

Normative Prompts Reduce Consumer Food Waste in Restaurants

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Abstract

This field study demonstrates that prompts reduce food waste in a restaurant. Based on the behavioral change literature, it was hypothesized that (1) informational prompts encourage consumers to reduce food waste, and that (2) an informational prompt with a normative message is more effective than a prompt with only an informative message. The results were mixed. As expected, diners who were exposed to prompts asked to take away their leftovers more frequently than diners who were exposed to no prompts. However, prompts with an informative *and* normative message were no more powerful than prompts with only an informative message.

Keywords: Consumer Food Waste; Behavioral Change (Intervention); Prompts; Information Intervention; Social Norm

1 Introduction

In today's world, a significant amount of food ends up as waste (Evans, 2012). Food waste leads to numerous societal, environmental, and economical ills. Among other concerns, food waste threatens global food security (Godfray et al., 2010), adds to climate change (Knipe, 2005; Ventour, 2008), and is linked to food price inflation (FAO, 2015). In industrialized countries, consumers are the single biggest producer of food waste (Beretta, Stoessel, Baier, & Hellweg, 2013; Parfitt, Barthel, & Macnaughton, 2010). Studies show that they waste 330 kg of food per year per household (Quested, Ingle, & Parry, 2012). Given that 65% of this waste could be avoided by more sustainable behavior (Farr-Wharton, Choi, & Foth, 2014), there is an urgent need to change consumer behavior. It is important that consumer behavior does not only have to change in private contexts such as in the home, but also in public contexts such as restaurants. The increasing frequency of eating out (see Thyberg & Tonjes, 2016) and growing food-waste-related challenges for restaurants that are caused by guests underscores this urgency (Sustainable Restaurant Association, 2010, cited in Papargyropoulou, Lozano, Steinberger, Wright, & bin Ujang, 2014).

Over the last two decades, practitioners (e.g., WRAP) have applied various behavioral change interventions, including awareness campaigns, in an attempt to reduce food waste at the consumer level. In contrast, researchers have only recently started to examine what drives consumer food waste (e.g., Block et al., 2016; Porpino, 2016; Stancu, Haugaard, & Lähteenmäki, 2016; Stefan, Van Herpen, Tudoran, & Lähteenmäki, 2013; Visschers, Wickli, & Siegrist, 2016) and what prevention options and policies would be effective (e.g., Hebrok & Boks, 2017; Thyberg & Tonjes, 2016). So far, practitioners and researchers have not done much to test the effect of concrete anti-consumer-food-waste interventions (e.g., Kallbekken & Sælen, 2013; Whitehair, Shanklin, & Brannon, 2013).

In general, behavioral change research has identified many intervention types that foster sustainable consumer behavior. Comprehensive reviews of these intervention types can

be found elsewhere (e.g., Abrahamse, Steg, Vlek, & Rothengatter, 2005; Homburg & Matthies, 1998; Osbaldiston & Schott, 2012; Schultz, 2014). Informational interventions are by far the most frequently applied and investigated type of intervention to promote sustainable consumer behavior. Informational interventions are based on the idea that information about the negative consequences of an undesired behavior (e.g., wasted resources) and the positive consequences of a desired behavior (e.g., saved resources) causes problem awareness and thus changes behavior. Yet, evidence shows that information alone seldom produces behavioral change and is more likely to be successful when combined with other intervention types (Kollmuss & Agyeman, 2002; McKenzie-Mohr, 2013; Steg, Buunk, & Rothengatter, 2008). A meta-analysis comparing common intervention types underlines this, as it reveals a relatively low average effect size ($g = .31$) for information-only interventions (Osbaldiston & Schott, 2012).

