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"The road to food waste is paved with good intentions": when consumers' goals inhibit the

minimization of household food waste

12 Abstract

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13 Despite their generally negative attitude toward food waste, consumers often pursue goals that can 14 inhibit their intention to reduce food waste. Identifying these goals that inhibit consumers' intention 15 to reduce food waste is essential for the development of successful public policy and retail 16 approaches designed to curb or reduce household food waste. First, we conducted semi-structured 17 qualitative interviews (N=110) aimed at identifying the consumers' main goals conflicting with their attitude toward food waste. Four main conflicts emerged as relevant in consumers' minds: 18 19 being a good provider, concerns over possible health risks, healthy diet, and saving money. We 20 then ran a quantitative study on adult consumers (N=163), aimed at testing an extended Theory of 21 Planned Behavior (TPB) model with the inclusion of such conflicting goals as additional predictors 22 of the consumers' intention to reduce food waste. Both studies were conducted in Italy. Results 23 show that three out of four conflicting goals – *being a good provider, concerns over possible health* 24 risks, and healthy diet – together with attitude and subjective norms, significantly affect the 25 intention to reduce food waste. In turn, the intention to reduce food waste negatively affects food 26 waste behavior. This study contributes to research on food waste by identifying additional and 27 previously neglected predictors of the intention to reduce food waste. In turn, these results provide 28 evidence of the existence of other valuable entry points to use for the design of successful 29 interventions aimed at reducing household food waste.

30

31 Keywords: food waste, goals, Theory of Planned Behavior

32

1. Introduction

33	Food is wasted from "farm to fork", with edible food discarded at every stage of food
34	production (Eurostat, 2011). Of the 88 million tonnes of food wasted every year in the EU, about 47
35	million tonnes are wasted at the consumer level (Stenmarck et al., 2016). More specifically,
36	European consumers discard on average 123 kg of food per capita every year (Vanham et al., 2015).
37	However, such staggering estimates are in conflict with consumers' self-reported negative attitudes
38	toward food waste, and with results from prior research showing that individuals feel bad when
39	wasting food resources (Evans, 2012; Watson and Meah, 2012).
40	Indeed, prior research has shown that consumers have goals that can inhibit individuals'
41	intentions not to waste (Evans, 2012; Hebrok and Boks, 2017; Setti et al., 2018; Visschers et al.,
42	2016; Watson and Meah, 2012). For instance, the pursuit of seemingly positive personal goals such
43	as offering an overabundance of food to family members and guests (e.g., Aschemann-Witzel et al.,
44	2015; Graham-Rowe et al., 2014; Schanes et al., 2018; Visschers et al., 2016), or following a
45	healthy diet full of fresh produce (e.g., Conrad et al., 2018), can lead to more food waste. In the
46	same vein, the consequences of protecting the health of oneself and others by avoiding potentially
47	risky foods (e.g., Graham-Rowe et al., 2014; Visschers et al., 2016; Watson and Meah, 2012), of
48	buying in bulk to save money and time so as to devote it to other activities, such as spending the
49	time saved with loved ones (Graham-Rowe et al., 2014; Hoolohan et al., 2018; Maubach et al.,
50	2009), and of consumers' preferences for varied and new foods (e.g., Hebrok and Boks, 2017; Setti
51	et al., 2018), can have the same effect.
52	However, while such personal goals have the potential to both contribute to literature on the
53	antecedents of food waste, and help explain consumers' intentions to reduce waste, there is a lack of
54	research testing the effect of these additional predictors on individuals' intentions. Indeed,

55 understanding food waste drivers and motivations in terms of factors that affect the intention to

56 reduce food waste either positively or negatively is essential in defining effective policy approaches

57 aimed at reducing food waste (Schmidt and Matthies, 2018; Thyberg and Tonjes, 2016).

58	In this paper, our primary aim is to show that the inclusion of such personal goals provides a
59	better understanding of intentions to reduce food waste. Specifically, building on recent studies in
60	food waste literature (Graham-Rowe et al., 2015; Russell et al., 2017; Stancu et al., 2016; Stefan et
61	al., 2013; Visschers et al., 2016) our conceptual model is an enriched version of the Theory of
62	Planned Behavior (TPB) model (Ajzen, 1991, 2002, 2015), with goals inhibiting the minimization
63	of food waste, attitude toward food waste, subjective norms, and perceived behavioral control as
64	predictors of the intention to reduce food waste. In turn, intention to reduce food waste is
65	hypothesized to predict food waste behavior. In this sense, our work provides a broader explanation
66	of intentions to reduce food waste, over and above the role played by attitudes, subjective norms
67	and perceived behavioral control.
68	In the following section, we describe the theoretical framework of our conceptual model and
69	the results of a preliminary study aimed at identifying the main goals inhibiting the intention to
70	reduce food waste - these to be included in our enriched TPB model. Following this, we present our
71	hypotheses and our methodology. Data collection was conducted in Italy. Based on the results of
72	our model we then discuss the implications for research, public policy, and practice. Finally, the
73	limitations of the study are outlined and avenues for further research discussed.
74	2. Theoretical framework
75	2.1 Theory of Planned Behavior in food waste literature
76	TPB (Ajzen, 1991; Ajzen, 2015) has been the main theoretical model used by previous
77	literature to explain food waste behaviors (e.g. Graham-Rowe et al., 2015; Russell et al., 2017;
78	Stancu et al., 2016; Stefan et al., 2013; Visschers et al., 2016). The TPB posits that intentions are
79	the main determinants of behaviors. Intentions are in turn predicted by attitude toward the behavior,
80	perceived behavioral control (PBC) over the behavior, and subjective norms. Attitude entails the
81	extent to which the individual has a favorable or unfavorable evaluation of the behavior to be
82	enacted (Ajzen, 1991) and in terms of wasting food it has been found to be negative, with
83	consumers feeling bad or guilty about wasting food (Evans, 2012; Watson and Meah, 2012).

84 Subjective norms refer to the social pressure that the individual may feel in performing or not 85 performing a certain behavior (Ajzen, 1991) and are translated into the extent to which people 86 deemed important by the individual would approve or disapprove of the individual's wasteful 87 behavior (Graham-Rowe et al., 2015; Stancu et al., 2016; Stefan et al., 2013; Visschers et al., 2016). 88 Finally, PBC refers to the individual's perceived ability to perform the behavior, and thus to the 89 extent to which the individual perceives the behavior to be easy or difficult to enact and be under 90 his/her control (Ajzen, 1991). While *attitude* and *subjective norms* are able to predict behaviors that 91 are under the individual's volitional control, PBC was added to the model to account for "the non-92 volitional elements inherent, at least potentially, in all behaviors" (Ajzen, 2002, p. 667). For 93 instance, individuals may feel that their food waste is caused by factors that are not under their 94 control, such as package sizes that are so big that the food cannot be consumed before it expires 95 (Evans, 2012; Williams et al., 2012), or food items bought for a special occasion that never 96 occurred, or for a specific recipe that ended up not being cooked (Aschemann-Witzel et al., 2015; 97 Graham-Rowe et al., 2014).

98 While the value of the original formulation of the TPB and its predictive power has been 99 largely recognized (e.g. Armitage and Conner, 2001), Ajzen (1991) defines the model as being 100 flexible and "open to the inclusion of additional predictors" (p. 199). Indeed, research on food 101 waste has applied extended versions of the TPB that account for some additional predictors of food 102 waste behaviors such as routines (Stancu et al., 2016; Stefan et al., 2013; Visschers et al., 2016), 103 negative emotions (Graham-Rowe et al., 2015; Russell et al., 2017) and self-identity (Graham-Rowe 104 et al., 2015). In a similar vein, Visschers et al. (2016) show that some personal goals are in conflict 105 with the negative attitude individuals hold toward food waste, so that while the latter pulls them 106 toward the minimization of food waste the former pulls them in the opposite direction, leading them 107 to increase the amount of food they waste. Specifically, such conflicting goals take the form of 108 concerns over possible health risks, in the sense that despite being troubled by the idea of wasting 109 food individuals consider the avoidance of the perceived health risks associated with consuming

110 leftovers, or products past their expiry dates, to be a priority (Aschemann-Witzel et al., 2015; 111 Graham-Rowe et al., 2014; Hebrok and Boks, 2017; Schanes et al., 2018; Visschers et al., 2016; 112 Watson and Meah, 2012). This preference towards avoiding health risks can reach the point where 113 individuals are even disgusted by the idea of consuming such foods (Aschemann-Witzel et al., 114 2015). Furthermore, the attitude toward the minimization of food waste conflicts with individuals 115 offering plenty of food to people they care about, or to their guests, with the goal of being seen as 116 good providers or good hosts (Visschers et al., 2016). Such a goal leads consumers either to offer an 117 overabundance or a large variety of foods so that the tastes of all members of the household are 118 satisfied (Aschemann-Witzel et al., 2015; Cappellini and Parsons, 2012; Graham-Rowe et al., 2014; Schanes et al., 2018), or to overbuy and overcook for social occasions fearing there might not be 119 120 enough food for all the guests (Graham-Rowe et al. 2014; Schanes et al., 2018).

121 In this sense, the literature on food waste has shown that whereas some factors positively 122 affect the intention to reduce food waste (e.g., Graham-Rowe et al., 2015; Russell et al., 2017), the 123 potential negative effects of other relevant factors have been largely overlooked, with only one 124 study explicitly investigating this negative effect (Visschers et al., 2016). Thus, building on 125 Visschers et al. (2016) and on existing research in the food waste literature, the rationale of our 126 study is to expand our understanding of such conflicting factors, and their potentially significant 127 role in the prediction of the intention to reduce household food waste, over and above the core TPB 128 constructs. In order to reach this goal, we have reviewed recent research on food waste to map the 129 main goals suggested or identified by prior literature as inhibitors of the intention to reduce food 130 waste. Specifically, we reviewed prior literature with the aim of verifying whether prior research 131 has suggested or speculated about the existence of other potential conflicting goals besides the ones 132 explicitly identified by Visschers et al. (2016). We then conducted a preliminary qualitative study 133 aimed at confirming the results of the literature review and at identifying the personal, conflicting 134 goals that are deemed most relevant by consumers.

Below we present the categories of personal goals able to inhibit the intention to reduce food waste as identified on the basis of the results of prior research. Next, we present the description and results of our preliminary study.

138

2.2. Consumers' goals conflicting with their attitude toward food waste

139

2.2.1. Concerns over possible health risks

140 Consumers' inability to judge the quality of leftovers meals or the edibility of ingredients 141 (Farr-Wharton et al., 2014) and the goal of avoiding the potential inconveniences associated with 142 foodborne illness (Watson and Meah, 2012) conflict with individuals' negative attitudes toward 143 food waste (e.g., Aschemann- Witzel et al., 2015; Farr-Wharton et al., 2014; Visschers et al., 2016; 144 Watson and Meah, 2012) and often lead to the premature disposal of food (Aschemann-Witzel et 145 al., 2015; Farr-Wharton et al., 2014; Graham-Rowe et al., 2014). Evidence from prior research also 146 suggest this goal to be particularly relevant for consumers who had negative experiences with food 147 in the past (Farr-Wharton et al., 2014), while in certain circumstances can even prevent individuals 148 to share food or to accept leftovers from other people (Lazell, 2016).

