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How to enhance the sustainable disposal of harmful products

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ABSTRACT

The effectiveness of sustainable disposable schemes remains an unsolved issue for policy-makers. This paper investigates the factors that can enhance consumers' ability to dispose of potentially harmful products sustainably. In a field experiment we demonstrate that the physical proximity to a drop-off point enhances the sustainability of consumer disposal of harmful products. We show that the influence of proximity on disposal behaviour is magnified if the consequences of disposal are described using metaphors. An online experiment complements these findings by showing that processing fluency – the ease to process information - is the mechanism behind this effect. These results provide practical implications for policy-makers and managers who want to enhance sustainable disposal of harmful products, underlying the critical importance of the simplicity of the disposal initiatives and the need to strategically place drop-off bins throughout the city.

1. Introduction

The 12th Sustainable Development Goal emphasises that global sustainable development cannot be achieved if waste management is not viewed as a priority and if waste is not disposed properly (UN General Assembly, 2015). This claim is especially true with respect to technological and electronic waste (i.e., e-waste), which often contains hazardous substances, such as mercury, lead or acid (D'Adamo et al., 2020; Dwivedi et al., 2022; King and Boxall, 2019). In this study, we focus on the case of batteries, which is representative of this global problem (Filieri et al., 2021). In 2019, 205.000 tons of portable batteries were sold in Europe, of which only approximately 50 % were collected for recycling (Eurostat, 2022). The remaining 50 % of this material is often thrown into the trash and ends up in landfills without any treatment or special precautions, causing significant long-term damage to the environmental and human health. Adequate treatment of this waste is therefore an environmental necessity. However, this proper treatment cannot be accomplished without the active participation of consumers who must bring these harmful products to the correct recycling point.

Consumer involvement in the disposal of harmful products depends on both macroenvironmental variables, such as institutional communication and thus consumer information, and microenvironmental variables, such as the environment surrounding individuals, in particular the accessibility and simplicity of the recycling process (Trudel et al., 2016). Specifically, the literature has shown that urban spaces and the existence of suitable infrastructure can impact consumer waste disposal (Albinsson and Perera, 2009). However, for this infrastructure to function properly, it must be made accessible in the consumer's mind, which includes the implementation of appropriate communication to educate and persuade consumers to cooperate and dispose of harmful waste in the appropriate garbage cans (Gilal et al., 2019).

Although some previous work has focused specifically on the area of sustainable disposal, as yet, this literature appears to provide inconsistent or contradictory findings concerning the factors that influence recycling behaviour (DiGiacomo et al., 2018; Kumar, 2019). In addition, such research has focused primarily on household recycling behaviour, thus neglecting the disposal of harmful products (Gu et al., 2017). This lack of evidence regarding harmful e-waste-containing products is unfortunate for two reasons: i) the significant environmental impact of this waste and the fact that such waste, unlike household waste, tends to grow rather than shrink and ii) the additional consumer's effort to process this waste compared to recycling household waste. These peculiar characteristics require an ad hoc analysis of the disposal behaviour associated with electronic products.

In this study, we explore the factors that facilitate the sustainable disposal of e-waste. Specifically, we focus on physical proximity to drop-off bins and on way the information is presented. We examine how the physical proximity of urban bins encourages consumers to collect

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harmful waste and dispose it in the appropriate urban bins. We also demonstrate that the use of metaphor (i.e., a similarity between something that is difficult to understand to something that is concretely known) facilitates information processing fluency.

This research provides three main theoretical contributions.

First, we identify the importance of physical proximity in enhancing consumers' disposal of e-waste. Although a notable stream of literature has acknowledged the role played by convenience factors – such as proximity - in facilitating recycling intentions (Sidique et al., 2010), recent studies have observed the opposite effect and reported nonsignificant effects of convenience on recycling behaviour (Kumar, 2019; Wang et al., 2016). Given these contradictory findings, we investigate and prove the key role played by physical proximity in determining sustainable disposal.

Second, while the use of metaphors has been studied extensively in the context of advertising (see Septianto et al., 2022), no studies have tested its potential with respect to encouraging sustainable disposal. Frequently marketers employ numerical information in communications. In some cases, numerical information can be replaced by a metaphor that is understandable by a wider audience. For example, the urgency of the Amazon deforestation is described by the Guardian (2021) announcing that "The Amazon rainforest is losing about 10.000 acres a day" while BBC news (BBC, 2019) describes the issue by declaring "Football pitch of Amazon forest lost every minute". We show that the use of metaphors can help facilitate consumer understanding of such information and consequently enhance sustainable consumer disposal.

Third, the present study advances our knowledge concerning processing fluency, showing the key role of this factor in explaining sustainable behaviour. When consumers are able to process information easily, such communication drives positive recycling behaviour, i.e., the disposal of e-waste in the appropriate bins.

By demonstrating how communication can affect consumer disposal behaviour, this research provides companies and policy-makers with a useful instrument for increasing consumer sustainable disposal behaviour. Raising awareness of the importance of collecting e- waste among consumers and removing the barriers that hinder their involvement in this activity is of vital importance. Communication is a powerful tool for

Table 1
Main contributions on the factors that enhance sustainable disposal.

Determinant of sustainable disposal	Main Factor	Author	Product/ material	Main findings
Sociodemographic factors	Culture	Crociata et al., 2015	Generic waste	- Cultural access is a determinant of recycling.
	Age, gender, income	Cruz-Cárdenas and Arévalo-Chávez, 2018	Generic waste	- Age, gender, and income are among the relevant predictors of sustainable behaviour.
	Population size, household income level and political orientation	Seacat and Boileau, 2018	Solid waste	- Population size, household income level and political orientation play important roles in understanding the nuances underlying recycling behaviour.
	Age	Wang et al., 2020	Solid waste	- Age is the most important sociodemographic factor influencing public awareness of recycling.
Psychological factors	Identity	Trudel et al., 2016	Everyday product	- When an everyday product (e.g., paper, cups, aluminium cans) is linked to a consumer's identity, it is less likely to be trashed and more likely to be recycled.
	Inspiration Awareness	Winterich et al., 2019	Plastic	- Consumers are inspired by the transformation of recyclables into new products, which motivates them to recycle.
	Attitude Perceived control Subjective norms Individual responsibility	Kumar, 2019	*E*-waste	- Attitude (moderated by sense of duty), perceived control, subjective norms and individual responsibility influence e-waste recycling. - Convenience and awareness of consequences do not influence recycling.
	Nostalgia	Zhang et al., 2021	Paper	- Nostalgia induces a sense of meaning, which in turn encourages customers to recycle more. - Nostalgia induced by nostalgic product designs, nostalgic music, and nostalgic memories augment recycling intentions.
Contextual factors	Convenience Residential conditions Economic benefits	Wang et al., 2011	*E*-waste	- Convenience of recycling facilities and service, residential conditions and economic benefits are determinants of residents' willingness to engage in and behaviour in the context of e-waste recycling.
	Aesthetic cues	Wang et al., 2017	Paper, plastic, metal	- Cuteness encourages consumers to engage in prosocial and conservation behaviours.
	Convenience	DiGiacomo et al., 2018	Food	- Making recycling and composting convenient can significantly increase waste diversion. - Composting rates are affected more strongly by decreasing distance to composting bins than by providing residents with in-suite equipment.
	Monetary incentives	Alhassan et al., 2020	Solid waste	- Monetary incentives encourage consumers to engage in source waste separation.
Informational factors	Gain vs. loss-framed	White et al., 2011	Solid waste	- Loss frames are more effective when paired with low-level, concrete mind-sets, whereas gain frames are more effective when paired with high-level, abstract mind-sets in messages.
	Approach/avoidance	Lord, 1994	Solid waste	- A message that highlights the negative outcomes that can be avoided (saving trees, using less landfill spaces, conserving energy) is more effective than a message that emphasises the negative outcomes that would occur if nothing were done (damaging the landfill, the health of the family)
	Psychological distance	Barnes, 2019	Plastic waste	- Exporting plastic waste leads to psychological distance from plastic pollution, which increases plastic consumption
		Li et al., 2011	Generic waste	-Using current issues and personal experiences can lead to more sustainable beliefs and actions
Contextual and informational factors	Physical proximity and metaphors	Own study	*E*-waste	- Physical proximity to a drop-off point enhances sustainable disposal - The influence of proximity on disposal behaviour is magnified if the consequences of disposal are described using metaphors, because they enhance consumer processing fluency of information.

influencing people's behaviour: the thoughtful and responsible use of this lever can affect individuals' well-being and impact social development even with a limited investment of resources.

2. Sustainable disposal of products

A plethora of work has sought to identify the factors that affect recycling and sustainable disposal behaviour (for a review of the literature, see Li et al., 2019 or Principato et al., 2021). As shown in Table 1, previous work has identified four main determinants – two internal and two external – that drive sustainable waste disposal: i) the sociodemographic characteristics of consumers, ii) psychological factors, iii) contextual elements, and iv) information.

The sociodemographic characteristics of consumers, such as culture (Crociata et al., 2015), age, education and gender (Cruz-Cárdenas and Arévalo-Chávez, 2018; López-Mosquera et al., 2015), are considered to be pivotal in influencing consumer behaviour. Women, young people, and people with a high level of education are most inclined to recycle. The role of incomes in this context remains uncertain, as older studies have agreed that higher-income households tend to waste more than lower-income families (Osner, 1982), while more recent studies have reported the opposite result (Stancu et al., 2016).

Psychological factors such as environmental identity (Whitmarsh and O'Neill, 2010), self-concept (Trudel et al., 2016), nostalgia (Zeng et al., 2021), faith in humanity (Bowen et al., 2022), and hope (Chadwick, 2015) have also been proposed to explain the adoption of sustainable disposal. Many studies have employed the theory of planned behaviour (TPB) to highlight the roles played by attitudes, perceived control, and social norms in the development of positive intentions regarding recycling (Kumar, 2019; Wang et al., 2022). Other studies have emphasised the roles played by less conscious mechanisms such as emotions. For instance, feelings of guilt cause consumers to be more inclined to reduce their amount of waste.

External factors such as convenience, rewards, and incentives also influence consumer behaviour positively. In fact, in a situation in which the disposal of waste is easier or more convenient, consumers tend to dispose of products sustainably (Alhassan et al., 2020). Among the factors presented, the impact of information and message framing has received surprisingly little attention. As noted by White et al. (2019, p 30), this fact is surprising because "one is unlikely to engage in more deliberate forms of sustainable behaviour change if one is not informed about the problem, potential positive actions and possible consequences". Some research has focused on the use of persuasive appeals in communication to encourage sustainable disposal. For instance, highlighting the negative consequences that can be avoided by recycling (e.g., preserving the landscape) seems to be more effective than emphasising the negative consequences that can occur if one does not recycle (e.g., destroying the landscape). Other studies have focused on gain (i.e., what is gained by adopting the behaviour) versus loss (i.e., what is lost by not adopting the behaviour) messages. These studies have found that loss-type messages are particularly effective when coupled with concrete information concerning how to recycle (White et al., 2011). However, the results of this research appear to be challenged to some degree by Griskevicius et al. (2012), who noted that such messages can be perceived as coercive and thus encourage defiance. An important and understudied element that seems to influence the effects of these messages, regardless of their form, is the concreteness of the message. As noted by Griskevicius et al. (2012), p. 118, "People disregard problem they cannot see or feel". In response to this issue, some research has highlighted the fact that communications clarifying the specific effects of pro-environmental behaviours can appear to be more concrete and are therefore more effective (Leiserowitz, 2006; Scannell and Gifford, 2013). Other studies have shown that referencing recent climate events can also increase the effectiveness of communication (Li et al., 2011).

In this research, we propose that the use of metaphors in messages can make complex communications - such as those associated with encouraging the recycling of e-waste - more effective. We propose that metaphors make it easier to represent the potential effects of behaviour that does not promote the sustainable disposal of waste and that this ease of representation increases processing fluency and therefore message effectiveness.

3. Conceptual framework

3.1. Physical proximity and sustainable disposal

Convenience represents the perceived savings in terms of time and effort that must be expended to accomplish a task, solve a problem, or exploit favourable circumstances (Farquhar and Rowley, 2009). Convenience can affect consumer decision-making their use of a service and influence their acquisition, consumption, and disposal of products. Physical proximity is a major component of convenience and represents a state of located spatially nearby a collection point. Although it is reasonable to believe that proximity enhances disposal intentions (González-Torre and Adenso-Díaz, 2005), the literature has reported contradictory results (Kumar, 2019).

On the one hand, a stream of literature has acknowledged the role played by proximity – and convenience more generally - in facilitating recycling intentions. Scholars who have endorsed this idea have proposed that greater distances to recycling bins cause the act of recycling to be perceived as more complex, labour intensive, and time-consuming (Sorkun, 2018), thus deterring-consumers from disposing of a product sustainably, especially for nonrecyclers (Sidique et al., 2010).

On the other hand, recent studies have suggested that proximity may not be effective with respect to affecting recycling behaviours (Kumar, 2019; Ramayah et al., 2012), although it may have an effect on recycling intentions and planning (Rhodes et al., 2015). These contradictory findings reported in the literature may be due to the self-reported measurement of recycling intentions employed in the relevant studies as well as to potential factors that moderate the effect of proximity on consumer behaviour (DiGiacomo et al., 2018). In this research, we anticipate that proximity facilitates consumers' recycling intention and behaviour and represents an important driver of the sustainable disposal of harmful products. The distance to a drop-off centre can require special effort on the part of consumers who must walk to the centre, thus increasing the perceived effort of product disposal. If the distance requires the use of a means of transportation, this situation causes an expenditure of time in addition to monetary inputs, including the requirement of access to a vehicle or other operating costs (Wagner, 2011). The relevance of proximity is even more influential in the case of harmful products - such as batteries – that are usually consumed at home and that must be collected and subsequently disposed of outside the house. For these reasons, we expect that consumers whose household is located close to a disposal drop-off bin are more inclined to dispose of products in the appropriate bins. Conversely, we expect that consumers who reside far away from a drop-off bin are more resistant to the sustainable disposal of harmful products. More formally, we propose the following:

H1. Physical proximity to the disposal location influences sustainable disposal on the part of consumers. Specifically, compared to low proximity, high proximity enhances consumer sustainable disposal.

3.2. The use of numbers and metaphors in communication

Making a behaviour accessible and easy to perform is a good way of promoting action, but it is not sufficient if consumers have little knowledge concerning why they should engage in such behaviour (Iyer and Kashyap, 2007; White et al., 2019). Lack of knowledge or understanding of the risks that are associated with unsustainable behaviour or lack of clarity with respect to information regarding these risks can contribute to poor implementation of sustainable behaviours (White

et al., 2019). In brief, if a behaviour is easy to perform but individuals do not understand its utility, there is a high risk that the behaviour will not be performed.

The intentions and behaviours of consumers towards the sustainable disposal of waste can therefore be influenced by messages concerning disposal schemes. The effectiveness of such messages largely depends on the way in which the information is described and conveyed to consumers. Frequently, information that is aimed at the improvement of sustainable behaviours includes numbers to highlight the importance of the phenomenon. The literature has emphasised the usefulness of including numerical information in communication. Numbers objectively quantify the environmental impacts of behavioral choices and frequently serve as inputs for decision-making. Indeed, numbers serve as the foundation for most decisions that we make throughout our daily lives (Adaval et al., 2013). In the context of marketing, numerical information is particularly relevant because consumers rely on such information for their evaluations and decisions (Lembregts and Pandelaere, 2019). However, although using numerical information is effective in some cases, e.g., consumers are more inclined to reduce the number of calories in the food they order when the menu includes numeric calorie labels (VanEpps et al., 2016), in other situations, such information can be difficult to comprehend and quantify, such as when consumers read units of measurement with which they are unfamiliar or when the magnitude of numbers is difficult to grasp. The comprehension of quantities can be enhanced by elements that facilitate message comprehensibility and representation (Pieters et al., 2010). The literature has highlighted the key role played by figurative or metaphorical associations in improving or encouraging the understanding of complex information, such as large quantities or measurements (Barone et al., 2022; Dehay and Landwehr, 2019). A metaphor is "a figure of speech that involves comparison between two objects" (Lee et al., 2019, p. 1175) that "transfers the features of one object to the other" (Septianto et al., 2022, p. 952). Metaphors cause individuals to infer an analogy between two objects that are structurally or physically similar. Hence, metaphors convey a similarity between something that is well known or concretely known and something that is less understandable or more complex and obscure (Bremer and Lee, 1997). As a result of their ability to increase the effectiveness of messages, metaphors have been used widely in communication – especially in advertising – to explain complex or technical products, influence consumer beliefs and attitudes, and even alter their behaviour with great effectiveness (Luffarelli et al., 2021; Van Rompay and Veltkamp, 2014). The point of utilising metaphors is to employ elements that the individual knows and can therefore easily represent. This approach facilitates the understanding of things that are complex and difficult to represent mentally because they are too large or too distant from the individual's lived reality (Santana et al., 2020). One reason for the effectiveness of messages employing metaphors is that they elicit mental imagery (Septianto et al., 2022), i.e., a visual representation of an object in the consumer's mind that makes an abstract object more concrete and easier to understand (Huang and Ha, 2020). This reason is why metaphors have been extensively used by salespeople to describe products to consumers (Gilliam and Rockwell, 2018).

Against this backdrop, we argue that metaphorical information is useful for persuading consumers to sustainably dispose of harmful products when they are close to a disposal drop-off. Indeed, when the proximity to a drop-off bin is high, consumers are encouraged to adopt a practical mindset, which causes them to seek out practical and clear information (White et al., 2011). Therefore, consumers prefer to receive concrete information regarding the disposal of products. In particular, the use of metaphorical information can ease the understanding of a message compared to the use of technical numerical information, which might be difficult to process. Hence, we hypothesise the following:

H2. The use of metaphorical (vs. numerical) information moderates the effect of proximity on sustainable disposal. Specifically, when a consumer is close to a drop-off bin, metaphorical information enhances sustainable disposal.

3.3. Processing fluency

We claim that when a drop-off bin is located close to the consumer's home, the consumer prefers to read information regarding the disposal of harmful products that is presented in a metaphorical way. We propose that this effect can be explained in terms of the processing fluency of information. Processing fluency represents the subjective experience of the ease or difficulty of processing information (Mauri et al., 2021). The processing of information is considered to be fluent when it is cognitively easy or instantaneous. A lack of fluency occurs when the consumer experiences a difficult cognitive process (Invernizzi et al., 2021). Processing fluency can be facilitated or obstructed by various aspects of the information, such as visual clarity (Silva and Topolinski, 2018), complexity (Graf et al., 2018), or message framing (Sarkar et al., 2022). The ease of processing information is particularly important for marketers, as it predicts consumer judgments and choices. A critical aspect of processing fluency is the fact that the processing experience "conveys that what one does is easy or difficult" (Schwarz et al., 2021, p. 5), thus determining the willingness of consumers to engage in a specific action or complete a specific task. In the context of sustainable disposal, we expect processing fluency to explain the effect of proximity and information description on sustainable disposal. As discussed previously, metaphors are used "to make abstract concepts more concrete and comprehensible by explaining the abstract concept in terms of a figurative thing that is open to intuitive experience" (Dehay and Landwehr, 2019, p. 290). Therefore, metaphors ease decision-making and facilitate processing because they make abstract concepts more concrete and thus more understandable (Cian et al., 2015).

Accordingly, when a consumer is encouraged to dispose of a product in a drop-off bin that is located close to her or his home, the use of metaphorical information in the message facilitates the processing of the information itself, thereby fostering sustainable disposal. Namely, for the message to have an effect on consumers, they must perceive the task as easy to accomplish. For such a perception to emerge, the message must be concrete and understandable to consumers. Indeed, the use of metaphors helps the consumer understand and process the information, especially when she or he exhibits a concrete mindset. In other words, if a message that promotes sustainable disposal is easy to process, the consumer is more willing to dispose of the product in the convenient bin when he or she is located close to the bin. If the message is difficult to comprehend, the consumer is less likely to dispose of the product sustainably. Formally, we predict the following:

H3. The impact of the interaction between proximity and information description on sustainable disposal is mediated by processing fluency.

4. Overview of the studies

We conducted two experimental studies to test our hypotheses. Study 1 was a field experiment that tested the effects of proximity and information description on consumer sustainable disposal. Study 2 confirmed the results of Study 1 by identifying processing fluency as the underlying mechanism that explains such an effect.

The use of both a field experiment and an online experiment ensured the internal and external validity of the results and enabled us to obtain more robust findings (Viglia and Dolnicar, 2020). Fig. 1 presents the overarching logic of the framework and hypotheses tested in the studies.

5. Proximity and information description manipulation

To define the manipulation of proximity (high vs. low), we conducted a pretest and an additional pilot test. Fifty Italian consumers (Mage 26; 53 % female) were included in the pretest. We recruited these

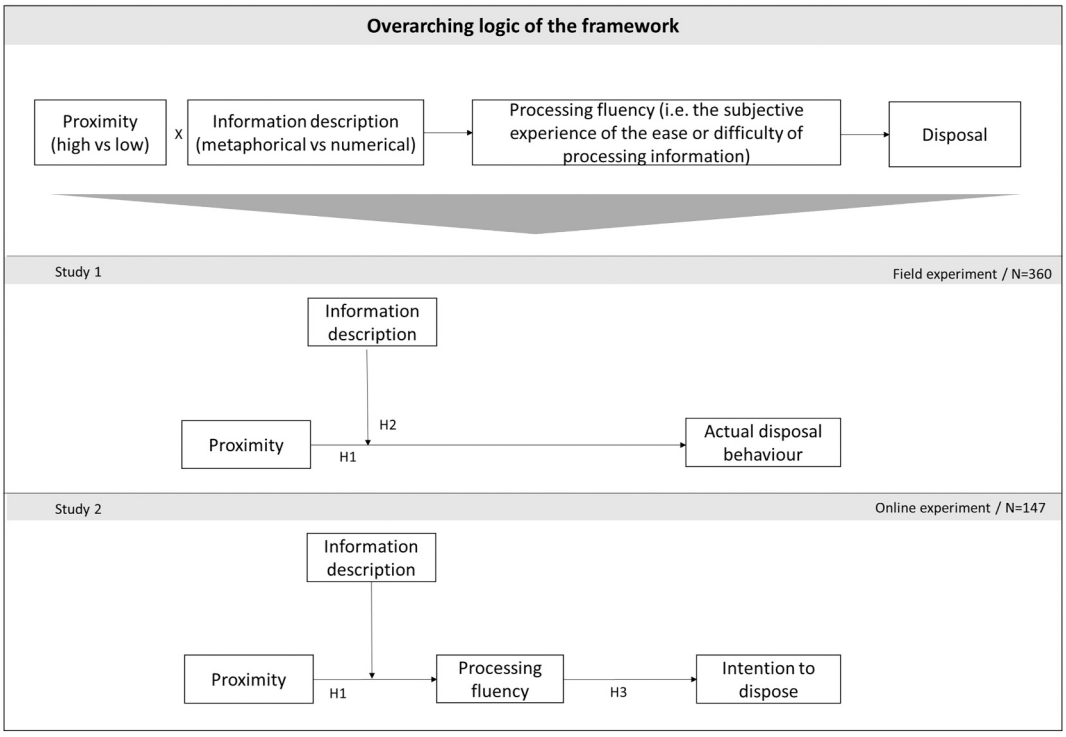

Fig. 1. The proposed conceptual framework for the research.

participants via the ProlificAcademic (ProA) online crowdsourcing platform given that its participants produce higher-quality data compared to other platforms (Peer et al., 2017). We asked participants to indicate the maximum distance between the drop-off bin and the home that they were realistically willing to travel to dispose of exhausted batteries in specific bins. The smallest distance (50 m) and the largest distance (5 km) indicated by respondents were chosen for the manipulation of low and high proximity in the experiment, respectively.

We also asked participants to indicate their willingness to dispose of batteries in the specific bin at the distance they indicated and at the distance they indicated plus 1 km. Intention to dispose of batteries was measured by adapting the scale developed by Grazzini et al. (2018). Thus, we asked respondents to express their level of agreement with the following statements: 1) I am likely to dispose of the batteries in the appropriate bin; 2) I am inclined to dispose of the batteries in the appropriate bin; and 3) I am willing to dispose of the batteries in the appropriate bin. We conducted a *t*-test, noting that participants indicated a higher degree of willingness to dispose of batteries in the specific bin at the distance they indicated compared to the increased distance ($M_{indicated} = 6.49$, $M_{increased} = 5.22$, $p < 0.01$).

In the additional pilot study, we tested the validity of the manipulation of proximity, which was developed by reference to the findings of the prestudy (high proximity = 50 m; low proximity = 5 km). One hundred Italian participants were recruited via ProA for inclusion in the pilot study (Mage 27; 58 % female). Participants were randomly assigned to one of the two treatment conditions (high vs. low proximity). They were asked to indicate the perceived proximity of the bin using Lange et al.'s (2014) 7-point Likert scale (how distant from your home is the bin for disposal of your batteries? 1 = very far away; 7 = very close). The results confirmed the intended effect of our manipulation of the bin's proximity. Participants in the high proximity condition indicated higher proximity of the bin compared to participants in the low proximity condition ($M_{high} = 6.57$, $M_{low} = 6.23$, $p < 0.01$). To suggest some preliminary insights into the impact of proximity on the willingness of consumers to sustainably dispose of batteries, we measured participants' intention to dispose (Grazzini et al., 2018). The results of a one-way ANOVA showed that proximity to the disposal location increases consumers' sustainable disposal intention ($M_{high} = 4.63$, $M_{low} = 2.07$, $p = 0.02$), thus providing initial support for H1.

The information included in the message was manipulated in terms of metaphorical vs. numerical information with respect to the negative consequences of unsustainable disposal. Specifically, we focused on metaphorical information that could help the consumer quantify the size of the damage in her or his mind. In contrast, numerical information provides a straightforward quantification of the damage. We prepared a letter signed by the mayor that consumers were to imagine receiving at home; the letter informed them of the new disposal scheme (see Appendix). In the metaphorical scenario, respondents read the following: "Consider the fact that a battery contains approximately one gram of mercury, an amount that can pollute a quantity of water equivalent to *7 bathtubs*. Given the fact that in Italy, few batteries are disposed of sustainably, we risk polluting the equivalent of *140 Olympic swimming pools* every year". The numerical information scenario included the following: "Consider the fact that a battery contains approximately one gram of mercury, an amount that can pollute a quantity of water equivalent to *1.000 litres*. Given the fact that in Italy, few batteries are disposed of sustainably, we risk polluting approximately *354.000.000 litres* of water every year". We tested the validity of the manipulation via ProA. We asked the participants to imagine that the municipality of the city in which they lived had installed bins for the disposal of exhausted batteries throughout the city. Relatedly, a letter was sent to citizens to inform them of the initiative, an extract from which was presented. Subsequently, we asked the participants to read the letter carefully and answer questions regarding the initiative. Sixty participants were included in the pilot study (Mage 28; 50 % female). Participants were randomly assigned to one of the two treatment conditions (metaphorical vs. numerical information). They were asked to assess how easy it was for them to represent in their mind the quantity of water polluted by exhausted batteries (1 = extremely difficult; 7 = extremely easy). The results of the *t*-test confirmed the validity of the manipulation, with respondents who were exposed to the metaphorical information scenario reporting higher values than respondents who were exposed to the

numerical information scenario (Mmetaphorical = 5.27, Mnumerical = 4.37, $p = 0.05$).

6. Study 1

6.1. Data collection, design, and procedures

In Study 1, we tested the effect of proximity (high vs. low) on disposal behaviour (H1) and the moderating effect of information description (metaphorical vs. numerical) (H2). We expected that consumers who lived close to the disposal bin would dispose of higher quantities of harmful waste than consumers whose place of residence was more distant. The study was conducted in a town of Northern Italy in April 2022. The municipality installed bins to collect exhausted batteries throughout the town and informed the consumers of the new scheme. We collaborated with the municipality to create and send the letter to consumers to inform them of the new disposal scheme for exhausted batteries. We manipulated the information description as described previously, and we randomly sent the letters to consumers' homes. Alongside the letter, we sent a small bag to consumers that they were required to use when disposing of exhausted batteries. Each bag included an identification code that enabled us to identify the consumer who disposed of the exhausted batteries. Consistent with our pilot test, we considered consumers to be in the high proximity condition when their residence was located closer than 5 km to a disposal bin. We considered consumers to be in the low proximity condition when their residence was 5 km or more from a disposal bin. After a period of two weeks, we collected the bags from each bin and measured the disposal rates of consumers. Specifically, we measured the proportion of batteries disposed of in the bin with respect to the assumed number of batteries in the household. The sustainable disposal rate was measured according to a 0–0.25-0.5-0.75-1 index, where 0 corresponded to the complete absence of disposal behaviour, 1 corresponded to the maximum possible disposal behaviour, and intermediate values corresponded to situations of partial disposal behaviour (Grazzini et al., 2018).

6.2. Results

After a period of two weeks, we collected 360 observations (Mage 42; female 32 %). More than half of the participants belonged to households that included >1 person (60 %). Approximately the same proportion of consumers was included in the high proximity (52 %) and low proximity (48 %) conditions. Half of the consumers each were assigned to the metaphorical information (50 %) and numerical information (50 %) conditions. First, we verified the effect of proximity on disposal behaviour. Consumers in the high proximity condition showed a significantly ($p < 0.01$) higher disposal rate (52 %) than consumers in the low proximity condition (40 %). The interaction effect of proximity and information description was also significant ($p = 0.03$). Consumers in the high proximity condition showed a higher disposal rate when the message included metaphorical information (59 %) than when it included numerical information (44 %). We introduced gender, age, and household as control variables, but only gender was significant ($p = 0.03$), with females demonstrating a higher rate of sustainable disposal behaviour (see Fig. 2).

7. Study 2

7.1. Data collection, design, and procedures

Study 2 was a between-subjects experiment featuring proximity as the independent variable and information description of the message as the moderator (metaphorical vs. numerical). We collected data via ProA in May 2022. We asked the participants to imagine that the municipality of the city in which they lived had installed bins for the disposal of exhausted batteries throughout the city. Relatedly, a letter was sent to citizens to inform them of the initiative, an extract from which was presented. Subsequently, we asked the participants to read the letter carefully and to answer questions regarding the initiative. Because respondents in online experiments must be asked to imagine a hypothetical situation (Viglia and Dolnicar, 2020), we manipulated physical proximity (high vs. low) by indicating to respondents the precise distances between the closest bin and their homes (50 m vs. 5 km) – consistent with the pilot test – to facilitate their comprehension of the scenario. The information description of the message was manipulated by using metaphorical vs. numerical information in the letter regarding the consequences of unsustainable disposal. The respondents were randomly assigned to one of the four conditions. We measured processing fluency using the bipolar 1-item scale developed by Graf et al. (2018) (the disposal of batteries in the appropriate bin is difficult/easy). As in the pilot study, we measured intention to dispose ($\alpha = 0.87$) by adapting the scale of Grazzini et al. (2018). We checked the manipulation of the information description by asking participants to indicate how easy it was for them to represent in their minds the quantity of water that was polluted by exhausted batteries (1 = extremely difficult; 7 = extremely). Finally, we asked the respondents to report their ages and genders.

7.2. Results

One hundred eighty-nine participants were included in Study 1 (Mage 39; female 71 %). The manipulation of information description

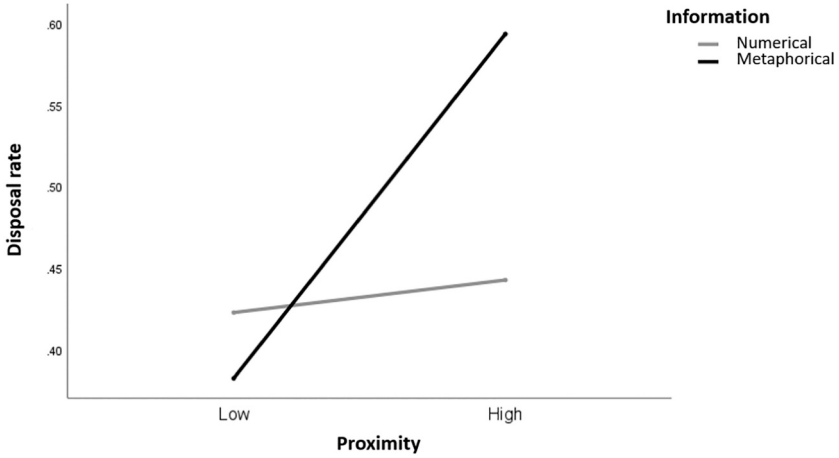

Fig. 2. The interaction effect of physical proximity and information description.

was confirmed via a *t*-test, which asked respondents to express the ease with which they were able to quantify the amount of water polluted by exhausted batteries (Mmetaphorical = 5.52, Mnumerical = 3.76, $p < 0.001$) when exposed to the metaphorical (vs. numerical) manipulation. First, we conducted a one-way ANOVA to assess the direct effect of proximity on intention to dispose. The respondents in the high proximity condition showed a stronger intention to dispose of the batteries than the respondents in the low proximity condition (Mhigh = 6.50, Mlow = 6.06, $p = 0.005$), thus confirming H1. Subsequently, we conducted a 2 × 2 two-way ANOVA to evaluate the interaction effect of proximity of the message x information description, which indicated a significant effect on processing fluency [$F(1, 188) = 6.95$, $p = 0.02$; $\eta^2 = 0.031$]. Specifically, when respondents were exposed to the high proximity scenario, a message including metaphorical information led to greater ease of processing information than in the context of the numerical information message (Mmetaphorical = 6.31, Mnumerical = 5.85, $p = 0.04$). Finally, we employed a moderated mediation test employing a bias-corrected bootstrap procedure (Hayes's Model 7; $n = 10{,}000$). We used Hayes' PROCESS macro featuring proximity as the independent variable, information description as moderator, processing fluency as the mediator, and intention to dispose as the dependent variable. The analysis showed a significant index of moderated mediation (c': $\beta = -0.23$; CI 95 % [−0.40; −0.02]), thus confirming H3. In particular, proximity had a significant and positive effect on processing fluency ($\beta = 0.694$, SE = 0.22, $t = 3.14$, $p = 0.001$). In turn, processing fluency had a significant and positive effect on the intention to dispose sustainably ($\beta = 0.24$, SE = 0.06, $t = 3.71$, $p < 0.001$). Proximity was no longer a significant predictor of intention to dispose after controlling for processing fluency, thus indicating the full mediation of processing fluency.

8. General discussion

The harmful consequences of unsustainable waste disposal are acknowledged by both scholars and practitioners. New technologies make the recycling of harmful products such as e-waste more economical and safer and thus represent a favourable opportunity to limit damage to the environment and human health. For the success of recycling initiatives, the engagement of consumers in disposal schemes is crucial (Zhang et al., 2019). For this reason, it is essential to understand the elements that encourage and facilitate consumers' sustainable disposal of e-waste. Previous research has mainly analysed the demographic and psychological factors that predict consumer intention to dispose sustainably (Principato et al., 2021), thus overlooking the impact of relevant external factors such as information, and has produced contrasting results concerning the role of proximity. Against this backdrop, we analyse the roles of physical proximity and information description in boosting sustainable disposal, and we identify processing fluency as the mechanism that explains this effect. Specifically, the field experiment (Study 1) shows how physical proximity to a drop-off bin enhances the sustainability of consumer disposal. This effect is magnified by the use of metaphorical information that can help consumers quantify the consequences of unsustainable disposal. The online experiment (Study 2) sheds light on the underlying mechanism that increases consumer intention to dispose of harmful waste (i.e., processing fluency). When messages that promote sustainable disposal are easy to process, the consumer is more inclined to dispose of the product in the convenient bin when he or she is close to the bin. In contrast, when such information is difficult to understand, the consumer is less likely to dispose of the product sustainably.

8.1. Implications for theory, practice and policy

These findings have important implications for both scholars and practitioners. First, we demonstrate the importance of physical proximity in enhancing consumers' disposal of harmful products. The extant literature has provided contradictory results concerning the effects of proximity: if, in some cases, proximity seems to foster sustainable disposal (Sidique et al., 2010), in other cases, it does not have any significant effect (Wang et al., 2016). The literature in this field has relied on data largely drawn from questionnaires, interviews, or reported behaviour (Fami et al., 2021), and field studies conducted in real-world settings have been scarce (Wang et al., 2020; Wu et al., 2018). Given the gap that frequently exists between consumers' intentions and their actions, especially in terms of sustainable behaviour, it is important to examine the actual implementation of consumers' intentions (Viglia et al., 2021). Thus, by conducting a field experiment, we demonstrate that physical proximity to the disposal location influences sustainable consumer disposal. Compared to low proximity, high proximity enhances sustainable consumer disposal. Second, we advance the literature concerning sustainable disposal by demonstrating the importance of information description with respect to the effectiveness of the disposal scheme. Although the use of numerical information can be successful in certain circumstances, it can also limit the consumer's understanding of a message if the quantity expressed by the numbers is difficult to represent mentally. This situation can occur when the relevant numbers are too large or too far removed from the individual's experience. Metaphorical information, in contrast, can aid consumers in representing quantities by employing elements with which consumers are familiar and which they can easily represent in their minds. We demonstrate that the use of metaphors to ease the processing of information enhances the sustainability of consumer disposal when consumers are close to the drop-off bin. Third, we advance our knowledge related to processing fluency, highlighting the central role of this factor in increasing sustainable disposal. We find that when consumers experience information processing as easy, they are more prone to dispose of harmful products sustainably. This evidence sheds light on the importance of facilitating consumers' understanding of information to encourage them to engage in sustainable actions. Our study has some implications that can be useful for managers and policy-makers in the implementation of effective disposal schemes. On the one hand, as physical proximity is relevant to boosting pro-environmental disposal, practitioners should design the number and positioning of drop-off bins in such a way as to reduce their distance from as many households as possible. On the other hand, practitioners should employ effective means of communication to inform consumers of sustainable disposal initiatives. We show that the simplicity with which information is shared can have a powerful influence on consumers' actions. Developing a clear and accessible message can affect the success of the disposal schemes.

8.2. Limitations and future research directions

We acknowledge that our research faces certain limitations that can offer opportunities for future studies. First, our field study was conducted during the first phase of the disposal initiative, and we collected data over a two-week period. However, the behaviours of consumers can change over time or in accordance with past actions. The literature has suggested that performing a sustainable action can lead to less sustainable future decisions because of the perceived progress towards a goal that triggers a perceived licence to engage in negative behaviour – the so-called licensing effect (Karmarkar and Bollinger, 2015). Thus, it may be possible that, following an initial motivation to dispose of waste sustainably, consumers feel legitimated to engage in more indulgent behaviour. Future studies could observe disposal behaviour over a longer period of time to examine whether licensing behaviours occur. Second, we study the use of metaphors to facilitate consumers' understanding of information pertaining to large quantities that can be difficult to represent. However, we expect the effectiveness of metaphors to decrease when consumers are related to small numbers or quantities that consumers encounter throughout their daily lives. Indeed, in these cases, metaphors could even complicate how people process information. For instance, is metaphorical information useful when providing information concerning money? Is it better to express a monetary value using

numerical information or metaphorical information such as the number of bags? We suggest that further studies should be conducted in this area. Besides metaphors, we analysed the notion of information description without including other potential aspects of message framing that can influence consumer sustainable behaviour. For instance, since physical proximity enhances sustainable disposal, can policy-makers use a message to increase *perceived* proximity regardless of *actual* proximity? What are the best strategies for strengthening perceived proximity to drop-off bins? Furthermore, an emerging stream of research emphasises the power of visuals (vs. text) in prompting sustainable behaviour (Zeng et al., 2021). Can visual elements help consumers easily process information related to disposal behaviour? Can images serve as an effective metaphor to facilitate the understanding of complex information? These findings help managers and policy-makers to effectively frame sustainable disposal messages.

Finally, we investigated the disposal of exhausted batteries in specific bins installed throughout the city. Indeed, many municipalities provide consumers with drop-off points where they can bring their e-waste for recycling. However, in some cities, retailers provide a system that allows all customers buying new electrical equipment the opportunity to recycle their old items free of charge. Supermarkets or other shops support local communities by providing recycling facilities for electrical equipment. In this case, consumers may bring e-waste and dispose it. Is physical proximity still relevant in this case? Are other contextual factors more impactful in nudging consumers to recycle their exhausted batteries? We leave the answers to these lingering questions to future studies.

9. Conclusion

The rapid accumulation of technological waste poses severe risks to human and environmental health. Consequently, managers and policy-makers need to find effective ways to enhance the consumer sustainable disposal of e-waste. In two experiments we show the critical importance of physical proximity and communication simplicity for successful sustainable disposal initiatives. The field experiment has helped to overcome the potential intention-behaviour gap that often exists in sustainable consumption. The online study has shed light on the psychological mechanism that explains disposal behaviour. As a core contribution, we demonstrate that the physical proximity to the disposal location and the communication of disposal initiatives considerably impact consumers' disposal of harmful products. In particular, we show that metaphors represent an effective instrument to ease the processing of information and, in turn, to enhance the sustainability of consumer disposal. Indeed, metaphors elicit mental imagery that facilitates consumers in understanding complex information or depict quantities that are difficult to measure or represent. Our findings represent a valuable starting point to advance scientific knowledge on this topic. Specifically, we marked three main potential areas for future research that are related to when, how and where sustainable disposal occurs.

Appendix A. Manipulation of information description

Metaphorical information scenario

CRediT authorship contribution statement

Diletta Acuti: Conceptualisation, Methodology, Formal analysis, