

Prospective “warm-glow” of reducing meat consumption in China: Emotional associations with intentions for meat consumption curtailment and consumption of meat substitutes

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ABSTRACT

Consumers' food choices strongly affect the environment, particularly as a result of the production and consumption of meat. From an environmental standpoint, it is important to gain a better understanding of how consumers can be motivated to eat less meat, particularly in non-Western countries where few studies on this topic have been conducted. The current study was conducted in China, where the level of meat consumption has increased rapidly. The findings indicate that prospective “warm-glow” feelings are positively related with consumers' intention to reduce meat consumption; this relation is stronger than the respective relations of both perceived sustainability and perceived health benefits with the intention to reduce meat consumption. Prospective “warm-glow” feelings are more strongly positively associated with the intention to reduce meat consumption via curtailment, than with the intention to consume (more) meat substitutes.

Every day, consumers make many decisions, of which many revolve around food. The production of food has a large environmental impact (Tukker & Jansen, 2006), particularly the production of meat products (Poore & Nemecek, 2018; Schösler, De Boer, & Boersema, 2012). Behaviour change in consumers' diets is eventually needed to lessen the environmental impact of meat consumption (e.g. de Bakker & Dagevos, 2012; Poore & Nemecek, 2018). However, consumers' willingness to eat less meat is quite low and it is unclear how consumers can best be motivated to reduce their meat consumption, particularly in non-Western countries (Hartmann & Siegrist, 2017).

In general, motives to reduce meat consumption can be categorized into health motives and moral motives, such as environmental motives (De Backer & Hudders, 2015). For instance, campaigns can stress that eating less meat is healthy, because this strongly decreases the risk for certain diseases or communicate how much CO₂-emissions can be reduced by eating less meat. The underlying mechanism that is used in such campaigns is known as “valuation by calculation” (Hsee & Rottenstreich, 2004): the larger the perceived benefits of an action are, the more likely it is that the action is adopted. Thus, the mechanism of “valuation by calculation” entails that consumers take into account certain calculative considerations in their decision-making, such as how much health and/or sustainability benefits they can gain by eating less meat.

Overall, communicating health and/or sustainability benefits to promote the reduction of meat consumption has had mixed results. For

instance, providing multiple, successive messages on the health and environmental impact of meat did not lower consumers' willingness-to-pay for meat (Castellari, Marette, Moro, & Sckokai, 2018). This indicates that learning more about health and sustainability benefits of eating less meat did not increase consumers' willingness to eat less meat, suggesting that the “valuation by calculation” approach might not be particularly successful in reducing meat consumption. Furthermore, de Boer and Aiking (2011) found a negative relation between how much value consumers place in caring for nature and their level of meat consumption, while a review of de Boer and Aiking (2017) showed that appeals to health and sustainability often do not contribute to consumers changing their diet, such as by eating less meat. However, Graham and Abrahamse (2017) found that environmental messages decreased consumers' intention to consume meat. Similarly, Vainio, Irz, and Hartikainen (2018) found that communicating health and sustainability benefits of eating less meat, was positively associated with consumers' intention to reduce meat consumption, but only among those with strong negative beliefs regarding meat consumption (Vainio et al., 2018). Overall, the literature suggests that a “valuation by calculation” approach by communicating health and/or sustainability benefits can motivate consumers to reduce their meat consumption in some cases, but given the mixed results and specific boundary conditions for its effectiveness (Vainio et al., 2018), it is necessary to explore alternative approaches to stimulate consumers to reduce their meat consumption.

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Previous research has shown that feelings have a positive relation with consumers' intention to act sustainably. For instance, Taufik, Bolderdijk, and Steg (2016) found that how good consumers anticipated to feel about themselves by acting sustainably, had a stronger positive relation with their intention to act pro-environmentally than how much benefits they perceived to gain from this, for instance in terms of sustainability benefits. In other words, the process of “valuation by feeling” (Hsee & Rottenstreich, 2004), in which the perceived value of an action is driven by how consumers (expect to) feel when they would perform the action, had a stronger relation with peoples' inclination to act pro-environmentally, than the mechanism of “valuation of calculation”. Although the study of Taufik et al. (2016) was not conducted in the domain of reducing meat consumption, it does provide initial evidence that the mechanism of “valuation by feeling” relatively strongly predicts intentions to engage in sustainable actions. Furthermore, Berndsen and van der Pligt (2005) showed that information with an affective focus that stressed how health risks of meat consumption can lead to anxiety, was more effective in increasing consumers' intention to reduce meat consumption, compared to information with a cognitive focus where the prevalence of heart diseases as a result of meat consumption was stressed. Although the study of Berndsen and van der Pligt (2005) did not focus on benefits in terms of how good eating less meat can make people feel, or how much health and/or sustainability benefits they can gain, their study does provide initial evidence that the mechanism of “valuation of feeling” is more predictive than “valuation by calculation” in stimulating a reduction in meat consumption. Based on the findings of Taufik et al. (2016) and Berndsen and van der Pligt (2005), it is hypothesized that anticipated positive feelings (“valuation by feeling”) have a stronger positive relation with the intention to reduce meat consumption, than how much health and sustainability benefits consumers perceive to gain from eating less meat (“valuation by calculation”; Hypothesis 1).

This (prospective) feel-good factor as a result of certain actions is also known as “warm-glow” (Andreoni, 1995; Van der Linden, 2018); the result of acting morally and doing the right thing, in this case by acting sustainably, which can make people feel good about themselves (Van der Linden, 2018). In contrast, not doing the right thing can elicit a “cold-prickle”, as this can make people feel bad about themselves (Andreoni, 1995). In the current study, the terms “warm-glow” and “cold-prickle” are used figuratively, as in Andreoni (1995) and Van der Linden (2018). Van der Linden (2018) showed that anticipated positive feelings (prospective “warm-glow” feelings) particularly have a strong positive relation with the intention for low-cost, less effortful sustainable behaviours, that fall in the domain of curtailment actions (e.g. lowering the thermostat). This suggests that prospective “warm-glow” feelings might be particularly predictive of reducing meat consumption via curtailment. Consuming (more) meat substitutes has been found to be less appealing for consumers than reducing meat consumption via curtailment (Vanhonacker, Van Loo, Gellnyck, & Verbeke, 2013). Meat substitutes can therefore be perceived as a relatively high-cost option for consumers to reduce meat consumption (Vanhonacker et al., 2013). Van der Linden (2018) showed that “warm-glow” feelings also predict intentions to engage in high-cost sustainable behaviours, but less when compared to low-cost sustainable behaviours. Therefore, it is expected that anticipated positive feelings (prospective “warm-glow” feelings) have a stronger positive relation with the intention to reduce meat consumption via curtailment, than with the intention to reduce meat consumption via meat substitutes (Hypothesis 2).

As was mentioned previously, prospective “warm-glow” feelings originate from people aiming to act morally (e.g. Andreoni, 1995). In formulating the previous hypotheses, the implicit assumption lies that prospective “warm-glow” feelings have a positive relation with the intention to reduce meat consumption, because consumers anticipate to feel good about themselves by acting sustainably in order to do the right thing. Acting sustainably is typically seen as moral, because this benefits future generations and the environment (De Groot & Steg,

2009). If prospective “warm-glow” feelings indeed have a positive relation with consumers' intention to reduce meat consumption, because they aim to act in a moral, sustainable manner, “warm-glow” feelings should particularly predict the intention to eat less meat among consumers who find it relatively important to make sustainable food choices. Thus, it is hypothesized that prospective “warm-glow” feelings have a stronger positive relation with the intention to reduce meat consumption, among consumers who find it important to make sustainable food choices (Hypothesis 3).

1. Current study

A better understanding on consumer motivations to reduce meat consumption is needed, particularly in non-Western countries (Hartmann & Siegrist, 2017). The current study was part of a project in urban China and was conducted in three large Chinese cities: Beijing, Shanghai and Guangzhou. The consumption of animal-based food products has grown rapidly in recent decades (Bonhommeau et al., 2013), even more so in China (Zhang, Dagevos, He, Van der Lans, & Zhai, 2008). Consequently, this increase in meat consumption is strongly related to environmental issues such as biodiversity loss (Machovina, Feeley, & Ripple, 2015) and health issues in China (e.g. Popkin, Adair, & Ng, 2012). Thus, the study was conducted in a setting where consuming meat has become more routine and where it is particularly important to stimulate a reduction in meat consumption.

2. Method

2.1. Participants

610 people participated in the study (304 females, 306 males). Participants in Beijing ($n = 204$), Shanghai ($n = 202$) and Guangzhou ($n = 204$) were recruited by MSI-ACI, a market research company, to conduct the study. Participants did not receive money for the study, but collected points for their participation which they could save and exchange for products/gifts. 19.5% of the participants fell in the age group 18–24 years, 37.9% in the group 25–39 years, 33.0% in the group 40–54 years and 9.7% were 55 + years old.

2.2. Design, procedure and measures

Participants completed an online survey. The survey was conducted in Mandarin, but the questions that were posed in the survey are presented in English in this paper. Participants first completed the food choice questionnaire (Steptoe, Pollard, & Wardle, 1995), which measures the importance of sustainability, health, price, convenience, mood, sensory appeal, price, (body) weight, and familiarity when making food choices. Subsequently, some questions were asked for a different study purpose; questions on the perception of pork, preference for pork from Europe over pork from China, food involvement (Bell & Marshall, 2003) and food neophobia (Eertmans, Victoir, Vansant, & Van den Bergh, 2005).

The subsequent questions were for the current study purpose. First, *anticipated positive feelings* of eating less meat/prospective “warm-glow” (“Eating less meat in the (near) future would make me feel good about myself”) and *anticipated negative feelings* of not eating less meat/prospective “cold-prickle” (“Not eating less meat in the (near) future would make me feel bad about myself”) were measured (1–7 scale; 1 = totally disagree, 7 = totally agree). *Anticipated negative feelings* were measured to explore whether possible emotional incentives to eat less meat, might lie in the negative emotion spectrum, in addition to the positive emotion spectrum. Subsequently, *perceived health benefits* (“Eating less meat would ...”, 1 = give me very little health benefits; 7 = give me a lot of health benefits), *sustainability benefits* (“Eating less meat would ...”, 1 = reduce very little CO₂-emissions; 7 = reduce a lot of CO₂-emissions), *financial benefits* (“Eating less meat would ...”, 1 = save me very

Table 1
Correlations among and descriptive statistics for study variables.

Variables	M (SD)	1	2	3	4	5	6	7	8	9
1. Intention curtailment	4.17 (1.51)		.57	.72	.49	.30	.33	.24	.28	.16
2. Intention meat substitutes	4.37 (1.40)			.50	.43	.28	.29	.23	.23	.24
3. Anticipated positive feelings	4.22 (1.40)				.58	.26	.30	.22	.28	.15
4. Anticipated negative feelings	4.22 (1.51)					.20	.18	.13	.20	.13
5. Sustainability benefits	4.73 (1.28)						.41	.36	.35	.26
6. Health benefits	4.85 (1.37)							.35	.57	.22
7. Financial benefits	4.47 (1.33)								.27	.12
8. Social benefits	4.70 (1.30)									.25
9. Importance sustainability	5.47 (.99)									

Notes. All reported correlations are statistically significant ($p < .05$).

Table 2
Summary of multiple regression analysis for variables predicting intention to reduce meat consumption via curtailment.

Variable	β	t	Sig.	95% CI	Sq. semi-partial corr.	Cohen's f^2	VIF
Anticipated positive feelings	.60	17.21	< .001	[.53, .67]	.222	.489	1.633
Anticipated negative feelings	.11	3.26	.001	[.05, .18]	.008	.018	1.511
Sustainability benefits	.08	2.55	.011	[.02, .17]	.005	.011	1.324
Health benefits	.08	2.16	.031	[.01, .16]	.003	.007	1.691
Financial benefits	.03	1.11	.269	[-.03, .11]	.001	.002	1.232
Social benefits	.01	.31	.758	[-.07, .09]	.000	.000	1.554

Notes. $Adj.R^2 = .544$, $F = 121.85$ ($p < .001$).

little money; 7 = save me a lot of money) and *social benefits* of eating less meat (“Eating less meat would ...”, 1 = not be approved by people I know; 7 = be very much approved by people I know) were measured. Perceived financial benefits were measured to explore to what extent its relation with the intention to reduce meat consumption, is comparable to other sustainable behaviours (Bolderdijk & Steg, 2015). Perceived social benefits were measured to explore possible influences of the collectivistic culture in China. The following questions measured *intention to reduce meat consumption via curtailment* (“I plan to reduce the amount of meat in my meals in the (near) future”; 1 = totally disagree, 7 = totally agree) and *by eating more meat substitutes* (“I plan to use more meat substitutes (such as tofu or wheat gluten/miàn jīn) in my meals in the (near) future; 1 = totally disagree, 7 = totally agree). Two examples of meat substitutes were given, so that participants had the same type of meat substitutes in mind when answering this question. The mean scores on these variables are reported in Table 1, along with the zero-order correlations between the variables.