149

2.2.2 Good provider identity

150 Despite consumers' negative attitude toward food waste and their desire to reduce it, 151 consumers often show the desire and pursue the goal of being a "good parent", "good host" or 152 simply a "good provider" for family members and household guests (Aschemann-Witzel et al., 153 2015; Cappellini and Parsons, 2012; Graham-Rowe et al. 2014). This goal is fulfilled by 154 overpurchasing or overcooking; these behaviors enable the "good provider" to satisfy the taste 155 preferences and pickiness of both guests and family members and it prevents the potential 156 embarrassment or guilt associated with not having enough food for everyone (Aschemann-Witzel et 157 al., 2015; Graham-Rowe et al. 2014; McCarthy and Liu, 2017). At the same time, it leads also to the 158 use of only certain ingredients and to large amounts of leftovers that are later disposed, leading to increasing amount of food waste (Graham-Rowe et al., 2014; Cappellini and Parsons, 2012) 159

160

2.2.3 Saving money

161 While monetary reasons, such as income constraints, induce consumers to cut down on food 162 waste, they can also make them more susceptible to over-purchasing discounted and low-quality 163 foods that later end up being discarded (Setti et al., 2018). For instance, Aschemann-Witzel et al. 164 (2017) argued that while selling suboptimal products (e.g., products close to their expiry dates or 165 suboptimal in their appearance) at a lower price may reduce food waste at the retailer's level, it may 166 increase it at the household level. Furthermore, consumers are attracted by the potential savings and 167 by the prospect of having food available at all times, or having bulk purchases to fall back on in 168 case something unexpected occurs (Farr-Wharton et al., 2014; Hebrok and Boks, 2017). However, 169 overstocking makes it harder for individuals to consume all the foods by their expiration dates or to 170 eat perishable products (e.g., fresh produce) while still fresh. Furthermore, consumers do not 171 account for the money they might potentially spend to eat out, whether at restaurants, cafeterias, fast 172 food joints, or take-aways, when buying in bulks or when deciding to overstock on food (Parizeau 173 et al., 2015). As a result, initial monetary savings resulting from bulk purchases or lower prices may 174 ultimately translate into higher levels of food waste later on (Farr-Wharton et al., 2014; Hebrok and 175 Boks, 2017; Setti et al., 2018).

176

2.2.4 Healthy diet

177 The call put out in recent years for healthier lifestyles and for an increase in consumption of 178 fresh foods (e.g., US Department of Health and Human Services, 2017) is another example of how 179 potentially positive behaviors -i.e. reduction of food waste and following a healthy diet -can180 conflict with each other. Indeed, healthier products such as fruit and vegetables have a shorter shelf 181 life (Aschemann-Witzel, 2015; Maubach et al., 2009). As a consequence, behaviors enacted in order 182 to encourage healthy eating such as putting fruit in a bowl on the counter rather than in the fridge 183 (Hebrok and Boks, 2017), or over-buying healthy and fresh foods to compensate for eating meals 184 that are perceived as unhealthy (Schanes et al., 2018), end up generating higher levels of household 185 food waste (Conrad et al., 2018).

186

2.2.5. Diversified and varied diet

187 Consumers find it boring to eat the same meal multiple times in a row (Cappellini, 2009), 188 and prefer to have a large variety of foods always stored in the house (Hebrok and Boks, 2017; Setti 189 et al., 2018). Both factors can affect the minimization of food waste: the former because individuals 190 may throw away edible leftovers because they want something new and fresh (Hebrok and Boks, 191 2017), the latter because unpredictability of appetite and circumstances (Schanes et al., 2018) may 192 make it difficult for people to consume all the food stored at home while it is still edible. Aiming for 193 variety in food choices also entails that individuals seek variation by trying new recipes and foods 194 which may end up being discarded when not meeting their expectations (Aschemann-Witzel et al., 195 2015).

196

2.2.6 Saving time

197 Time constraints and consequently the goal to save time constitute another factor that may 198 negatively affect consumers' intentions to minimize food waste (Setti et al., 2018). Indeed, 199 consumers adopt different strategies in order to save time, namely: stocking up on food so as to save 200 time on shopping trips and to avoid going shopping if something unplanned happens (Graham-201 Rowe et al., 2014); cooking large meals and storing them in the fridge or freezer with the intention 202 of eating them over several days (Farr-Wharton et al., 2014; Hebrok and Boks, 2017); buying meals 203 away from home so as to save up the amount of time spent on cooking in order to spend it on other, 204 more pleasurable, activities such as spending time with friends and family (Graham-Rowe et al., 205 2014; Hoolohan et al., 2018; Maubach et al., 2009). Each of these strategies conflicts with 206 minimization of food waste: respectively, consumers may find it difficult to consume all the food 207 stored at home; individuals may forget about leftovers or may find it undesirable to eat the same 208 meal repeatedly, and hence may dispose of it after a while (Farr-Wharton et al., 2014; Hebrok and 209 Boks, 2017); eating outside entails that the food stored at home, and which would otherwise have 210 been eaten, may go to waste because of perishability or expiry dates (Hoolohan et al., 2018).

211

3. Preliminary study

212 Whereas prior literature on food waste provides a first suggestion that goals pursued by 213 individuals in their everyday life can potentially inhibit their intention to reduce food waste, this 214 evidence is fragmented and often speculative. Hence, we conducted a qualitative study in order to 215 provide a broader and more complete overview of these personal goals. Specifically, this study was 216 aimed at identifying the main conflicts consumers may experience, in relation to their attitude to 217 minimizing food waste, by prompting them to openly discuss their thoughts and feelings about food 218 waste and their attitudes toward its reduction. By adopting this exploratory approach, we ensured 219 that consumers were not "guided" in their responses, and that conflicting goals would simply 220 emerge from the broader discourse about personal attitudes toward food waste. In this way, we 221 ensured that the conflicts arising from the interviews were the most prominent ones in the 222 consumers' minds, and thus the ones most worthy of investigation. Furthermore, the qualitative 223 study was aimed at verifying whether the conflicts identified by prior research on food waste would 224 also consistently emerge from the consumers' interviews.

The interviews were conducted in Italy in March 2016. Master students working on class projects collected semi-structured interviews from a convenience sample of adults responsible for shopping and cooking in their household. Each student was asked to recruit and interview 3 people. Each interviewer asked participants questions about the following topics:

Thoughts and feelings regarding throwing food away (e.g. Tell me about your thoughts and feelings regarding throwing food away. Why do you throw food away?).

Behaviors regarding reducing food waste (e.g. What do you think are the best or most
 effective ways either to avoid wastage altogether, or at least reduce the amount of food that
 gets thrown away in the home? Which, if any, of these behaviors do you carry out
 yourself?).

For the purpose of the present paper we focused our attention on the first part of the interview and we selected interviews reporting a conflict in consumer attitudes toward food waste. The total data collection resulted in a sample of 172 adult consumers. The vast majority of

individuals held very negative attitudes toward food waste. Among them, 110 (64.2% of the total;
39% male, average age = 45) provided valuable insights reporting specific personal goals not in line
with their general negative attitude toward food wastage. Two master students, familiar with the
topic under investigation, acted as independent coders and categorized the responses, identifying the
personal factors that make individuals experience a conflict in their attitudes toward food waste.
Discrepancies in coding were discussed by the coders in order to reach a resolution. Inter-code
reliability was .84.

245

3.1 Results

246 The classification of responses resulted in five main categories: *being a good provider*, 247 healthy diet, concerns over possible health risks, saving money, and a miscellaneous category (see 248 Appendix). The results of the qualitative study revealed that several types of personal goals are 249 possible causes of conflict with a negative attitude toward food waste. Being a good provider, in 250 particular, emerged as the most frequently reported factor (37.3%). Healthy diet was another 251 frequently reported personal goal in conflict with a negative orientation toward food waste (28.2%). 252 Consumers who were health-conscious stated that they tended to purchase a large variety of fresh 253 foods which frequently were not fully eaten and thus had to be discarded. Concerns over possible 254 health risks was the next most frequent response category: 16.4% admitted to throwing away some 255 food in order to avoid perceived health risks associated with leftovers or food products whose use-256 by dates had expired a few days before. Saving money was indicated as a cause of conflict with 257 negative attitude toward food waste by 11.8% of respondents, who reported that promotional offers 258 and lower unit prices encourage them to buy more than actually needed, with possible effects on their levels of food waste. In addition, a miscellaneous category contains respondents (6.3%) who 259 260 report their need for saving time, or for variety, as personal goals conflicting with the negative 261 attitude toward food waste.

262

4. Hypotheses development

263 Results of the qualitative study showed that four categories of goals – *being a good* 264 provider, healthy diet, concerns over possible health risks and saving money – emerge in 265 consumers' minds as conflicting with their negative attitude toward food waste. These goals 266 partially coincide with the six categories of conflicting goals suggested by prior literature. Hence, 267 we have both support from prior literature and primary qualitative data suggesting that these four 268 categories are the most relevant for investigation as factors conflicting with the attitude toward food 269 waste and as additional predictors of the intention to reduce food waste. On the other hand, the 270 other two categories identified by prior research - saving time and diversified and varied diet -271 were mentioned considerably less in the interviews and thus appear not to be prominent in 272 consumers' minds in relation to their planned efforts to reduce food waste. We thus include being a 273 good provider, healthy diet, concerns over possible health risks and saving money in our TPB 274 model, which provides the theoretical basis of our analysis.

More specifically, the quantitative study is useful for tying together predictions based on existing research, discussed above, with results of the qualitative interviews, so as to show that the prediction of an intention to reduce food waste can be improved by the inclusion of additional predictor variables. Indeed, it is possible that individuals holding a negative perception of food waste may at the same time pursue intrinsically positive goals that have indirect negative effects on other aspects of their life.

Hence, consistent with the TPB, we expect that attitude, subjective norms, and PBC emerge
as positive predictors of intention. Thus:

283 H1a. Attitude toward food waste reduction has a positive effect on intention to reduce food waste

H1b. *Subjective norms have a positive effect on intention to reduce food waste*

285 **H1c.** *Perceived behavioral control has a positive effect on intention to reduce food waste*

In line with the TPB, we also expect that intention negatively affects food waste behavior.

287 H2: Intention to reduce food waste has a negative effect on food waste behavior

288 Finally, considering the additional predictors identified above, we expect that:

H3a: The goal of following a healthy diet has a negative effect on intention to reduce food waste

H3b: The goal of saving money has a negative effect on intention to reduce food waste

291 H3c: The goal of avoiding possible health risks associated with food has a negative effect on

292 *intention to reduce food waste*

H3d: The goal of being a good provider has a negative effect on intention to reduce food waste

294

5. Main study: Materials, method, and results

295 To assess our conceptual model (see Figure 1), a study was conducted with a convenience 296 sample of Italian consumers. In line with Russell et al. (2017), we developed a two-step data 297 collection design. In March 2018 (first step), each respondent was asked to first complete a paper-298 based questionnaire measuring the relevant variables: the four specific additional predictors 299 (personal goals) introduced by the present study and the standard TPB constructs. All these 300 variables were considered to test the hypothesized model, together with the amount of food waste 301 each respondent recorded in a one-week period (the third week of April 2018; second step of data 302 collection) as a measure of food waste behavior. We decided to have one-month temporal distance 303 between the two steps of the data collection (survey and the diary) in order to minimize possible 304 biases of underestimation of food waste caused by the preliminary survey.

305 In order to obtain the measure of food waste behavior, we asked each respondent to fill in a 306 one-week, daily-based paper diary collecting information on several different consumption 307 behaviors (e.g., water consumption, energy consumption, amount of food wasted). As for the 308 variable of interest for the present study (i.e., food waste), participants were asked to enter all the 309 food and drinks they throw away as waste during the day using the same materials as in Romani et al. (2018). The amount of food waste thrown out could be recorded using a number of metrics: 310 311 weight, volume or number of items. We asked respondents to weigh items as much as possible 312 using their available scales. Information from the diaries was inserted manually into an excel 313 database. All the quantities were converted to weight (grams) during the post analysis of the diaries.

314

4.1 Participants

315 Subjects were recruited by 62 Master's students participating in a consumer behavior class 316 in Italy. Each student recruited 3 respondents; s/he was instructed to recruit people who are the 317 main ones responsible for food-related decisions in their household. All respondents who explicitly 318 consented to participate in the research received both a letter explaining the aim of the study and 319 visits to their home. Twenty-three participants (about 12% of the total) did not deliver the materials 320 at the end of the project, or delivered incomplete and/or incorrectly completed materials. The final 321 sample thus included 163 participants¹ responsible for food shopping and cooking in their 322 household (89% of the total were women²; 9.2% aged 18-29, 34.4% aged 30-49, 40.5% aged 50-70, 323 and 1.8% over 70; 21.1% were undergraduate or higher educated respondents, 61.5% with a high 324 school education, and 17.4% with a lower level of education; average household member = 3.7, SD 325 = .72). A small monetary reward was given to respondents who completed the study.

326

5.2 Measures

327 In order to achieve a greater participation of subjects and to balance their effort in terms of 328 tasks to be performed (i.e., each of them had to answer the questionnaire and fill in the diary of food 329 wasted), we developed a parsimonious questionnaire able to measure the constructs of interest with a limited number of items. Following TPB guidelines (Ajzen, 1991), respondents' attitudes toward 330 331 food waste were measured using two semantic differential items, introduced by "I think engaging in 332 food waste reduction behaviors is..." (bad/good, negative/positive), on 7-point scales (e.g., 1=very bad, 7=very good) (ρ =.89)³. Subjective norms regarding food waste were measured using two 333 items: "If I reduced food waste, people who are important to me would..." (1= completely 334 disapprove, 7= completely approve), and "Most people who are important to me think that reducing 335 food waste is..." (1 = very undesirable, 7= very desirable) (ρ =.81). *PBC* was measured using two 336

¹ In line with Bentler and Chou's (1987) recommendation and supported by recent simulations studies (e.g., Sideridis, Simos, Papanicolaou, and Fletcher, 2014; Wolf, Harrington, Clark, and Miller, 2013), the sample size used is adequate for estimating the hypothesized model; the ratio of cases (*N*) to the number of model parameters (*q*) is higher than 5. ² The large number of women in our final sample is in line with the division of labor within the Italian family where women continue to be the ones mainly responsible for food related activities (ISTAT, 2016).

³ As suggested in literature (Eisinga et al., 2012; Stanley, 1971), we use the Spearman-Brown reliability estimate (ρ value) for the two-item scales; for the three-item scales we report the Cronbach α value.

337 items: "How much control are you perceived to have over whether you reduce food waste in your 338 household?" (1 = very little control, 7 = a great deal of control); "How difficult would it be for you 339 to reduce food waste in your home?" (1 = very difficult; 7= very easy) (ρ =.76). Intention to reduce 340 food waste was measured using two items: "My intention to reduce food waste in my home in the next period is..." (1 =very weak, 7= very strong); and "How likely are you to reduce food waste in 341 342 your home in the next period?" (1 =very unlikely, 7 =very likely) (ρ = .86). Food waste behavior 343 was measured using the one-week, daily-based paper diary. All the quantities of food waste 344 recorded by participants were converted to weight (M = 968.25 grams/213,46 pounds; SD = 813.08345 grams/179,25 pounds).

The four categories of personal goals in conflict with the attitude toward food waste 346 347 reduction – being a good provider, healthy diet, concerns over possible health risks and saving 348 *money* – were measured with a multi-item scale partially adapted from previous research (Visschers 349 et al. 2016) and partially derived from Study 1. In detail, *healthy diet* goals were measured using the following two items : "I like to have for me and my family very healthy meals, mostly based on 350 351 fresh, perishable foods" and "I am very health conscious and as much as possible try to buy fresh 352 foods regularly" (1 =strongly disagree, 7= strongly agree) (ρ = .60). The saving money goal was 353 measured using the following three items: "I believe that buying food in big packages makes it 354 possible to take advantage of lower unit prices", "price promotions on foods help me achieve 355 efficient home management", and "I appreciate promotional offers on foods because they give me the opportunity to buy more food for a given amount of money" (1 =strongly disagree, 7= strongly 356 357 agree) ($\alpha = .67$). Concerns over possible health risks was measured using three items: "I believe 358 that the risk of becoming ill as a result of eating food past its use-by date is high", "I believe that 359 one can't safely eat food products whose use-by dates expired a few days ago", and "I am worried 360 that eating leftovers results in health damage" ($\alpha = .72$); and *being a good provider* using three 361 items: "It would be embarrassing to me if my guests ate all the food I had prepared for them. They would probably have liked to eat more", "I like to provide a large variety of foods at share 362

363 mealtimes so that everyone can have something he or she likes", and "I always have products 364 available to be prepared for unexpected guests or events" ($\alpha = .65$), these variables are adapted from 365 Visschers et al. (2016).

366

4.3 Results

367 Before moving on to test hypotheses, measures were validated (see Table 1). The scales had 368 adequate reliability. The dependent variable measuring the total amount of food waste, measured in 369 grams by each respondent, was normalized using a log transformation to reduce biases caused by 370 outliers and satisfy normality assumptions. A confirmatory factor analysis (CFA) on the variables 371 included was run using Lisrel 8.80; the fit of the model was evaluated using the following goodness of fit (GOF) indicators: χ^2 (df)=155.03 (135), p=.11; CFI=0.97; NNFI=0.96; RMSEA=0.03; 372 SRMR=0.05. The GOF indicators of the CFA model were excellent (Bagozzi and Yi, 2012). All 373 374 factor loadings were high and significant, the average variances extracted (AVE) reached the 375 recommended threshold of 0.50 for each of the dimensions (Hair et al., 2005) (see Table 1) and 376 were higher than the highest squared correlation with any other latent variable (Fornell and Larcker, 377 1981), suggesting that the measures exhibited convergent and discriminant validity. Given these results⁴, it is appropriate to move on to the tests of our main hypotheses. 378 379 In order to test the hypotheses, we ran the TPB enriched model illustrated in Figure 1. We 380 used structural equation modeling (Lisrel 8.80) to conduct the analyses.

	Mean	SD	1	2	3	4	5	6	7	8	9
1. Food waste	6.39 ^b	1.44									
2. Intention to reduce food waste	6.08	1.07	21**	.87							
3. Attitude	5.19	1.42	27**	.39**	.59						
4. PBC	5.75	1.38	08	.25**	.05	.51					

⁴ Common method Variance (CMV) was also controlled considering the effects of an unmeasured latent methods factor by allowing the items to load on their theoretical constructs and on a latent common methods factor (CMF) (Podsakoff *et al.*, 2003) (χ^2 (df)=135.29 (116), p=.096; CFI=0.98; NNFI=0.96; RMSEA=0.03; SRMR=0.05). The analysis showed that all loadings of the measures on their respective theoretical latent variables remained positive and significant (ps<0.001). By contrast, all the loadings on the CMF were not significant, with the exception of three barely significant with loadings much less strong compared to those of the pertinent factors. Therefore, CMV is not a major problem in the model.

5. Subjective norms	6.38	.91	11	.21**	.02	.22**	.81				
6. Eating healthy	4.67	1.53	02	.04	.15	.15	.12	.52			
7. Saving money	3.76	1.35	22**	.12	.14	.14	02	.22**	.50		
8. Health risks	2.66	1.44	.05	42**	49**	49**	.07	37**	17*	.55	
9. Good provider	3.55	1.27	.08	25**	13	13	05	.05	12	.09	.50

 $\frac{382}{a}$ AVE values are on the diagonal. ^b The non-normalized value for food waste is M = 968.25 grams/213,46 pounds (SD = 813.08)

384

Table 1: Means, Standard Deviations, and Correlations^a

385

386 The enriched TPB model (see Figure 1) showed an excellent fit (Bagozzi and Yi, 2012): 387 $\chi^2(df) = 175.92$ (141), p = .03; CFI = .96; NNFI = .95; RMSEA = .04; SRMR = .06. The results 388 show that attitude (b = .41; t = 4.69) and subjective norms (b = .14; t = 1.97) were significant 389 predictors of intention to reduce food waste behavior, supporting H1a and H1b, whereas the 390 hypothesized relationship between PBC and intention to reduce food waste (H1c) was not supported 391 (b = .09; t = .76). The additional variables considered in these analyses play a role in affecting the 392 consumer's intention to reduce food waste. In detail, three out of four personal goals, in conflict 393 with the attitude toward food waste reduction, negatively affect intention: *healthy diet* (b = -.42; t = 394 -2.29); concerns over possible health risks (b = -.48; t = -2.32); and being a good provider (b = -.24; 395 t = -2.17), supporting H3a, H3c, and H3d, respectively. Conversely, saving money does not affect 396 the intention to reduce food waste (b = -.03; t = -.36), thus H3b is not supported. Finally, results 397 show that intention to reduce food waste negatively affects (b = -.23; t = -2.76) the food waste 398 behavior of our respondents. H2 is thus supported. In accordance with the TPB model, we also 399 considered the direct relationship between PBC and the food waste behavior that resulted as not 400 significant (b = .01; t = .05). Results are shown in Figure 1. The amount of variance in intention to

³⁸³ grams/179,25 pounds). Asterisks indicate the following: *p < 0.05, **p < 0.01.

401 reduce food waste accounted for by the model is $56\%^5$.



⁵ The comparison between the classic TPB model ($\chi 2(df) = 28.27$ (20), p = .11; CFI = .99; NNFI = .98; RMSEA = .05; SRMR = .05) and the enriched one showed a substantial increase in the amount of variance in intention to reduce food waste accounted for by the model (32% for original TPB model explained vs. 56% for the enriched TPB model). ECVI and AIC indexes of the enriched TPB model (ECVI=1.94, AIC=313.92) are lower compared to the same indexes pertaining to the alternative classic model (ECVI=2.34, AIC=374.35), reinforcing the usefulness of the inclusion of the personal goals.

addition of the goal to follow a healthy diet full of fresh, perishable products, the goal of avoiding
possible health risks associated with food consumption and the goal of being a good provider
predict intentions to reduce food waste. Conversely, the goal of saving money that leads to
behaviors that may favor waste does not predict intentions to reduce food waste.

416 From a theoretical standpoint, the results of the present study add to the literature on food 417 waste showing that the prediction of intention to reduce food waste is strengthened by the inclusion 418 of additional variables other than the ones originally considered in the TPB (e.g., Graham-Rowe et 419 al., 2015; Russell et al., 2017; Stancu et al., 2016; Stefan et al., 2013; Visschers et al., 2016). 420 Specifically, our study shows that while focusing on attitude is warranted, other personal goals that 421 shape individuals' decisions in their everyday life should be accounted for when trying to predict 422 intention to reduce food waste. By taking into specific consideration the different effects of both the 423 consumer's negative attitude toward wasteful behaviors and his personal goals, a more complete 424 picture of the mental processes behind the intention to reduce food waste can be obtained. In this 425 sense, we extend results by Visschers et al. (2016) by showing that the goal of following a healthy 426 diet as well as concerns over possible health risks and being a good provider significantly affect the 427 intention to reduce food waste. Conversely, the goal of saving money does not predict an intention 428 to reduce food waste. One possible explanation is that consumers underestimate the extent to which 429 they engage in such shopping behaviors. This potential underreporting of the behaviors enacted in 430 order to save money may have reduced the effect that this variable has on their intention to reduce 431 food waste, leading to insignificant results. On the other hand, an alternative explanation could be 432 that food is perceived as taking up only a small fraction of disposable income; as a result, the saving 433 opportunities associated with these expenses are deemed limited and thus negligible by consumers. 434 As a result, consumers underestimate the role played by saving money when doing their grocery 435 shopping thus leading to a non-significant result of the goal of saving money on intention to reduce 436 food waste.

The findings of the present study provide useful suggestions for initiatives aimed at the 437 438 minimization of household food waste. In particular, the significant role played by personal goals 439 for being a good provider, for avoiding health risks, and for following a healthy diet show that 440 interventions aimed at reducing food waste could potentially be successful by targeting behaviors 441 that are apparently unrelated to the generation of food waste. For instance, food waste awareness campaigns could focus on a new meaning of good provider, by showing that being a good provider 442 443 for one's family entails ensuring a world free of waste for future generations as well as providing 444 good and abundant food for the people one cares about. On the other hand, more knowledge about 445 the actual risks associated with the consumption of leftovers or of products close to or past their 446 expiry dates could significantly increase consumers' intentions to reduce food waste. In this sense, 447 supermarkets such as WeFood in Denmark (https://www.danchurchaid.org/join-us/wefood) or 448 retailers such as East of England Coop (https://www.eastofengland.coop/) selling products past their 449 best-before dates are showing that the consumption of products that are usually deemed suboptimal 450 (Aschemann-Witzel et al., 2015), unworthy, or risky does not entail any threat for the consumer's 451 own health or that of the people s/he cares about. Moreover, websites such as SuperCook 452 (https://www.supercook.com/#/recipes) or BigOven (https://www.bigoven.com/) help consumers 453 make good use of their leftovers or of their overabundance of fresh, highly perishable products by 454 suggesting potential recipes to cook with the ingredients they already have available at home. Other 455 examples are famous chefs promoting the use of suboptimal products and showing consumers that 456 they are safe to consume. This is, for instance, the case of Jamie Oliver promoting the consumption 457 of aesthetically imperfect fruits and vegetables (Smithers, 2015). Such initiatives aimed at providing 458 consumers with the tools to reduce their household food waste could be similarly adopted, both at 459 the public policy level and by retailers, by providing citizens or consumers with more information 460 about how to efficiently use their food inventories. These could range from recipe booklets to 461 websites or apps acting as intermediaries between consumers willing to donate their surplus of food, 462 and charities that would distribute it to those in need.

Whereas initiatives aimed at educating consumers can be useful in terms of both public 463 464 policy and retail initiatives directed at reducing food waste, their impact has been shown to be only 465 limited when evaluated in relation to actual behavioral change (e.g., Cappellini and Pearson, 2012; 466 Hebrok and Heidenstrøm, 2019; Richetin et al., 2012; Watson and Meah, 2012). More specifically, 467 recent research has put out a call for the definition of interventions that account for the way food is 468 handled and used rather than the way in which it is acquired and disposed of (e.g. Hebrok and 469 Heidenstrøm, 2019; Stöckli et al., 2018). Our results are in line with this approach, as they show 470 that everyday goals – which are translated into everyday practices – affect consumers' intention to 471 reduce food waste. In this sense, different agents could develop interventions with the aim of 472 reducing the conflict between these consumers' goals and attitude toward food waste. For instance, 473 companies could offer small packages for produce, so that it would be easier for consumers to both 474 follow a healthy diet and reduce food waste. In a similar vein, companies could design packages 475 with instructions about how to store food when it is close to the expiration date (e.g. freeze it before 476 it expires) or when produce is starting to spoil (e.g. cutting fruits and vegetables into pieces and 477 freezing them for later use in smoothies or shakes). By doing so, companies would potentially 478 prevent the emergence of strong health concerns about food whose quality consumers may find 479 difficult to assess. Other solutions include smart fridges that track the expiration dates of food 480 (Eadicicco, 2016) or other smart objects (e.g., voice assistants such as Alexa or Google Home) that 481 could help in reducing the conflicts between personal goals and attitudes toward food waste. 482 While hypotheses were supported and recommendations were drawn, this study has 483 limitations that need to be addressed. The main limitation of our study refers to self-reported 484 measures. More specifically, consumers may report higher intentions to reduce food waste because 485 of response bias due to social desirability. In particular, while a daily-based diary is a more reliable 486 measure than asking respondents about their food waste on a general level, it can still be subject to

487 inaccuracy and social desirability bias (Xue et al., 2017). Acknowledging this issue, we run specific

488 analysis (i.e., CMV) to check for possible social desirability bias. Future research can further

489 address this problem (e.g., by collecting specific data on the social desirability tendency of 490 respondents and checking for this in the analysis). Moreover, it needs to be mentioned that 491 observable higher levels of food waste would strengthen our conclusions about the effect of 492 intentions on behavior rather than weaken them. Therefore, future research could then use more 493 objective measures of food waste behaviors to avoid inaccuracies and ensure reliability of results. 494 Furthermore, this study used convenience samples (although with adult consumers responsible for 495 shopping and cooking) and future studies may consider samples representative of the general 496 population in order to strengthen their findings. Finally, this study was intended to provide a 497 foundation for launching additional research on the key role of personal goals in conflict with 498 negative attitude toward food waste and their effects on food waste behaviors. The evidence here 499 illustrated provides a basis for future studies to empirically assess how these personal goals can be 500 managed to reduce food waste. Specifically, in addition to the direct effects of personal goals on the 501 intention to reduce food waste, it would be interesting to investigate whether these goals are able to 502 moderate the effect of attitude on intention. For example, comparing consumers who have the goal 503 of healthy eating with those who do not share this goal might show interesting different effects on 504 the relationship between the attitude toward food waste and the intention to reduce it that could be 505 worth investigating.

506 In conclusion, our research shows that accounting for antecedents that indirectly affect food 507 waste – and as such they might go unnoticed – attitude is essential for the achievement of food 508 waste reduction goals. We believe such a broader perspective to be both theoretically relevant and 509 warranted for the design of successful managerial and public policy initiatives aimed at mitigating 510 food waste.

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647 Appendix. Categories of conflicts emerging from qualitative interviews

Category	% of respondents	Qualitative comments
Being a good provider	37.3	Last Sunday we had a guest for lunch and we cooked more pasta than we needed, and so we had some leftovers. Given that we had a guest I honestly thought "better to have more than less food". However, it was avoidable as we also had other foods to eat $(F, 21)$
		Yesterday I wasted both my first and second course. Maybe I cooked more than necessary, but this is because my family is unpredictable: one day they eat way too much, another day way too little, and so it is virtually impossible to predict their food behaviors. It is impossible to make a good host, especially in a big family in which you find out last minute who's going to eat at home and what are everybody's preferences for the day. And I want to be a good provider and so I end up wasting food. (F, 50).
Healthy diet	28.2	It often happens with yogurts. I force myself to eat them because they are good for my health, but I end up not eating them either because I don't feel like it or because I forget about having them in the fridge. (F, 60)
		I usually discard dairy products, fruits and vegetables. I often buy too much of these products to avoid not having them at home or fearing I might end up not eating properly, but sometimes I am forced to throw them away because they had expired and I didn't manage to use them in time. (F, 26)
Concerns over possible health risks	16.4	I recently trashed a barely used mayonnaise bottle; it wasn't either empty or expired, but it had a bad taste. I don't want to catch salmonellosis, even if I feel guilty. (M, 30)
		I realized yogurts in the fridge expired a week ago. I don't like to take my chances with dairy; had they been expired only for a few days I might have tried them and then decided what to do with them. However, I thought that a week was too much time and I feared I might get sick. I'm sorry about wasting, but in these cases there is no choice. Way too risky! (F, 49)
Saving money	11.8	I have bought a large box of fruits and vegetables (even 15kg boxes) at the farmers' market in order to pay a lower price. It can happen that I might not be able to use all the produce. Some of it may go bad and I'm forced to throw it away with great regret. (M, 49)
		I am susceptible to promotions. It's beyond me. I always think about how to get a good deal. Often I realize that I have food that I cannot consume and that I have to throw away. Every time I really regret it, but I always end up doing it again. (M, 45)
Miscellaneous (taste and variety	6.3	I tend to waste when I try to experiment with new recipes that end up being real failures. I can't serve those dishes. (F, 52)
to experiment with new food; saving time)	are attributed to :	I often waste when I make weekly shopping expeditions in order to save time. It's rare but it can happen. Too many products not easy to consume in time. (F, 45)