The limited effectiveness of informational interventions is relevant when designing anti-consumer-food-waste interventions for two reasons: First, real-world campaigns against consumer food waste almost exclusively implement informational interventions. Second, the academic food waste literature mainly recommends informational interventions and rarely other intervention types (e.g., Carlsson-Kanyama, 2004; Jörisen, Priefer, & Bräutigam, 2015; Priefer, Jörisen, & Bräutigam, 2016; Stancu, Haugaard & Lähteenmäki, 2016). Researchers and practitioners should test the effectiveness of extending informational interventions and campaigns with other intervention types.

One intervention type to consider is prompts: verbal or written reminders to perform or avoid a certain behavior. According to behavioral change literature, prompts are relatively effective intervention type ($g = .62$; Osbaldiston & Schott, 2012). Prompts are particularly effective when they occur before the target behavior takes place, when they address a specific (vs. loosely defined) behavior that is easy to perform, and when they are worded politely (vs. as a demand) (Steg et al., 2008). Accordingly, organizations concerned with food waste

86 encourage stakeholders in the food service sector (e.g., restaurants) to prompt their customers
87 to reduce food waste. For instance, in their guidelines document, ‘Resource Pack for
88 Hospitality and Food Service Sector: Engaging with Consumers to Help Reduce Plate Waste’,
89 WRAP proposes that restaurants place messages on menus, posters, the buffet, or table cards.¹
90 Although we do not know of any documented evaluation of real-world implementations of
91 prompts, experimental research provides first evidence that prompts can reduce food waste. In
92 one study, for example, a simple print message (i.e., ‘All Taste No Waste—Eat What You
93 Take, Don't Waste Food’) in a university dining facility led to students reducing food waste
94 by 15% (Whitehair et al., 2013). Similarly, a written prompt with a ‘normative-connoted
95 message’ (i.e., ‘Welcome back! Again! And again! Visit our buffet many times. That’s better
96 than taking a lot once.’) on breakfast buffets led hotel guests to reduce food waste by 20%
97 (Kallbekken & Sælen, 2013).

98 A second intervention type to consider is social influence. Social influence as an
99 intervention type is based on the idea that behavior that conforms to social norms is more
100 likely to be adopted. According to behavioral change literature, social influence is a relatively
101 effective intervention strategy ($g = .63$; Osbaldiston & Schott, 2012). Social norms are
102 particularly effective when not only signaling what the majority does (*descriptive norm*) but
103 also what the majority (dis)approves of (*injunctive norm*) (Griskevicius, Cialdini, &
104 Goldstein, 2008; Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008; Schultz, Nolan,
105 Cialdini, Goldstein, & Griskevicius, 2007). We do not know of any real-world examples
106 where practitioners explicitly apply social norms in order to tackle consumer food waste.
107 Likewise, we did not find evidence of a systematic, scientific examination of social norms as
108 anti-consumer-food-waste interventions.

¹ See: http://www.wrap.org.uk/sites/files/wrap/UK%20LFHWHospitalityResourcePack_0.pdf.

So far, we argue that combining intervention types—namely informational interventions, prompts, and social norms—is an effective strategy to tackle consumer food waste. Consumers are particularly susceptible to anti-food-waste prompts and social norms in a restaurant context (Kallbekken & Sælen, 2013; Whitehair et al., 2013). In restaurants, prompts work well because a specific, easy-to-perform target behavior such as taking away leftovers (vs. throwing out leftovers) can be addressed where they occur (see Steg et al., 2008). Social norms seem to work well in a restaurant because it is a public context. Typically, social norms exert more influence on food decisions in public contexts, where one's behavior is visible to others (Templeton, Stanton & Zaki 2016). Recent experimental evidence showing how normative the act of taking away leftovers is underlines the importance of social norms in restaurants. In fact, in an anonymous restaurant dining situation (with an unknown companion) taking away leftovers is more embarrassing (i.e. norm-violating) and thus less likely than in a personal restaurant dining situation (with a socially close companion). Importantly, this difference weakens when servers orally inform diners about the norm of taking away leftovers (Hamerman, Rudell, & Martins, 2018). This implies that restaurants can establish social norms and foster anti-consumer-food-waste behaviors.

