Resources, Conservation & Recycling 125 (2017) 107–114

Contents lists available at ScienceDirect

Resources, Conservation & Recycling

journal homepage: www.elsevier.com/locate/resconrec

Full length article

Bringing habits and emotions into food waste behaviour

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ARTICLE INFO

Keywords:
Food waste
Consumers
Theory of planned behaviour
Theory of interpersonal behaviour
Emotion
Habit

ABSTRACT

This study examined consumer food waste behaviour using a comprehensive model integrating the theory of planned behaviour (TPB), the theory of interpersonal behaviour, and the comprehensive model of environmental behaviour. Using a temporally lagged design, one hundred and seventy-two respondents answered four questionnaires over a period of 14 months. Questionnaires measured emotions in relation to food waste, habits, the TPB variables, intention to reduce food waste, and self-reported food waste behaviour. Results showed that the less well-studied variables of habits and emotions were important determinants of participants' intentions to reduce food waste and their current food waste behaviour. As expected, we found that negative emotions were associated with greater intentions to reduce food waste, but contrary to our predictions they were also associated with higher levels of food waste behaviour. In other words, participants who experienced more negative emotion when thinking about food waste intended to reduce their waste but actually ended up wasting more food. Results also show that participants with a greater sense of control, and more normative support for reducing food waste also had stronger intentions to engage in the behaviour. Our findings extend existing understanding and underscore the importance of the non-cognitive determinants of behaviour, namely emotions and habits. The implications for research and practice are discussed.

1. Introduction

Food waste is a significant global problem, with estimates suggesting that one third of edible food produced for human consumption is wasted globally each year (FAO, 2011; Goebel et al., 2015; Graham-Rowe et al., 2014a). The environmental costs of this waste are significant and can be seen in the environmental burden and resources required to produce the food as well as emissions associated with any food wasted. Food waste is a particular issue in developed countries where a major contribution to food waste is from households (Parfitt et al., 2010).

In the UK, for example, estimates suggest that 15 million tonnes of food and drink are thrown away annually, with almost half of that (7 million tonnes) attributed to households (WRAP, 2013). Reflecting global averages, the average household in the UK throws away approximately a third of the food they purchase for consumption (Evans, 2011a) which makes up 17% of household waste (Defra, 2015). The economic costs of this waste have been estimated at approximately £470 (USD 590) per year per household, and up to £700 (USD880) for families with children (WRAP, 2013).

Increasing evidence suggests that there are many positive consequences of reducing food waste (Parfitt et al., 2010; Quested et al., 2013). Waste reduction at the level of household consumption is critical because the environmental impact accumulates throughout each of the following stages of the food life cycle (Williams and Wikström, 2011). Given the magnitude of waste, any reductions in food and drink waste at a household level may have a substantial positive environmental effect. Quested et al. (2013), for example, suggests that an average UK household has the potential to reduce greenhouse gas emissions by a similar amount to installing 270 mm (11 in.) of loft insulation or all household members foregoing an annual return flight from the UK to central Europe (WRAP, 2013).

Food waste reduction is a promising avenue for decreasing food waste and there is a growing body of literature that investigates consumers' food waste behaviour and its determinants (Visschers et al., 2016). Even so, compared to research on the quantity of wasted food, and the global impact of the food system, studies of consumer food waste behaviour are much less prevalent. We argue that there is more work to be done to more fully understand the determinants of food waste behaviour, and that the insights additional research could bring will provide a much stronger basis for efforts to promote food waste reduction at the household level.

Research on the determinants of food waste has to date been dominated by qualitative research (Evans, 2011b; Graham-Rowe et al.,

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http://dx.doi.org/10.1016/j.resconrec.2017.06.007
Received 24 March 2017; Received in revised form 11 May 2017; Accepted 5 June 2017

2014b; Quested et al., 2013). These studies have been successful in advancing our understanding of consumer food waste behaviour and demonstrated that consumers' perceptions about food waste are important determinants of food waste behaviour. More recent work has quantified these effects and shown the relative importance of attitudes, norms, and perceived behavioural control as predictors of consumer food waste behaviour (Visschers et al., 2016). Each of these studies has pushed the field further, yet we argue more remains to be done. In particular, we note that there has been a lack of research that emphasises the non-cognitive determinants of food waste behaviour. Indeed, research on pro-environmental behaviour more generally has shown that the non-cognitive variables of habits and emotions are important drivers of behaviour. Yet, to our knowledge there have been no quantitative studies to date that have investigated the relative importance of these determinants as they relate to food waste behaviour and recent reviews have not identified studies in this domain (Hebrok and Boks, 2017).

In this paper we aim to advance the field by reporting the results of a study that examines both cognitive and affective determinants of consumers' food waste behaviour. The research is the result of an ongoing collaboration between the authors' university and the UK retailer Asda. Using a co-production process (Clark and Dickson, 2003), the researchers co-designed a suite of surveys that were administered to Asda's customer panel. These data were used to test a conceptual model of food waste behaviour that was based on the theory of planned behaviour (Ajzen, 1991), the theory of interpersonal behaviour (Triandis, 1977), and the comprehensive model of environmental behaviour (CMEB; Klöckner, 2013). In addition, we draw on current knowledge of the emotional determinants of behaviour (Bamberg and Möser, 2007; Weiss and Beal, 2005) to augment the model and identify the role of emotion as a driver of food waste behaviour.

In the following section of the paper we outline the theoretical framework and describe the key components of the conceptual model. We then present the hypotheses, followed by a description of the study methods and analysis process. Following this the results are presented and discussed in the context of existing literature. Implications for research, practice and policy are discussed, noting the limitations of the research and potential avenues for future research.

2. Background and theoretical framework

To identify the most important factors affecting food waste we developed a comprehensive model by integrating different theoretical perspectives. The theoretical foundation of this paper rests primarily on the theory of planned behaviour (TPB; Ajzen, 1991), and is supplemented by the theory of interpersonal behaviour (TIB; Triandis, 1977) and the comprehensive model of environmental behaviour (CMEB; Klöckner, 2013). We present our conceptual model in Fig. 1 and in the following sections we outline the hypotheses in the model and identify the contribution of each of the three theories to the development of our model.

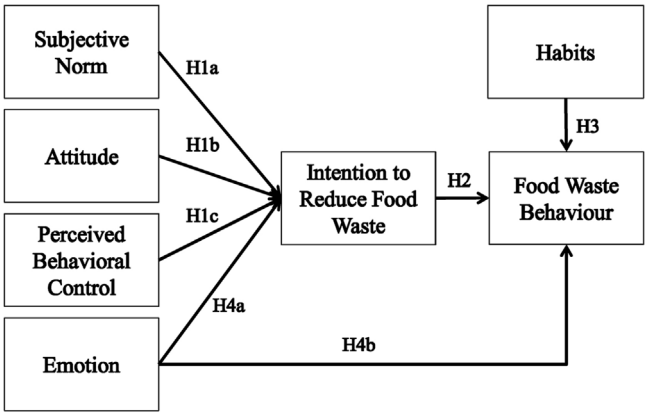

Fig. 1. Conceptual model of the determinants of food waste behaviour.

2.1. Theory of planned behaviour

The TPB has been used widely to predict and explain environmental behaviour. A recent meta-analysis by Klöckner (2013), showed that approximately 40% of all papers published in the environmental psychology domain used the TPB as the theoretical underpinnings of their research and it has been successfully used to predict household behaviours including water conservation (Fielding et al., 2012; Russell and Fielding, 2010), public transportation (Heath and Gifford, 2002), and recycling (Tonglet et al., 2004). The TPB suggests that behaviour is directly determined by intentions, which in turn are predicted by attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). Attitudes are a general measure of the favourability of a particular behaviour for the individual. Subjective norms are made up of the perceived expectations of other people who are important to the subject, or in other words, the social pressure to engage in that particular behaviour. Finally, perceived behavioural control is a measure that captures the degree to which people perceive that they have the ability, means, and opportunity to perform a particular behaviour. According to the TPB, intentions to engage in a specific behaviour are increased when individuals hold a positive attitude to the behaviour, if they think that important other people expect them to engage in a particular behaviour, and if they perceive that they have an adequate level of control to be able to engage in the intended behaviour. Each of these constructs is an indicator of perceptions that individuals hold. For instance, the extent to which an individual believes important others expect them to engage in a particular behaviour does not necessarily reflect what those significant others actually expect if they were asked directly. According to the TPB it is, however, the perception that is important in determining the behaviour, rather than actualities.

Consistent with the TPB (Ajzen, 1991), we expect that attitudes, subjective norms, and PBC will account for significant variance in intentions, and that these variables will emerge as positive predictors of intentions. Thus:

In line with the TPB, we also expect that intentions will be a significant and negative predictor of food waste behaviour, in that the greater the intentions to reduce food waste, the lower the food waste behaviour that will be observed.

2.2. Habits and emotions

Although the theory of planned behaviour has received strong empirical support in explaining environmentally relevant behaviours, one of the key criticisms is that it under represents the contribution of the non-cognitive determinants of behaviour, particularly habits and emotions (Klöckner, 2013; Russell and Fielding, 2010). The TPB rests largely on the assumption that individuals make rational and reasoned choices (Bamberg, 2003; Bamberg and Möser, 2007; Hines et al., 1986; Vining and Ebreo, 2002). Because food waste behaviour has less visibility to other people (e.g., neighbours) than other types of pro-environmental behaviour (e.g., recycling or transport behaviours), the social normative drivers of food waste behaviour are likely to be of less importance than they would be for other types of behaviour. There is, therefore, growing recognition that the TPB is not enough to predict many behaviours and that many behaviours are guided by more automatic and affective processes including habits or routines (Steg and Vlek, 2009; Verplanken and Holland, 2002), as well as emotion (Bamberg and Möser, 2007; Quested et al., 2013; Triandis, 1977).

For this reason, we integrate the two additional perspectives from Klöckner (2013) and Triandis (1977) for the purposes of our research. In a meta-review of environmental behaviour research Klöckner (2013) showed that the TPB lacked predictive power for those behaviours that

were repeated over time (see also Klöckner and Blöbaum, 2010). These insights are also congruent with the work of Triandis (1977) who suggested that past behaviours, or habits, are particularly important in explaining current or future behaviour. Given that the creation and disposal of food waste is a repeated, and often habitual, behaviour we therefore considered these insights to be of particular relevance.

As defined by Verplanken and Holland (2002, p. 287), habits are "relatively stable behavioural patterns, which have been reinforced in the past… [and] are executed without deliberate consideration, and result from automatic processes, as opposed to controlled processes like consciously made decisions." An automatic response, rather than deliberative reasoning thereby guides habitual behaviours. Habits are usually conceptualized and measured as the frequency of past behaviour as it is thought that behaviours that are performed frequently form habitual patterns that become automatic responses in future situations (Ouellette and Wood, 1998).

In relation to food waste, habits are likely to play an important role. Given their frequency and automaticity, we argue that food waste is likely to have a strong habitual element (Darnton et al., 2011). Additionally, Quested et al. (2011) argues that food waste behaviours are usually performed for reasons unrelated to other waste prevention on pro-environmental objectives, and that food waste behaviour has a marked habitual and pronounced emotional component.

In line with the CMEB (Klöckner, 2013), we expect that habits will be a direct positive predictor of food waste behaviour, thus we expect that the greater past food waste behaviour the more likely participants will report high levels of current food waste behaviour.

Finally, in line with the theory of interpersonal behaviour (Triandis, 1977) we argue that emotions are likely to play an important role in driving food waste behaviour (or conservation). The TIB identified emotion as a key driver of behaviour in 1977, yet to date the role of emotion has been largely neglected. Research into environmentally relevant behaviours has largely focused on the more cognitive drivers identified in the TPB including attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). The neglect of emotion is somewhat surprising given the importance of emotion for decision-making and its potential to impact behaviour (Graham-Rowe et al., 2014a; Triandis, 1977; Weiss and Beal, 2005). Emotions can be defined as a reaction to an object or an event, and they comprise both a feeling and cognitive component (Forgas, 1994; Lazarus, 1991). Emotions signal the importance of an issue and therefore provide an impetus for action (Lazarus, 1991; Lerner and Keltner, 2000). Emotions can also be described in terms of their valence, or directionality, as either positive or negative (Forgas, 1994; Lazarus, 1991).

Past research has shown that emotions have an effect on conservation decisions (Vining, 1987, 1992). Yet less is known about how emotions affect individual pro-environmental behaviour. Studies in this area have been dominated by an examination of guilt. Bamberg et al. (2007), for example, showed the importance of guilt as a determinant of transport behaviour and found that guilt was a positive predictor of a moral norm to undertake public transportation behaviour. Others have shown that negative emotions in general can have a positive impact on pro-environmental behaviour (Grob, 1995).

On the other hand, there is also evidence to suggest that positive emotions may also be important in determining environmentally relevant behaviours. Webb et al. (2013), for example, showed that positive anticipated emotions had a positive effect on intentions to engage in energy saving behaviour. Others (e.g., Bissing-Olson et al., 2016) have shown that pride in relation to a behaviour positively predicts future behaviour.

These studies have identified emotion as a determinant of pro-environmental behaviour yet to date we know of none that have quantitatively identified emotion as a predictor of food waste. Moreover, although qualitative research has suggested that emotions may be related to consumers' food waste behaviour, it is not clear in these studies whether emotion is driving food waste or is a consequence of it. Watson and Meah (2012), for example, conducted an ethnographic study of consumers' relationship to food and waste. Their findings showed that participants reported a sense of guilt about wasting food. Quested et al. (2013) also conducted qualitative research and found that guilt was present when consumers waste food. Stefan and colleagues (Stefan et al., 2013) also discussed guilt as part of 'moral attitudes' and suggested that most consumers feel bothered or guilty when engaging in wasteful behaviour.

Taken together these studies indicate that both emotion is related to food waste behaviour, yet to date it is not clear what role emotions may play. Theoretically, the TIB (Triandis, 1977) suggests that emotions in general are important predictors of behavioural intentions. Thus we expect that:

H4a. Both positive and negative emotions in response to food waste will have a direct positive relationship to behavioural intention to reduce food waste.

Drawing on emotions literature we also expect that both positive and negative emotions will be a direct predictor of actual behaviour. This hypothesis is drawn from affective events theory (Weiss and Beal, 2005), which suggests emotion affects behaviour in two ways. First, and consistent with the TIB (Triandis, 1977), emotions can have an indirect effect on behaviour (as per Hypothesis 5a). Second, emotions can drive behaviour directly (Lazarus, 1991; Lerner and Keltner, 2000; Weiss and Beal, 2005) because they provide a motivational impetus (Lazarus, 1991). In line with the emotions theory we therefore predict emotion will have a direct influence on behaviour. In line with past research we expect that the more emotion is present the less likely individuals will waste food, thus we hypothesise:

H4b. Both positive and negative emotions in response to food waste will have a direct negative relationship to food waste behaviour.

This study makes an important theoretical and applied contribution to the literature. Although the TIB has been used to qualitatively evaluate food waste, to our knowledge there has been no quantitative, generalizable research employing this framework to understand the determinants of food waste behaviours of consumers. The incorporation of emotions and habits is consistent with recent research that acknowledges the influence of emotion on behavioural decisions. Theoretically, the integration of these variables recognizes that the non-cognitive determinants of behaviour can be an important influence on intentions and behaviour beyond the traditional cognitive factors. Furthermore, from an applied perspective, the findings of this research have utility for groups and organisations seeking to influence consumer food waste behaviours.

3. Methods

To assess our conceptual model (see Fig. 1), a four-phased questionnaire study was conducted with a sample of individual consumers from the UK supermarket, Asda. One of the limitations of past research is a reliance on single cross-sectional designs. While these designs are useful to understand the relationships between variables there is the possibility of common method variance that may inflate the relationships between variables of interest (Podsakoff et al., 2003). By measuring our independent and dependent variables at different points in time we attempt to overcome these limitations and to test the robustness of the relationships between the variables of interest. The questionnaires measured emotions and habits in addition to the standard TPB constructs of attitudes, subjective norms, and perceived behaviour control (PBC) in relation to food waste behaviour.

3.1. Procedure

Participants were recruited through Asda's online customer panel. Panellists are able to opt in and out of each survey and are incentivised to take part by being entered into a monthly cash prize draw (see: https://pulse.asda.com). The research team in collaboration with

Asda's customer insight team designed the questionnaire. Raw data were collected by Asda and given to the research team to analyse. All participants were assigned a unique identifying code so that their responses could be matched between different survey administrations. This research underwent ethical review prior to data collection and the research was carried out in alignment with the ethical guidelines and privacy requirements of the authors' employers.

Questionnaires pertaining to this research project were conducted online at four time periods. The questions relating to this research were included as part of the Asda customer insight survey. Each survey included on average 20 questions and took approximately 10 min to complete. The first, in October 2014, included the independent measures including demographics, attitudes, subjective norms, PBC, and past habitual behaviour. The second survey, conducted in March 2015, included measures of emotion. The third survey was administered in September 2015 and included measures of intention to reduce food waste, and the final survey, conducted in December 2015, measured food waste behaviour.

Participants were included in the sample if they responded to all four surveys over the course of the study. During the course of the research an intervention study was also being conducted (Young et al., 2017). Participants included in the sample of the study described in this paper formed the control group for the larger intervention study. Participants included in the control group were those who did not regularly shop at Asda stores (i.e., secondary shoppers) and those who reported that they had not seen any of the intervention materials. The final sample for this research included 172 consumers. The median age of participants was in the range of 50–59, and 59% of respondents were female.

3.2. Measures

3.2.1. Habitual food waste behaviour

We followed past research in pro-environmental behaviour that has operationalized habits as past behaviour for water (Fielding et al., 2012), recycling and public transportation use (Carrus et al., 2008). Using this operationalization we used past food waste behaviour as an indicator of food waste habit. Food waste behaviour was measured in the first survey (Time 1: October 2014) using two items: frequency and quantity of food wasted. Frequency of waste was measured by asking consumers "How regularly do you think food is thrown away in your household (e.g. as a result of cooking too much or food spoiling)?" Responses were given on a five-point Likert scale (1 = Never, 5 = Most mealtimes). Quantity of food wasted was measured by asking, "Over the past week have you thrown out any of the following items? Please select all that apply." Participants indicated the types of foods wasted and these were summed to provide an index of food quantity. Quantity and frequency were summed to provide an overall index of habitual food waste behaviour.

3.2.2. Attitudes to food waste

Following TPB guidelines (Ajzen, 1991), participants' attitudes to food waste were measured using four semantic differentials at Time 1. Participants responded to the following question: "I think engaging in food waste behaviours is…" (bad/good, harmful/beneficial, unpleasant/pleasant, unsatisfying/satisfying). Responses were made on 5-point scales (e.g., 1 = very bad, 3 = neither good nor bad, 5 = very good). The scale had an acceptable level of internal reliability, $\alpha = .76$ (Nunnaly, 1978; Tabachnick and Fidell, 2001 Tabachnick and Fidell, 2001).

3.2.3. Subjective norms

Participants' perception of subjective norms regarding food waste was measured using two standard TPB items (Ajzen, 1991) at Time 1. Participants were asked, "If I reduced food waste, people who are important to me would…" (1, completely disapprove, 5 = completely approve), and "Most people who are important to me think that reducing food waste is…" (1 = very undesirable, 5 = very desirable). The scale had an acceptable level of internal reliability with the Pearson correlation of .72 (Nunnaly, 1978; Tabachnick and Fidell, 2001 Tabachnick and Fidell, 2001).

3.2.4. Perceived behavioural control (PBC)

The next scale, PBC, was assessed using three standard TPB items (Ajzen, 1991) at Time 1. These included: "How much control do you have over whether you reduce food waste in your household?" (1 = very little control, 5 = a great deal of control); "How difficult would it be for you to reduce food waste in your home?" (1 = very difficult; 5 = very easy); and "It is mostly up to me whether I reduce food waste in my home" (1, strongly disagree, 5 = strongly agree). The scale had an acceptable level of internal reliability, $\alpha = .59$ (Nunnaly, 1978; Tabachnick and Fidell, 2001 Tabachnick and Fidell, 2001).

3.2.5. Emotion measures

Similar to other emotion measures (e.g., PANAS; Watson et al., 1988), emotions were measured in the second survey (Time 2: March 2015) using single item measures that asked participants, "Which of the following words best describe how you feel about wasting food in your home?" A list of emotions was then given to participants. The list included the items: frustrated, anxious, guilty, optimistic, proud, content, relaxed. These items were drawn from previous research (Bamberg et al., 2007; Quested et al., 2013; Stefan et al., 2013; Watson et al., 1988) and augmented by the Asda research insight team. Responses were dummy coded with 1 to indicate the presence of the emotion, and 0 to indicate absence. The negative emotions (frustrated, anxious, and guilty) were summed to form a negative emotion scale. Similarly, positive emotions (optimistic, proud, content, and relaxed) were summed to form a positive emotion scale.

3.2.6. Behavioural intentions

Following the guidelines of the TPB (Ajzen, 1991), participants' intentions to reduce food waste were measured using two items at Time 3 (September 2015). These items included: "My intention to reduce food waste in my home in the next week is…" (1 = very weak, 5 = very strong); and "How likely are you to reduce food waste in your home in the next week?" (1 = very unlikely, 5 = very likely). The scale had an acceptable level of internal reliability with Pearson correlation of .66 (Nunnaly, 1978; Tabachnick and Fidell, 2001 Tabachnick and Fidell, 2001).

3.2.7. Food waste behaviour

Behaviour was measured in the fourth and final survey (December 2015) using the same items as habits. As with habits, these items were summed to provide an index of household food waste behaviour.

4. Results

4.1. Overview of analyses

Means, standard deviations, and inter-correlations among the independent and dependent variables are shown in Table 1. A hierarchical multiple regression analysis was conducted using the revised TPB framework. Preliminary hierarchical regression analyses showed that the control variables of gender and age were not significant predictors and they were therefore removed from further analysis. Preliminary analyses showed that the attitude, subjective norm, perceived behavioural control, and intention were not normally distributed. To overcome this assumption violation we transformed these variables using a square root calculation (Tabachnick and Fidell, 2001) and found no change in the significance or direction of the relationships in our analysis. For parsimony we report the results of the non-transformed variables below.