3. Results

A regression analysis was conducted to test whether prospective “warm-glow” feelings have a stronger positive relation with the intention to reduce meat consumption via curtailment, than perceived health and sustainability benefits. Intention to reduce meat consumption via curtailment was regressed on *anticipated positive feelings* of eating less meat, *anticipated negative feelings* of not eating less meat, and *perceived health, sustainability, financial and social benefits* of eating less meat. In order to determine whether the different predictors predict unique variance in the data, the variance inflation factor (VIF) was calculated to check for multicollinearity. If the VIF is smaller than 10, the predictors each predict unique variance and multicollinearity is not an issue (O'Brien, 2007). Additionally, semi-squared partial correlations are reported, to indicate the degree of unique variance of each predictor.

3.1. Predicting intention to reduce meat consumption via curtailment

Combined, the different predictors explained 54.4% of the variance (Adjusted R^2) in intention to reduce meat consumption via curtailment

(Table 2). The more participants anticipated to feel good about themselves (prospective “warm-glow”) when eating less meat ($\beta = 0.60$, $t(603) = 17.21$, $p < .001$, 95% CI [.53, 0.67]) and anticipated to feel bad about themselves (prospective “cold-prickle”) when not eating less meat ($\beta = 0.11$, $t(603) = 3.26$, $p = .001$, 95% CI [0.05, 0.18]), the higher their intention was to reduce meat consumption via curtailment. Also, the higher the sustainability benefits ($\beta = 0.08$, $t(603) = 2.55$, $p = .011$, 95% CI [0.02, 0.17]) and health benefits ($\beta = 0.08$, $t(603) = 2.16$, $p = .031$, 95% CI [0.01, 0.16]) were perceived to be, the higher the intention was to reduce meat consumption via curtailment. As hypothesized, the relation between prospective “warm-glow” feelings and the intention to reduce meat consumption (in this case via curtailment) was stronger, than the respective relations of perceived health and sustainability benefits with the intention to reduce meat consumption, as reflected by the non-overlapping 95% confidence intervals of the predictors¹ (Hypothesis 1). The Cohen's f^2 indicates that the relation between prospective “warm-glow” feelings and the intention to reduce meat consumption via curtailment can be considered a large effect size (Cohen, 1988; Cohen's $f^2 > 0.35$). Prospective “cold-prickle” feelings were not more predictive of the intention to reduce meat consumption via curtailment than prospective health and sustainability benefits, as the 95% confidence intervals of the predictors overlap. Perceived financial benefits ($\beta = 0.03$, $t(603) = 1.11$, $p = .269$, 95% CI [-0.03, 0.11]) and social benefits ($\beta = 0.01$, $t(603) = 0.31$, $p = .758$, 95% CI [-0.07, 0.09]) of eating less meat, were not predictive of the intention to reduce meat consumption via curtailment.

To test Hypothesis 3, a separate regression analysis was run using the PROCESS macro for SPSS (Hayes, 2012). Following Aiken, West, and Reno (1991), the moderator variable (importance of making sustainable food choices) was mean-centered. The stronger prospective “warm-glow” feelings ($\beta = 0.69$, $t(606) = 23.74$, $p < .001$, 95% CI [0.63, 0.74]) and the more important making sustainable food choices ($\beta = 0.10$, $t(606) = 2.41$, $p = .016$, 95% CI [0.02, 0.19]) were, the higher the intention was to reduce meat consumption via curtailment.

¹ Following a similar procedure as reported in Julious (2004) and Payton, Miller, and Raun (2000).

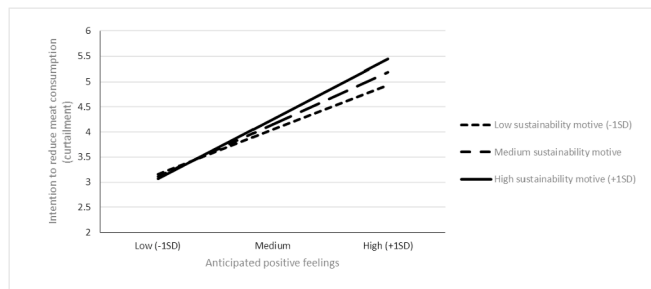


Fig. 1. Simple slopes analyses for predicting intention to reduce meat consumption (curtailment).

