



The new norms of food waste at the curb: Evidence-based policy tools to address benefits and barriers[☆]



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ARTICLE INFO

Article history:

Received 29 January 2017

Revised 4 July 2017

Accepted 7 July 2017

Available online 27 July 2017

Keywords:

Food waste

Norm communication

Field experiment

Behavior change intervention

Policy implementation

ABSTRACT

Cities around the world are under increasing political pressure to develop organics collection programs (OCP) to curb the flow of food waste into landfills, reduce the associated greenhouse gases, and generate compost or biogas. While OCPs tend to focus on infrastructure, they often overlook the linchpin role that household behavior change plays in the success of OCPs. The current research used a longitudinal field experiment (n=370) to test both the effectiveness of a new curbside OCP and new social innovations intended to stimulate pro-environmental changes in household behavior. The findings suggest greater participation levels occur by implementing both new supportive infrastructure (i.e., curbside carts and collection services), and innovations that target the social aspects of waste (i.e., communicating social norms of separation). The data also provide an opportunity to test new model for predicting the most efficacious behavior-change interventions based on population profiles. The results provide some support for the model; reducing barriers (i.e., curbside carts and collection) tends to help all population profiles, but norm communication increases participation more for the hypothesized profile than for other sub-groups.

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1. Introduction

Food waste is the single largest material stream entering landfills in the U.S., where it generates a quarter of the country's methane emissions (U.S. EPA, 2011). Cities around the world are under increasing political pressure to develop organics collection programs (OCP) to curb the flow of food waste into landfills, reduce the associated greenhouse gases, and generate compost or biogas. While countries such as the Netherlands (ETC/SCP, 2013a) and Sweden (ETC/SCP, 2013b) rely heavily on incineration to process municipal waste, over half of all waste in the U.S. is sent to landfills

(U.S. EPA, 2013). The remaining half is recycled or used as in-fill, and to a far lesser extent, composted (U.S. EPA, 2013). In California, statewide mandates for landfill diversion (CalRecycle, 2009) and greenhouse gas reductions (CA ARB, 2014) have driven aggressive OCPs largely targeting infrastructure development through a successful grant and loan program (Mortensen, 2014). Around the world, OCPs tend to focus on the deployment of curbside carts, collection fleets, and new technologies for processing facilities (Castán Broto & Bulkeley, 2012), often overlooking the linchpin role that household behavior-change plays in the success of OCPs.

The current research used a longitudinal field experiment informed by social-psychological research to test first, whether the provision of supportive infrastructure leads to improved food waste separation in households, and second, whether normative messaging further increases separation (i.e., structural and social interventions respectively). Normative messaging communicates the actual behavior of others (i.e. “descriptive norm” communication; Cialdini & Trost, 1998) and has been shown to increase pro-environmental behaviors more than information or financial incentives alone (Osbaldiston & Schott, 2012). While norm communication has been studied in a suite of other behavioral domains (Abrahamse, Steg, Vlek, & Rothengatter, 2005; Cialdini, Reno, & Kallgren, 1990; Porter, Leeming, & Dwyer, 1995) and has proven successful as a policy tool in energy conservation (Allcott, 2011),

Abbreviations: CMSD, Costa Mesa Sanitary District; OCPs, organics collection programs.

[☆] This work was supported by the Haynes Lindley Doctoral Dissertation Fellowship, the Costa Mesa Sanitary District, the Stanley Behrens Public Impact Fellowship, and the UC Irvine Data Science Initiative. The Board of Directors at the Costa Mesa Sanitary District directed the implementation of the curbside organics program including decisions related to the distribution of curbside carts which served as a treatment in one of the experiments discussed here. The remaining funding sources had no involvement in the study design nor the writing or submission of this article.

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the current research is the first to test norm communication in the context of OCPs. The findings indicate increased participation results both from new supportive infrastructure (i.e. curbside carts and collection services), and social innovations (i.e. communicating social norms of separation).

The current research also responds to calls to test new models for predicting the most efficacious behavior-change interventions (e.g. norm communication, group commitment, financial incentives) based on the population's perceived benefits of and barriers to particular behaviors (Schultz, 2014). The data reveal mixed support for Schultz' model. Contrary to the predictions of the behavior-change intervention model, reducing barriers helps all populations perform the behavior rather than a particular benefit-barrier profile, but norm communication does increase participation more for the hypothesized profile (i.e. Low Benefits and Low Barriers) than for other sub-groups.

2. Literature review

Previous research has examined the role of the material, individual, and social contexts of waste management. Bulkeley and Askins (2009) argue that waste management is co-created by the systems of provision and household practices. Whether or not a household has access to OCPs, for instance, is a product of infrastructural and institutional arrangements, or the systems of provision (Bulkeley & Askins, 2009). Yet, cultural preferences, social norms, habits, and identity, interact with spatio-temporal constraints and the systems of provision to shape household waste management (Evans, 2014; Visschers, Wickli, & Siegrist, 2016; Gregson, Metcalfe, & Crewe, 2007).

In the case of household organic waste, municipalities establishing OCPs in the U.S. have almost exclusively relied on technical innovations (Castán Broto & Bulkeley, 2012), focusing on supply-side approaches that “modify resident choice situations” (Vlek & Steg, 2007, p. 12) by altering the material or physical infrastructure (Southerton, McMeekin, & Evans, 2011). Supply-side approaches targeting structural factors (i.e. those beyond the control of household decision-making) have been shown to influence household food waste generation and sorting behaviors, including distance to recycling points (González-Torre, 2005) and frequency of waste collection (Gellynck, Jacobsen, & Verhelst, 2011; González-Torre, 2005). Indeed, providing supportive infrastructure for food waste separation such as curbside collection services has long-term efficacy in diverting food waste from landfills (Bernstad, 2014; Hage, Söderholm, & Berglund, 2009). However, a recent waste characterization study in San Francisco, a poster-child of U.S. OCPs, suggests that the available source-separation infrastructure for organics goes under- or mis-used with more than half of landfill streams comprised of readily compostable or recyclable materials (SF Environment, 2013). This performance rate underscores the need to do more than provide infrastructure. Successful OCPs may demand that municipalities ‘cross the threshold’ (Bulkeley & Gregson, 2009) by more directly engaging with the individual and social aspects of household waste generation and management. Programs that address *individual* contexts target consumer attitudes and knowledge to change the decision-making of individuals, including tools such as testimonials of trusted representatives or education campaigns (Southerton et al., 2011). While previous research suggests that awareness and accurate knowledge of recycling programs are significantly higher for recyclers than non-recyclers (Vinning & Ebreo, 1990); caution should be taken in assuming the causal direction. In a meta-analysis examining the determinants of recycling behavior (Hornik, Cherian, Madansky, & Narayana, 1995). Hornik et al. (1995) found that knowledge of recycling programs, personal commitment to recycle, and financial

incentives revealed among the strongest predictors of recycling behaviors.

Conversely, a more recent meta-analysis, which included Hornik et al.'s (1995) study, evaluated interventions to promote pro-environmental behaviors more generally, concluding that providing instructions (i.e., education campaigns to increase knowledge) and financial incentives ranked among the lowest effect sizes (Osbaldiston & Schott, 2012). Instead, the interventions with the largest effect sizes were those leveraging cognitive dissonance, social modeling through norm communication, and goal-setting (Osbaldiston & Schott, 2012). Rather than targeting *individual* contexts, however, these factors engage social-psychological processes, or what Southerton et al. (2011, p.1) refer to as *social* contexts in that they deal with “the social norms, cultural conventions, and shared understandings of consumer practices.” Social contexts should be understood both for their supportive as well as their constraining forces for recycling behaviors. For instance, social psychological factors such as perceptions of ‘purity’ in the home and the desire to be perceived by others as a “good provider” increase waste-generating behaviors and reduce the tolerance of in-home sorting practices, especially in the case of food waste (Visschers et al., 2016).

Southerton et al. (2011, p. 2) argue that targeting individual contexts alone “excludes social contexts in which individual decisions, attitudes, and choices are often understood and framed”. Nevertheless, among programs that use social innovations to promote pro-environmental behavior, there is a disproportionate focus on *individual* rather than *social* contexts. Social psychological factors such as perceptions of ‘purity’ in the home and the desire to be perceived by others as a “good provider” increase waste-generating behaviors and reduce the tolerance of in-home sorting practices, especially in the case of food waste (Visschers et al., 2016). The objective of the current research is to test the efficacy of interventions that target structural and social contexts of household waste management practices to improve OCP implementation.

The social intervention is based on theories from social psychology that considers human behavior an interaction between individual psychological states and the influence of the social context (Allport, 1985), the latter being largely undetected by individuals (Schwartz, 1977; Gardner & Stern, 2002). This field provides a crucial lens through which to understand, predict, and influence human behavior. The current research specifically draws on theories of social influence (Deutsch & Gerard, 1955), social norms (Cialdini et al., 1990), and social marketing (McKenzie-Mohr, 1999) discussed briefly below.

The social-psychological literature on pro-environmental behavior-change is largely characterized by laboratory-based (Deutsch & Gerard, 1955) and in-situ experiments (Carrico & Riemer, 2010) examining the social influences on individual behaviors and leverage points for change. These experiments target travel behaviors (DeGroot & Steg, 2007), energy and water conservation (Dietz, Gardner, Gilligan, Stern, & Vandenberg, 2009), litter prevention (Cialdini et al., 1990) and recycling (Hooper & Nielsen, 1991). Recently a small body of research has drawn on social-psychology to understand food-related behaviors including purchasing and waste-generating behaviors (Parizeau, von Massow, & Martin, 2015; Visschers et al., 2016). Only one study was found that focused on changing food waste separation behaviors using environmental messaging and in-kitchen separation devices (Bernstad, 2014). However, as discussed in Section 2 above, environmental and informative messaging frames yield worse results than normative ones (Osbaldiston & Schott, 2012). The current study is the first to test whether norm communication improves separation behavior in the context of curbside OCPs.

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