Taken together, neither practitioners nor researchers have systematically tested the promising combinations of informational interventions, prompts, and social norms as anti-consumer-food-waste interventions. Therefore, this field study aimed to test the effect of an informational prompt and an informational *and* normative prompt on consumer food waste in a restaurant. It was hypothesized that diners are more likely to take away their leftovers when exposed to a prompt than when exposed to no prompt. Further, it was hypothesized that a prompt with both an informative *and* normative message is more effective than a prompt with only an informative message.

2 Method

2.1 Sample, Design, and Procedure

The field study employed a one-factorial between-subjects design with the factor *intervention* (control vs. informational prompt vs. informational and normative prompt). The three intervention conditions were tested in a pizzeria in a Swiss city for six weeks. Data was collected only on weekdays. Conditions were counterbalanced across weekdays, so that conditions were equally tested across weekdays. Every weekday, data was collected for 90 minutes around the main dining time.

During data collection, two experimenters were present and pretended to be diners. Diners were not aware of the ongoing field study. If a diner had leftovers, waiters were instructed to clear the dishes and inform an experimenter about the diner. Only pizza dishes that were not finished qualified as leftovers. Experimenters unobtrusively approached diners who had leftovers (irrespective of whether they had asked for takeaway boxes or not). Diners were told that they had been selected randomly and were asked to fill in a questionnaire. In order to disguise the main purpose of the study, they were asked whether they liked the pizza. Then they indicated sociodemographic details, whether they made use of the takeaway option, and whether they wanted to receive an email with a debriefing after the end of the study. Finally, participants were thanked and given a five-Swiss-franc voucher for their next pizza. The final sample consisted of 54 diners (43 women, $M_{age} = 37$, $SD_{age} = 15$ years).

2.2 Material

2.2.1 Intervention

According to the idea of a three-step intervention design, different (or no) place cards were placed on each table in the pizzeria showing different messages for the information-alone and the information-plus-social-norm condition. The messages were in German and were displayed on both sides of the cards. The place cards were made of brown DIN A6 120 g/m² paper. White silhouettes of cutlery on a red circular background were depicted on the

bottom right corners of the folded paper. In the control condition, no place card was put on the table.

Figure 1 depicts the front of the original place cards. In the information-alone prompt condition, the place cards displayed only information about food waste: 'Food waste happens in the restaurant too. A third of all foods are thrown away. 45% of waste occurs in households and restaurants. Please ask us to box your leftover pizza slices for takeaway to avert food waste.' In the informational and normative prompt condition, normative aspects were stressed: 'Our guests expect a reduction of food waste. A third of all foods are thrown away. 45% of the waste occurs in households and restaurants. The majority of our guests expect that the wasting of food is reduced. Therefore, many people ask us to wrap their pizza leftovers. Please ask us to box your leftover pizza slices for takeaway to avert food waste.' We included descriptive normative aspects (i.e., what other guests expect in terms of reducing food waste) as well as injunctive normative aspects (i.e., what others do in order to reduce food waste). This is based on findings that combining descriptive and injunctive norms is more effective than only invoking one norm type (e.g., Schultz et al., 2007).



Figure 1. Front view of the original (German-language) place cards for the informational prompt condition and for the informational and normative prompt condition.

2.2.2 Food Waste Behavior

In order to measure diners' food waste behavior, we recorded whether diners chose to dispose of or take away their leftovers. To ensure that the conditions to ask for takeaway leftovers were the same for all diners, only leftover pizza was considered. This was decided because a diversity of leftovers creates a lot of variance in the data. For instance, the barriers to taking away soup or saucy leftovers are much higher than the barriers to taking away pizza. Also, diners that only left pizza crusts were not considered.

Waiters were instructed to not proactively ask diners if they want to take home their leftovers. Thus, the preconditions to ask for a pizza box (takeaway option) were the same for all diners.

3 Results

Based on a 3×2 (intervention [control vs. information vs. information and social norm] \times food waste behavior [dispose vs. take-away]) contingency table (see Table 1), a chi-square test revealed an association between intervention condition and food waste behavior, $\chi^2(2) = 6.08, p = .048$ (at a 95% significance level). In the control condition, the percentage of diners that asked to take away their leftovers was only 25% (vs. 75% of diners that chose to dispose of their leftovers). In contrast, the percentage of diners that asked to take away their leftovers in the informational prompt condition was 55% (vs. 45% of diners that chose to dispose of their leftovers) and 64% in the informational and normative prompt condition (vs. 36% of diners that chose to dispose of their leftovers).

Table 1

Association Between Intervention and Food Waste Behavior

Intervention	Takeaway		Discard	
	N	%	N	%
Control	5	25	15	75
Informational Prompt	11	55	9	45
Informational and Normative Prompt	9	64	5	36

Notes. A chi-square test revealed a significant association between intervention and food waste behavior, $\chi^2(2) = 6.08, p = .048$.

A post hoc analysis with three separate 2×2 (intervention \times food waste behavior) comparisons was conducted. Single comparisons revealed that diners exposed to the informational place card marginally more frequently asked to take away their leftovers, $\chi^2(1) = 3.750, p = .05$, compared to diners that were exposed to no place card. Similarly, diners exposed to the informational and normative place card more frequently asked to take away their leftovers, $\chi^2(1) = 5.247, p = .02$, compared to diners that were exposed to no place card. However, no significant association was found for diners exposed to the informational and normative place card compared to diners that were exposed to the informational place card, $\chi^2(1) = 0.293, p = .59$.

4 Discussion

The present field study tested whether prompts with a combination of informational interventions and social norms reduce consumer food waste. Although not all hypotheses were supported, the field study demonstrated the general effectiveness of the combined interventions in reducing food waste. When informational prompts, as well as informational and normative prompts, were placed on the tables compared to no prompts on the table, relatively more diners took away their leftovers (vs. disposed of their leftovers). Note that our finding is significant at the 95% level but not at the 99% level (the probability of committing

a type I error should be kept in mind when interpreting our results). However, what this research could not demonstrate is that the informational-plus-normative prompt was more effective in reducing food waste than the informational-only prompt.

This research contributes to the food waste literature by addressing the lack of proof about using prompts and social norms to reduce consumer food waste. To our knowledge, this research represents the first empirical examination of an intervention addressing the specific behavior of taking away leftovers in a restaurant. In this light, it is astonishing that, so far, researchers have widely ignored the general behavioral change literature when examining anti-consumer-food-waste interventions. Behavioral change literature offers various insights into how diverse intervention types effectively foster sustainable food consumption. Although research on behavioral change interventions are mostly separated by issue (e.g., littering), there is significant overlap in theories, concepts, methodologies, and procedures (Mick, Pettigrew, Pechmann, & Ozanne, 2012). Researchers interested in anti-consumer-food-waste interventions are urged to consult behavioral change (intervention) literature.

One limitation of this study is its small sample size. Here we want to point out three things: First, one needs to be careful when interpreting the small sample size as indicating a low frequency of consumer food waste in restaurants. In fact, concluding from the small number of 'leftover diners' that food waste is not an issue is inaccurate, as we only measured leftover pizza, and not other dishes like pasta. Second, one needs to consider that taking away leftovers is only one of several anti-food-waste behaviors that diners could have employed. Others are, for instance, ordering smaller portions, ordering fewer dishes, finishing their food even if they were sated, or sharing dishes with others. All of these alternative behaviors are potential causes for the relatively small sample and thus we cannot rule out that we underestimate food waste reduction due to (normative) prompts. Third, one needs to consider that the small sample size goes along with a limited generalizability of our results. Further studies are required, with larger sample sizes, in order to improve statistical power. Ensuring

adequate sample size helps minimize type I and type II errors. In regard to generalizability, further studies also need to examine (normative) prompts across different cultures and social classes. This is because social norms (in restaurants) vary across different cultures and social classes (e.g., Higgs & Thomas, 2015; Hupkens, Knibbe & Drop, 2000).

Another limitation of this study is that it leaves the underlying psychological mechanisms of the effect of informative and normative prompts unexplored. Whitehair et al. (2013) belong to the first group of studies that explicitly examine such underlying mechanisms in the domain of consumer food waste. Yet when examining whether beliefs concerning food waste explain why a normative message reduces consumer food waste, they found no evidence. We encourage future researchers to follow Whitehair et al.'s (2013) example; that is, to examine underlying mechanisms and report results even if they are non-significant.

One psychological mechanism that might prove relevant in the context of restaurants is that many behaviors are perceived as normative or norm-violating and embarrassing. Based on the concept of 'impression management' (i.e., self-presentation by which people try to improve their image; Leary & Kowalski, 1990), empirical laboratory research (i.e., Hamerman, Rudell, & Martins, 2018) demonstrates that when diners want to impress dining partners, asking to take away leftovers is embarrassing as it violates the prevalent social norm. Such feelings of embarrassment make it less likely that diners would take leftovers away (compared to when dining with companions with whom one is comfortable and does not feel the need to impress). However, this pattern does not occur when servers orally prompt diners about taking leftovers away, which indicates how social norms and stigma attached to this anti-consumer-food-waste behavior can be influenced by restaurants. On the one hand we see our study as a field evaluation of such a norm intervention to reduce waste behavior in a restaurant context. On the other hand, we acknowledge that the previous findings can only hint towards the underlying process that took place. To fully understand the relevant

psychological drivers, future replications of this field study could not only extend the research design by qualitative interviews (Patton, 2015), for instance with a thematic analysis (Braun & Clarke, 2006; Braun, Clarke, & Terry, 2013), but should also systematically identify the psychological processes and boundary conditions of the effect of prompts and social norms on consumer food waste in restaurants.

Another, more general (i.e., not limited to the context of restaurants and the behavior of taking away leftovers) underlying pattern that should be examined is whether social norms and the effect of normative prompts differ in public and private contexts. Evidence suggests that social influence affects consumer behavior differently depending on whether the context is public or private; that is, whether one's behavior is visible or invisible (Argo, Dahl, & Manchanda, 2005; White & Dahl, 2006). In particular, conforming to social norms is more important in public than in private (Ariely & Levav, 2000; Hamerman et al., 2018). Given that diners in the present field study were observed in a public context, future research could examine whether normative prompts also work in private spaces such as consumers' kitchens. In terms of the application of normative prompts, such findings are crucial.

A further limitation of this study is that we cannot make any conclusion about the stability of the behavioral change, as we did not conduct any follow-up research. General behavioral change research shows that many interventions lead to behavioral change in the short term, but are unable to establish change in the long term (see Abrahamse et al., 2005). Thus, we cannot rule out that the effect we found is only temporary. Future testing of (normative) prompts against consumer-food-waste behavior needs to consider follow-up measures in order to make conclusions about the long-term effectiveness of anti-consumer-food-waste interventions. Such long-term evaluations are important as previous research nearly exclusively tested anti-consumer-food-waste interventions at one time, and within a short time interval (for an exception see Schmidt, 2016; Young, Russel, Robinson, & Barkemeyer, 2017).

This research is of practical relevance for organizations that promote sustainable food consumption. Moreover, it implies that, with simple and inexpensive measures, practitioners such as restaurants can foster sustainable behavior in their guests.

5 Conclusion

This field study shows that informational prompts and informational and normative prompts in the form of place cards are able to reduce consumer food waste in a restaurant by encouraging diners to take away their leftovers.

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