	.37
R^2 change	.24***	.07***	.04***	.05***	.12***	.13***
Intentions						
TPB components						
Attitudes	-.42***	-.28***	-.26***	-.34***	-.26***	-.16*
Subjective norm	.06	.06	.03	.06	.08*	.07
PBC	-.03	-.02	.03	-.02	-.06	-.01
MAQ scales						
Hedonism		-.21***				
Affinity			-.31***			
Entitlement				-.15**		
Dependence					-.27***	
Global						-.38***
R^2	.19	.21	.24	.20	.24	.26
R^2 change	.19***	.02***	.06***	.02**	.05***	.07***

Note. Reg = regression. Standardized beta weights are displayed for each regression. The first regression only included the TPB components, with each successive regression adding a MAQ subscale or global scale (i.e. all subscales combined).
*p < .05; **p < .01, ***p < .001.

Table 6
Hierarchical regressions: TPB and MAQ predicting agreement with proposed measures.

Predictor Variables	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6
TPB components						
Attitudes	-.49***	-.32***	-.23***	-.36***	-.32***	-.10*
Subjective norm	.17***	.17***	.07*	.18***	.18***	.15***
PBC	-.04	-.05	.04	-.04	-.09**	-.05
MAQ scales						
Hedonism		-.22***				
Affinity			-.49***			
Entitlement				-.21***		
Dependence					-.25***	
Global						-.50***
R^2	.26	.28	.41	.29	.29	.36
R^2 change	.26***	.02***	.15***	.03***	.03***	.10***

Note. Reg = regression. Standardized beta weights are displayed for each regression. The first regression only included the TPB components, with each successive regression adding a MAQ subscale or global scale (i.e. all subscales combined).
*p < .05; **p < .01, ***p < .001.

3. Discussion

3.1. Summary of results

RQ1 Perceived environmental friendliness. The environmental benefit of consuming less meat was rated significantly lower by respondents in comparison to all other sustainable food behaviours and the difference between the highest rated (i.e. buying foods with less packaging material) and the lowest (i.e. eating less meat) was large based on effect size calculations. Eating less meat was rated by consumers as less environmentally friendly when compared to the other five sustainable behaviours, even though reduced meat consumption would likely have much greater and more widespread environmental benefits compared to many if not all of the other listed behaviours.

RQ2 Motivations for Reduction. Strength of motivations for meat reduction differ depending on individuals' meat eating habits. Standard consumers, reducers, and abstainers all seem to have differing priorities when it comes to the reduction of meat. High cost of meats and health concerns seem to be primary motivations for standard consumers and reducers, with raised ethical motivations such as environmental friendliness and animal welfare concerns buttressing the more primary motivations among reducers. For abstainers, more ethical motivations such as animal welfare concerns and environmental friendliness are primary, while motivations such as health concerns and taste preferences play more minor roles.

RQ3 and RQ4 TPB and MAQ predicting willingness, intentions and proposed measures. The construct of meat attachment, as outlined by the MAQ, was validated based upon a confirmatory factor analysis which establishes its usefulness along with the TPB components in studying meat-related opinions and habits. Based upon hierarchical multiple regressions, attitudes and meat attachment (all subscales and global scale) were significant predictors of willingness and intentions to reduce meat intake, while subjective norm and PBC had no consistent significant predictive ability. Attitudes and meat attachment were also the most significant predictors for agreement with proposed structural measures aimed at reducing meat consumption; however, subjective norm was also a significant predictor. For the proposed structural measures, consumers agreed most with the plant-based food subsidy proposal, followed by the proposal for more plant-based foods in public institutions, and finally the proposal for a tax on meat and meat products. The framing used for the proposals seemed to have little impact on consumer agreement, except for the proposal of meat taxes, where agreement levels were significantly higher given the environmental frame versus the public health frame.

3.2. General discussion

In New Zealand, consumer awareness of the relative environmental impacts of meat consumption in comparison to other sustainable food behaviours seems to be low, matching a trend seen in other nations (Campbell-Arvai, 2015; Lea & Worsley, 2008; Macdiarmid et al., 2016; Siegrist, Visschers, & Hartmann, 2015). This is important to note, as a non-existent or tentative connection between meat eating and its associated environmental impacts could potentially explain why environmental concern was the weakest motivation for consumers when considering to reduce their meat intake. Increasing knowledge concerning meat consumption's link to environmental impacts could be an important component in intervention efforts that strive to motivate dietary change among consumers, as meat reduction among vegetarians has been shown to be influenced by multiple motivations, with some acting as catalysts for dietary change and others as supplementary support for continued meat reduction (Fox & Ward, 2008). Awareness raising of associated environmental issues could therefore complement other motivations that are already more salient among consumers, such as health and cost concerns, in order to further promote reduced meat consumption. However, knowledge alone does not necessarily result in

direct action (i.e. value-action gap; Kollmuss & Agyeman, 2002) and more studies are needed in order to understand the limitations of awareness raising on prevalent habits like high levels of meat consumption.

High costs of meat and health benefits associated with its reduced intake were the most prevalent motivations for consumers, which could be a result of heightened awareness regarding these issues, or simply a tendency for individuals to think about and prioritize personal well-being and safety above other concerns that are less salient and tangible in their daily lives (e.g. animal welfare, environmental impacts). This is relevant for businesses that market meat substitutes, as relaying health benefits and ensuring competitive prices will likely be important selling points for transitioning standard consumers from meat to alternative plant-based products. However, as also observed by de Boer et al. (2017), motivations to reduce shift between consumer groups, with health benefits, animal welfare and environmental concerns being stronger motivations for reducers when compared with standard meat eaters. Also, animal welfare concerns was the most prominent reason given by abstainers for reducing their meat consumption (followed by environmental concerns), further supporting the link between ethical beliefs and stronger commitments to meat reduction (Hoffman et al., 2013; Penny et al., 2015). Therefore, awareness raising campaigns that focus on multiple motivations for reduction rather than one alone (utilizing animal welfare and environmental arguments alongside more salient health benefits) could have the potential to convince standard consumers to reduce, while also making the commitment for those who have already reduced even stronger.

Many standard consumers and reducers listed high costs of meat as the strongest, if not one of the strongest motivators for reducing consumption. These findings support the influence of price on the decision to purchase meat, aligning with previous studies which found meat demand to be relatively elastic (i.e. price sensitive) when compared to other food categories (Andreyeva, Long, & Brownell, 2010). Of course, shifts in demand depend on the meat product under question, as slight variations in elasticity exist between the different meat categories (Andreyeva et al., 2010; Gallet, 2010; Lusk & Tonsor, 2016). For example, the study of Andreyeva et al. (2010) found that beef had an estimated elasticity of 0.75, while that for fish was 0.50; so an equivalent increase in price for both products would result in different effects on demand for each product (demand decreasing to a greater extent for beef than for fish, in this example). Although shifts in price would seem to be a major influence on meat demand, as prices increase, meat demand becomes more inelastic (i.e. price insensitive) as found by Lusk and Tonsor (2016). They also found that income level of the consumer plays an important role on meat demand, as those with higher incomes more frequently choose “higher cuts” of meat such as steaks and whole chicken breasts, in comparison to other products such as ground beef and deli ham. In addition, demand for specific meat products among those with higher incomes is more sensitive to price changes in competing products, and thus, the pricing of meat products relative to one another seems to have greater influence on relative demand for higher income individuals in comparison to those with lower incomes. So although high prices associated with meat products is a major motivation for individuals to reduce, the type of meat, the current prices relative to those in recent history, and the individual's income level will all ultimately determine whether a price change will marginally or greatly impact that individual's demand for a specific meat product.

One interesting point to note, is that although standard consumers rated high costs of meat as being their strongest motivation to reduce intake, the idea of meat taxes had the least support of all structural measures. So although price manipulations are likely to be an effective policy tool to help curb meat intake, the implementation of such a proposal would likely be met with strong resistance from consumers and the meat industry, as expressed by multiple authors (Edjabou & Smed, 2013; Nordgren, 2012; Säll & Gren, 2015). Therefore, it will likely be necessary to first address these positive attitudes and attachments that consumers hold towards meat in order to gain enough support for these structural measures that have the potential for more widespread dietary change. Thinking ahead, the effectiveness of such policies if implemented will have to be assessed, as retailers and consumers find ways to subvert certain measures. For example, in response to newly implemented food taxes, retailers can offer price adjustments or discounts to keep sales of the product high and/or consumers can shift to cheaper stores to purchase the same or similar products at lower prices, ultimately weakening the policy's impact on consumption rates (Jensen & Smed, 2013). Thus, even if a proposed measure such as a meat tax is implemented, it will likely take complementary efforts in awareness raising campaigns and/or framing strategies that increase other motivations in addition to cost (e.g. environmental sustainability benefits).

Attitudes and meat attachment were observed to be a strong predictors of willingness, intention, and agreement with proposed structural measures, but subjective norm and PBC offered no clear predictive power (except for subjective norm for agreement with proposed measures). This slightly contradicts Povey et al. (2001), who found all TPB components to be significant predictors of intentions to reduce meat consumption, although subjective norm and PBC were much weaker predictors than attitudes. These findings fall in line with more recent results from Graca et al. (2015a), who found attitudes and meat attachment to be the strongest predictors in regards to willingness and intentions to reduce meat intake, with subjective norm and PBC being only minor and inconsistent predictors. Implications based on these findings are relevant to any strategy aiming to change current consumption patterns, whether to benefit the environment or public health. In order to increase willingness and intentions to reduce meat intake, as well as promote acceptance of more meat reduction structural measures, positive attitudes and attachment that consumers hold towards meat will likely need to be addressed.

This is only the second study (to the author's knowledge) to utilize the MAQ, adding further to its validity and reliability as a tool for measuring meat attachment and predicting intentions and willingness to reduce meat consumption. Also, being used in a New Zealand context gives the MAQ some cross-cultural validity, as attachment patterns and their associations with current meat eating behaviours and considerations for future reduction seem to be consistent across the two nations presently studied (Portugal and New Zealand). Expanded use of the questionnaire in other nations will be vital in order to determine whether the MAQ has universal qualities, or if major inconsistencies in theory or measurement of meat attachment exist between cultures. Findings from this study give further support to the use of the MAQ as a measurement and predictive tool in regards to meat attachment and willingness to reduce meat intake. This tool could prove useful for not only further scientific enquiry into meat attachment and behaviour change studies, but also for organizations wishing to understand and measure changes in meat attachment across populations and/or over time.

4. Limitations and future directions

The limitations of this research are mainly a result of the methods utilized, as well as the scope with which the research questions were addressed. For example, participants' meat intake levels were self-reported and therefore, not free from personal biases or fallacies. In addition, frequency of meat consumption was measured, but amounts of meat consumed each meal was not. Future studies could utilize food journals (either written or photographed) in order to gain a more fine-tuned portrayal of both frequencies and quantities of meat consumed. In addition, the data collection period was during that of Lent, a holiday where some Christians may not consume meat for at least one day of the week. Due to New Zealand having a sizable Christian population, the holiday could have had an impact on specific variables such as

willingness or intentions to reduce meat consumption. However, an "other" option (along with text box) was included among the answer choices for possible motivations to reduce, and few participants listed religious reasons. Thus, the authors did not feel the need to specifically focus on and discuss the possible influence of religious motivation for this specific sample. Due to the nature of being a cross-sectional study, no patterns or changes in meat consumption attitudes or attachments can be seen over time. Future studies are likely to benefit from utilizing the TPB and MAQ in a time series fashion, in order to elucidate changes that occur from controlled interventions, media campaigns, or any other event that might have significant impacts on consumers' meat-related thoughts and behaviours. Also, this study mainly focused on understanding the MAQ as a practical tool for measuring meat attachment and predicting willingness and intentions to reduce, along with agreement towards proposed structural measures. Future studies wishing to add further to the theoretical understanding of meat attachment are likely to benefit from taking a more psychological approach, possibly by comparing or combining other established theoretical models (e.g. 4Ns of meat consumption; Piazza et al., 2015) with the MAQ. Lastly, the current study only looked at consumers in New Zealand. Although findings from the MAQ seem to be quite similar between the two nations currently studied (Portugal and New Zealand), evidence from other nations is needed in order to determine whether the theoretical structure of meat attachment has universal properties that can be applicable across regions and cultures.

5. Conclusion

In summary, awareness of meat's environmental impacts is low among New Zealand consumers, matching trends seen in other western nations. Educating consumers about these issues has the potential to act as a complementary motivation along with already more prevalent and salient motivations such as cost and health considerations. Attitudes and meat attachment are strong predictors of willingness and intentions to reduce personal meat intake, as well as agreement with structural measures aiming to reduce meat consumption at a broader scale. These findings have implications on interventions trying to promote meat reduction at the personal and/or societal level, which will likely need to address the positive attitudes and attachment towards meat that consumers hold, if significant dietary shifts are to occur. The utilization of the MAQ as a measurement and predictive tool seems promising, and its implementation in experimental studies and within organizations to gauge the effectiveness of meat reduction interventions is a logical next step.

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