As expected, the interaction term prospective “warm-glow” feelings \times importance of making sustainable food choices was statistically significant ($\beta = 0.10$, $t(606) = 3.59$, $p < .001$, 95% CI [0.05, 0.16]). Simple slopes analyses (see Fig. 1) showed that among those who found it relatively important to make sustainable food choices (+1SD above the mean), the stronger prospective “warm-glow” feelings were, the higher the intention was to eat less meat via curtailment: $\beta = 0.79$, $t(606) = 22.31$, $p < .001$, 95% CI [0.72, 0.86]. Among those who found it less important to make sustainable food choices (-1SD below the mean), there is a positive, but weaker positive relation between prospective “warm-glow” feelings and the intention to eat less meat via curtailment: $\beta = 0.59$, $t(606) = 13.07$, $p < .001$, 95% CI [0.50, 0.68].

3.2. Predicting intention to reduce meat consumption via consumption of meat substitutes

A regression analysis was run in the same manner as before, only now with the intention to use more meat substitutes in meals as the dependent variable to test whether prospective “warm-glow” feelings are more predictive of the intention to consume more meat substitutes, than perceived health and sustainability benefits.

Combined, the different predictors explained 30.8% of the variance (Adjusted R^2) in the intention to use more meat substitutes in meals (Table 3). The more participants anticipated to feel good about themselves (prospective “warm-glow”) when eating less meat ($\beta = 0.32$, $t(603) = 7.41$, $p < .001$, 95% CI [0.22, 0.38]) and anticipated to feel bad about themselves (prospective “cold-prickle”) when not eating less meat ($\beta = 0.20$, $t(603) = 4.77$, $p < .001$, 95% CI [0.11, 0.27]), the higher their intention was to use more meat substitutes in meals. Also, the higher the perceived sustainability benefits ($\beta = 0.10$, $t(603) = 2.57$, $p = .011$, 95% CI [0.03, 0.19]) and health benefits ($\beta = 0.11$, $t(603) = 2.43$, $p = .015$, 95% CI [0.02, 0.20]) were, the higher the intention was to consume more meat substitutes. As hypothesized, the positive relation between prospective “warm-glow” feelings and the intention to reduce meat consumption (in this case by consuming more meat substitutes), was stronger than the respective relations between prospective perceived health and sustainability benefits and the intention to reduce meat consumption, as reflected by the non-overlapping 95% confidence intervals of the predictors (Hypothesis 1). The Cohen's f^2 indicates that the relation between prospective “warm-glow” feelings and the intention to reduce meat consumption by consuming more meat substitutes can be considered a small effect size (Cohen, 1988; Cohen's $f^2 > 0.02$). As was the case with curtailment of meat consumption, prospective “cold-prickle” feelings did not more strongly predict the intention to reduce meat consumption by consuming more meat substitutes, than perceived health and sustainability benefits, as the 95% confidence intervals of the predictors overlap. Perceived financial benefits ($\beta = 0.07$, $t(603) = 1.74$, $p = .083$, 95% CI [-0.01, 0.15]) and social benefits ($\beta = -0.02$, $t(603) = -0.37$, $p = .714$, 95% CI [-0.11, 0.07]) had no significant relation with the intention to reduce meat consumption by eating more meat substitutes.

The 95% confidence intervals of prospective “warm-glow” feelings to predict the intention to reduce meat consumption via curtailment (95% CI [0.53, 0.67]) and to predict the intention to reduce meat consumption by consume more meat substitutes (95% CI [0.22, 0.38]) do not overlap. This is also reflected in the difference in effect sizes, as the relation between prospective “warm-glow” feelings and the intention to reduce meat consumption via curtailment could be considered a large effect size (Cohen's $f^2 > 0.35$), while the relation with the intention to reduce meat consumption via meat substitutes can be considered a small effect size (Cohen's $f^2 > 0.02$). Thus, prospective “warm-glow” feelings have a significant positive relation with the intention for both types of strategies to reduce meat consumption but as expected, prospective “warm-glow” feelings have a stronger positive relation with the intention to reduce meat consumption via curtailment, than via consuming meat substitutes (Hypothesis 2).

To test Hypothesis 3, a separate regression analysis was run in the same manner as before, only now with the intention to consume more meat substitutes as the dependent variable. The stronger the prospect of “warm-glow” feelings ($\beta = 0.44$, $t(606) = 13.08$, $p < .001$, 95% CI [0.37, 0.50]) and the more important making sustainable food choices ($\beta = 0.24$, $t(606) = 4.78$, $p < .001$, 95% CI [0.14, 0.34]) were, the higher the intention was to consume more meat substitutes in the near future. In contrast to what was hypothesized, the interaction term prospective “warm-glow” feelings \times importance of making sustainable food choices was not statistically significant ($\beta = 0.03$, $t(606) = 0.89$, $p = .375$, 95% CI [-0.04, 0.09]).

4. Discussion

Consumers' food choices strongly affect the environment (Tukker & Jansen, 2006), particularly in relation to the production and consumption of meat (Poore & Nemecek, 2018). Currently, consumers' willingness to reduce their meat consumption is quite low and it is unclear how consumers can best be motivated to reduce their meat consumption (Hartmann & Siegrist, 2017). This paper aims to provide insights in potential motivations for consumers to reduce their meat consumption, via either curtailment (i.e. reducing the amount of meat in meals) or by consuming more meat substitutes in meals. The main aim of this paper was to study whether anticipated positive feelings (prospective “warm-glow” feelings) have a stronger positive relation with consumers' intention to reduce their meat consumption, compared to perceived health and sustainability benefits of eating less meat. The study was conducted in China, where the level of meat consumption has strongly increased in recent decades (Zhang et al., 2008). This way, the current study also contributes to at least partly fill in the current knowledge gap of how consumers in non-Western countries can be motivated to reduce their meat consumption (Hartmann & Siegrist, 2017).

The current study showed that prospective “warm-glow” feelings have a positive relation with consumers' intention to reduce their meat consumption; this relation was stronger than the respective relations of perceived health and sustainability benefits of eating less meat with consumers' intention to reduce meat consumption. Nonetheless, it should be noted that perceived health and sustainability benefits were positively associated with the intention to reduce meat consumption as well, in line with findings of Graham and Abrahamse (2017) and Vainio et al. (2018). The findings of the current study extend research of Berndsen and van der Pligt (2005) and Taufik et al. (2016) which showed that feelings can be more predictive than more calculative considerations, in predicting consumers' willingness to act pro-environmentally. The current study also extends the findings of Taufik et al. (2016), by showing that this mainly is the result of positive emotions: prospective “warm-glow” feelings have a stronger positive relation with the intention to reduce meat consumption than perceived health or sustainability benefits, but this was not the case for prospective “cold-prickle” feelings. These findings also fit with recent

Table 3

Summary of multiple regression analysis for variables predicting intention to reduce meat consumption via meat substitutes.

Variable	β	<i>t</i>	Sig.	95% CI	Sq. semi-partial corr.	Cohen's f^2	VIF
Anticipated positive feelings	.32	7.41	< .001	[.22, .38]	.063	.091	1.633
Anticipated negative feelings	.20	4.77	< .001	[.11, .27]	.026	.038	1.511
Sustainability benefits	.10	2.57	.011	[.03, .19]	.007	.010	1.324
Health benefits	.08	2.16	.031	[.02, .20]	.006	.009	1.691
Financial benefits	.07	1.74	.083	[-.01, .15]	.003	.004	1.232
Social benefits	-.02	-.37	.714	[-.11, .07]	.000	.000	1.554

Notes. Adj. $R^2 = .308$, $F = 46.18$ ($p < .001$).

studies suggesting that appealing to positive emotions might be more strongly related to pro-environmental behaviour, than negative emotions. For instance, [Chatelain et al. \(2018\)](#) showed that messages that elicit positive emotions are more likely to result in a higher willingness to engage in a second pro-environmental behaviour, compared to when negative emotions are elicited, while eliciting anticipated feelings of pride was found to lead to a higher motivation to act pro-environmentally than eliciting anticipated feelings of guilt ([Schneider, Zaval, Weber, & Markowitz, 2017](#)).

Additionally, the strength of the relation between prospective “warm-glow” feelings and consumers' intention to reduce their meat consumption, depends on the strategy used to eat less meat. More specifically, prospective “warm-glow” feelings predicted the intention to reduce meat consumption via either curtailment or the consumption of meat substitutes, but as expected prospective “warm-glow” feelings were more strongly positively associated with the intention to reduce meat consumption in the case of reducing meat consumption via curtailment. This hypothesis was formulated based on findings of [Van der Linden \(2018\)](#) that show that “warm-glow” feelings have a stronger relation with consumers' intention to engage in low-cost sustainable behaviours, as opposed to high-cost sustainable behaviours, and that [Vanhonacker et al. \(2013\)](#) found that consumers perceive curtailment actions as a more low-cost option than meat substitutes. However, in the current study the intention to consume (more) meat substitutes was higher than the intention to reduce meat consumption via curtailment (Table 1). This suggests that in the current study reducing meat consumption via curtailment was actually perceived as the more high-cost option. Therefore, based on this result the relation between prospective “warm-glow” feelings with the intention to reduce meat consumption thus actually is stronger for the more high-cost (and not low-cost) sustainable behaviour, namely curtailment, in contrast to findings of [Van der Linden \(2018\)](#) and Hypothesis 2 of the current study. A possible reason for the different results might be the domain that was studied, as the current study focused on meat consumption, while [Van der Linden \(2018\)](#) focused on multiple sustainable domains such as energy conservation and (sustainable) transport. Possibly, the extent to which certain domains that were studied by [Van der Linden \(2018\)](#) were perceived as low-cost (or high-cost) is different than how low-cost the different strategies to reduce meat consumption are perceived to be. Another important difference between the current study and that of [Van der Linden \(2018\)](#), is that [Van der Linden \(2018\)](#) used a 4-week gap between the measurement of prospective “warm-glow” feelings and self-reported pro-environmental behaviour, whereas in the current study “warm-glow” feelings and intention to reduce meat consumption were measured cross-sectionally. Future research could use a similar design as [Van der Linden \(2018\)](#) to examine whether the relation between prospective “warm-glow” feelings and consumers' intention to reduce meat consumption is (still) present at a later point in time, and to what extent this relation then is different depending on whether curtailment or the consumption of meat substitutes is used as a strategy to reduce meat consumption.

In the case of reducing meat consumption via curtailment, prospective “warm-glow” feelings more strongly affected consumers' intention to consume less meat among those consumers who find it

relatively important to make sustainable food choices. However, this was not the case for meat substitutes: prospective “warm-glow” feelings affect consumers' intention to consume more meat substitutes, irrespective of the perceived importance to make sustainable food choices. Thus, the expected interaction between prospective “warm-glow” feelings and the perceived importance to make sustainable food choices was not replicated. Future research is needed to test the possibility that the significant interaction that was found in the case of curtailment of meat consumption was merely a chance finding. This could also be further explored by using alternative examples of meat substitutes, such as seaweed or pulses, in future research and test whether prospective “warm-glow” feelings more strongly affect consumers' intention to consume these meat substitutes among those consumers who find it relatively important to make sustainable food choices. If again, the expected interaction would not be found when studying these alternative meat substitutes (instead of tofu and wheat gluten/miàn jīn which were used as examples in the current study), this strongly points to the interaction that was found in the case of curtailment of meat consumption being a chance finding.

4.1. Limitations and future research

The current study has some limitations that can be addressed in future research. First, the variables that measured the different consequences of eating less meat were measured with a single item. This can affect the reliability of the measured constructs, as well as introduce some degree of statistical noise. Yet, in many cases single-item and multi-item measures perform equally well when measuring constructs (e.g. [Bergkvist & Rossiter, 2007](#)). Still, future research could apply different measurements by also using multi-item measures to further explore the validity of the findings.

Second, the findings in this paper provide insights on how consumers can be motivated to reduce their meat consumption, but are correlational. An experimental study is needed to establish a causal link between prospective “warm-glow” feelings and increasing consumers' intention to reduce meat consumption. For such an experiment to increase consumers' intention to eat less meat, it is crucial to elicit prospective “warm-glow” feelings. Images are often used to elicit emotional responses ([Hsee & Rottenstreich, 2004](#)); particularly images which highlight nature can elicit positive feelings ([White et al., 2010](#)). Additionally, [Schneider et al. \(2017\)](#) used message framing to show that having people imagine how proud they would feel when acting pro-environmentally, elicited anticipated feelings of pride, which subsequently affected the motivation to act pro-environmentally. In their experiment, [Chatelain et al. \(2018\)](#) used a fictitious advertisement where positive message framing (“Thanks to you, more than 90% of all plastic bottles are recycled in Germany, more than in any other country. Thank you very much”) was combined with positive images (including images of a butterfly on someone's hand). This advertisement elicited positive emotions, which subsequently increased the intention to act pro-environmentally, compared to other advertisements ([Chatelain et al., 2018](#)). A similar experimental design can be used to test different messages to reduce meat consumption, in which one message is aimed at eliciting prospective “warm-glow” feelings (using similar types of

framing and images as Chatelain et al., 2018 and/or Schneider et al., 2017), while a different message is purely aimed at informing consumers of health and/or sustainability benefits of eating less meat. The first type of message could read “Just imagine how good you could feel about yourself when you reduce your meat consumption. Because of people like you, CO₂-emissions can be reduced by up to 50% by 2050. Thank you very much!” and use similar images as Chatelain et al. (2018) and images of nature (White et al., 2010). The second type of message could read “By reducing meat consumption, CO₂-emissions can be reduced by up to 50% by 2050. The less meat you eat, the better this is for the environment”. Images can again be used, but it is important to use images that do not elicit prospective “warm-glow” feelings.² Additionally, measuring actual behaviour is recommended given the intention-behaviour gap (Webb & Sheeran, 2006). A future experimental study can for instance be conducted in a supermarket, where either the message aimed at eliciting prospective “warm-glow” feelings or the strictly informational message is placed near the shelf with meat products and meat substitutes. Subsequently, it can be tested which type of message leads to a larger amount of meat substitutes being bought. Additionally, the amount of meat (in grams) that is bought can be measured to test whether less meat is bought when the message is used that aims to elicit prospective “warm-glow” feelings, as an indicator for reducing meat consumption via curtailment.

Third, given the correlational nature of the current study, alternative models with the same variables could be tested in future research. For instance, it could be reasoned that the different types of benefits of eating less meat affect each other: consumers could derive stronger prospective “warm-glow” feelings when more sustainability and/or health benefits are perceived. Given that the perceived importance of making sustainable food choices moderated the extent to which prospective “warm-glow” feelings affect the intention to reduce meat consumption via curtailment, this suggests that at least perceived sustainability benefits might affect how good consumers anticipate to feel by eating less meat.

Fourth, the current study focused on sustainability and health benefits because of the relatively many studies that have tested the relation between these benefits and consumers' motivation to eat less meat. However, future research can explore the relation between prospective “warm-glow” feelings and consumers' intention to reduce their meat consumption, compared to the relation of other types of perceived benefits and consumers' intention to reduce their meat consumption. An example are benefits in terms of animal welfare, as research has shown that consumers care about animal welfare and that this can be a factor in considering to eat less meat (De Backer & Hudders, 2015).

Finally, future research could explore to what extent consumers imagined consuming other food items when thinking about reducing meat consumption via curtailment. While it is possible that some consumers did not imagine consuming other food items, thus strictly focusing on eating less meat, the possibility cannot be excluded that other consumers did imagine consuming something else in order to sustain their protein intake. For instance, it could be possible that some consumers might have thought about compensating a reduction in meat consumption, with other protein sources such as pulses.

5. Conclusion

It is important to gain a better understanding of how consumers can be motivated to reduce their meat consumption, particularly in non-Western countries such as China where the level of meat consumption has grown rapidly in recent decades (Hartmann & Siegrist, 2017; Zhang et al., 2008). Currently, many campaigns (in general, but in China as well) communicate more calculative considerations, such as perceived

health and sustainability benefits of eating less meat, in order to persuade consumers to reduce their meat consumption. However, the current study shows that it is important to also consider emotional motivations that consumers have to eat less meat, by appealing to how good consumers can feel about themselves when they would reduce their meat consumption. Thus, taking into account the prospective “warm-glow” feelings that consumers can get by eating less meat, might be an alternative route to motivate consumers to reduce their meat consumption, and lessen the environmental impact of consumers' food choices.

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² Ideally, images are pre-tested in a pilot study, to examine to what extent images elicit prospective “warm-glow” feelings.

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