Table 1
Means, Standard Deviations, Time, and Bivariate Correlations.[a]

	Mean	SD	Time Measured	1	2	3	4	5	6	7	8
Attitude	4.26	0.60	Time 1	.76							
Subjective Norms	4.02	0.76	Time 1	.56**	.72						
Perceived Behavioural Control	4.15	0.64	Time 1	.30**	.33**	.59					
Habitual food waste behaviour	3.52	1.81	Time 1	−0.10	0.03	−.21**	–				
Positive Emotion	0.20	0.56	Time 2	−0.02	0.01	0.04	−0.07	–			
Negative Emotion	0.80	0.81	Time 2	.10	0.05	−0.06	.18*	−.32**	–		
Intention	3.58	0.84	Time 3	.36**	.42**	.43**	0.02	−0.01	.19*	–	
Food waste behaviour	3.08	1.49	Time 4	−.17*	−0.05	−.23**	.71**	−.15*	.29**	−0.06	–

[a] Cronbach's alpha for computed scales are on the diagonal. Asterisks indicate the following: * = $p < 0.05$, ** = $p < 0.01$.

A path analysis was conducted using AMOS 22 structural equation modelling (SEM) software program. As noted above, the scales measuring attitude, subjective norm, perceived behavioural control, and intention had adequate internal reliability. Given the sample size was below the generally accepted level of 200 for a full latent model SEM analysis, a path analysis was considered appropriate (Hair et al., 2011). Results from these analyses are presented in the following section.

4.2. Path model

The results of the path model showed a good fit to the data ($\chi^2 = 105.06$, df 16 $p < .001$ RMSEA = .08, CFI = .88). Twenty-nine per cent of the variance in intention to reduce food waste, and 46% of variance in food waste behaviour were explained by the variables in the model. The path model with standardised estimates is shown in Fig. 2.

The results show that, consistent with TPB, subjective norm ($\beta = .21$, $p < .001$), and perceived behavioural control ($\beta = .37$, $p < .001$) were significant predictors of intention to reduce food waste behaviour, thus providing support for hypotheses 1b and 1c. The path from attitudes to intention was not significant ($\beta = .07$, $p = .20$), thus hypothesis 1a was not supported. In line with the TPB, intention to reduce food waste was directly and negatively related to food waste behaviour ($\beta = -.12$, $p < .01$), thus providing support for Hypothesis 2.

Hypothesis 3 was supported with a finding of a significant positive relationship between habitual food waste and current food waste behaviours ($\beta = .65$, $p < .001$). Hypotheses 4a and b concerned the relationship between emotions and intentions to reduce food waste (4a) and food waste behaviour (4b). Results showed that negative emotions had a positive relationship with intentions to reduce food waste ($\beta = .16$, $p < .001$). There was no significant relationship between positive emotions and intention ($\beta = -.02$, $p = .74$), thus providing only partial support for hypothesis 4a. We expected there to be a negative relationship between emotions and food waste behaviour, however, for positive emotions we found no relationship ($\beta = -.02$, $p = .58$) and for negative emotions we found a significant positive relationship ($\beta = .17$, $p < .001$), thus providing a result contrary to our predictions. In other words, our results showed that the experience of more negative emotion was associated with higher intention to reduce food waste but contrary to our predictions, also associated with higher food waste behaviour.

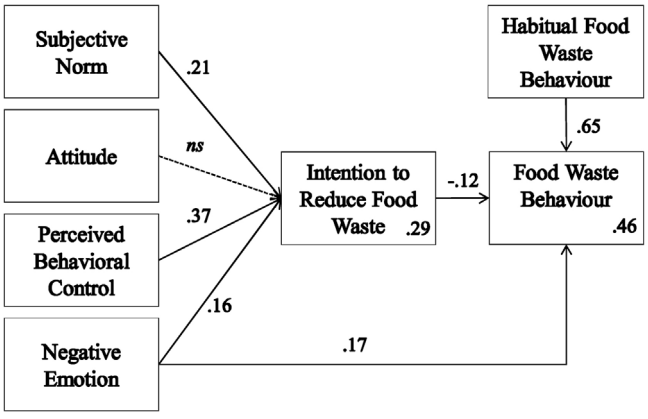

Fig. 2. Results of Path Analysis including Standardised Beta Weights.

5. Discussion

The current study tested a comprehensive, integrative model of food waste behaviour that incorporated both traditional cognitive factors (attitudes, subjective norms, perceived behavioural control) and more neglected non-cognitive factors (habit and emotions). Our results show that the model predictors explained almost half the variance in food waste behaviour (46%), and almost a third of variance in intention to reduce food waste (29%). Additionally, our findings underscore the importance of the non-cognitive drivers of habits and emotions as drivers of food waste behaviour.

These findings add empirical support to the notion that habits and emotions have an important role to play in driving food waste behaviour. Our results lend support to a more comprehensive model of food waste behaviour. Indeed, consistent with the theory of interpersonal behaviour (Triandis, 1977) and the comprehensive model of environmental behaviour (Klöckner, 2013), emotions and habits are important determinants of food waste behaviour.

Contrary to our predictions, we found that negative emotions had a positive relationship with food waste behaviour. This was the inverse of the expected relationship and suggests that the more negative emotion respondents experienced, the more food they wasted. This is particularly striking given that we also found negative emotions had a positive relationship to intentions to reduce food waste. Based on past research (Bamberg and Möser, 2007; Grob, 1995; Vining, 1987) we expected that stronger emotional experiences would lead to an increase in intentions to reduce food waste (Bamberg and Möser, 2007), and a consistent reduction in food waste behaviour. These findings suggest that although emotion may result in a greater intention to reduce food waste, the subsequent behaviour is actually the reverse. Our research demonstrates that these negative emotional experiences do not translate into food waste reductions, despite participants' intentions to do so.

What might be causing such inconsistent behaviour? It could be that the negative emotions are engaging different psychological mechanisms for longer-term intentions compared to immediate behaviour. Research has shown that although some emotions share a similar valence, their behavioural responses are quite different (Lerner and Keltner, 2001). For example, when the behaviour will occur sometime in the future, then negative emotions lead to stronger intentions because of the impetus to take action to reduce the problem. In this way if the negative emotion was anger associated with how much food is wasted this would likely lead to a greater intention to reduce food waste in future. However, when the behaviour is imminent, then the negative emotion may lead to greater food waste behaviour through an avoidance-oriented behaviour; e.g., I'm angry about food waste but because that makes me

feel bad I want to avoid having to think about it at all; so I'll take the easier option and not reduce food waste.

An alternative explanation for our findings is that the negative emotions were a consequence of the food waste behaviour. Indeed, as noted earlier, qualitative research in this area has shown that participants report experiencing negative emotions when wasting food (Quested et al., 2013; Stefan et al., 2013; Watson and Meah, 2012). Our study was rigorous and temporally-lagged such that measures of negative emotions were taken before the food waste measure. Therefore, the effect of emotions we found in this study could not simply be a consequence. In order to further investigate the role of emotion we urge future researchers to use similar methodologies to our own or to take experiential measurements to further understand this paradox of negative emotions.

The findings of our research also underscore the importance of not relying on intention as a proxy measure for behaviour. Indeed, if we had measured behavioural intention only it would be easy to draw the conclusion that negative emotions may be an effective lever for future interventions designed to reduce food waste. When in fact, our research shows a very different relationship to self-reported behaviour. Our results serve as a note of caution for future research that conflates intention and behaviour.

The area of emotions and food waste behaviour may be fruitful for future research. In the current study we examined emotions in terms of valence only, or whether the emotion is positive or negative. Future research that examines specific emotions may be of benefit. As qualitative studies have shown that guilt and disgust are of particular importance to food waste (Quested et al., 2013; Stefan et al., 2013), a focus on these specific emotions may be important in further understanding the relationship between emotion and food waste behaviour. A focus on discrete emotions would also allow further understanding of whether our findings may be attributed to one, or a few, specific discrete emotional experiences.

Our findings show that the role of habits is particularly important as a determinant of food waste behaviour. Indeed, habits were the single most important predictor of behaviour in our study. This finding has important implications for future research and practice that aims to encourage food waste reductions. It may be, for example, that an emphasis on breaking habits may be a fruitful avenue for future intervention work. Interventions that involve the use of prompts (De Young, 1993) may be effective in breaking habits in the short term, however, further research is necessary to investigate whether this would be effective for food waste behaviour.

Our study also makes a methodological contribution because of the administration of multiple surveys to test our model. The timing of the surveys to measure independent and dependent variables at different time points gives us confidence that our results were not affected by common method variance (Podsakoff et al., 2003). We are confident, therefore, that the relationships we found are robust and valid.

5.1. Implications

The findings of our study has implications for both scholars and for practitioners. Our results highlight the importance of both habits and emotions in combination with more cognitive predictors in explaining food waste behaviour. Our results suggest that caution is necessary in arousing negative emotions as a way of influencing behaviour. We would argue against using a purely negative approach that focuses on communicating the costs and negative implications of food waste. Our results suggest that while this sort of approach may be successful in increasing intention to reduce food waste it may not be successful in encouraging actual decreases in food waste behaviour. Indeed, it may be that by arousing negative emotions in an intervention approach, change agents may actually be doing more harm than good and may result in increases in food waste behaviour. This finding also has implications for pro-environmental behaviour campaigns outside of food waste especially by pressure groups who often have negative campaigns.

The importance of habits in explaining food waste behaviour suggests that targeting habits may be a fruitful area for intervention strategies. Behaviour change approaches that aim to change food waste habits may be a useful avenue for intervention design. This may include putting prompts on packaging in order to break habits in the short-term, or attempting to change long-term behaviour by focusing on meal planning and storage. Future research that examines the efficacy of these approaches in changing food waste habits would be of benefit.

Our results also suggest that encouraging stronger subjective norms and a greater sense of control may be more effective mechanisms to change food waste behaviour. This might involve communicating what other people can do at home to reduce food waste, such as those already highlighted by the UK 'Hate Waste Love Food' campaign of shopping smarter (using shopping lists), storing products better, planning meals and using up food that could be thrown away, all of which encourage consumers to reduce their food waste (WRAP, 2015).

Theoretically, an important contribution of the current study was in testing the link between habits and emotions and the more often researched cognitive determinants of behaviour. Our results suggest that food waste is a complex behaviour and that habits and emotions are important considerations in determining household food waste. This finding has important implications for theoretical models of food waste behaviour. We argue that the relative contribution of these variables in determining food waste behaviour demonstrates that theories that do not take into account the dynamics of habits and emotions are unlikely to adequately capture the psychological antecedents of food waste behaviour.

5.2. Limitations

One of the limitations of study is the moderate sample size of 172. Although our sample was adequate to test our findings using a path model, it was not sufficient to conduct a full latent structural model (Hair et al., 2011; McDonald, 1996). Research suggests that path models approximate structural models and we are therefore confident our results are indicative of relationships found in general. However, further research is needed to more fully investigate our findings in a larger sample.

A second limitation of this study is the reliance on self-reported behaviour. The most effective mechanism for measuring food waste behaviour would be to conduct observations. Given the nature of the study and the pragmatic considerations within the research project, it was not possible to conduct observational measures of food waste behaviour. We therefore relied on self-reported food waste behaviour and participants' recall of food wasted over the previous week. This does, however, remain a limitation and future research that looks at the coherence between self-reported and observational measures of behaviour would be of benefit in this sphere of research.

Our data are also based on data from one country (the UK) and were recruited through a participant pool from one company (Asda). We attempted to broaden our sample by including Asda's 'secondary shoppers', or those who regularly shop at Asda's competing stores. We would therefore argue that our findings can be generalised to the broader population. Given that participant recruitment was conducted by Asda it is, however, possible that results are more closely aligned to the perspective of Asda shoppers rather than the general population. Future research that uses a broader approach to participant recruitment would allow the testing of our findings and their fit to a wider population.

Finally, future research that takes a more nuanced view of emotion would be of benefit in this area. For the purposes of this research we categorised emotion in terms of valence. This resulted in some interesting findings particularly around the differences of the relationship between emotion with intention and with behaviour. It is likely that a

more nuanced view may yield even more interesting results. For example, examining emotions in terms of their behavioural tendencies (Lazarus, 1991) or discrete emotion properties could yield greater understanding of what sorts of emotion are most important in determining food waste behaviour. Another route is to investigate households that have food waste collected by local government and the emotional impact of seeing the waste impact of seeing the waste separated (these households tend to reduce their food waste overtime). Indeed, it may be that particular discrete emotions such as guilt or disgust may be of particular in relation to food waste (Quested et al., 2013).

6. Conclusions

In the current research we have shown that habits, emotions, subjective norms, perceived behavioural control, and intentions all have a role to play in determining food waste behaviour. Our findings underscore the importance of habits and emotions as drivers of food waste behaviour and suggest that these non-cognitive drivers deserve much more attention than they have received in past research. These findings are important for practitioners and future researchers in that they suggest that attempts to change behaviour by appealing to attitudes my not be successful and that efforts may be better placed in designing less negative campaigns that create new, more positive, habits. Reducing food waste is a major global challenge that will continue into the future. The current research provides valuable insights about the factors that are important to target in order to reduce food waste at the household level. This information can be used to inform practitioners and may assist in future efforts to reduce household food waste.

Fundings

This work was supported by Innovate UK, Economic and Social Research Council (ESRC) and Asda (grant number KTP009067).

Acknowledgements

We are grateful to Chris Brown, Laura Babbs and staff at Asda for their help and support in collecting data for this paper.

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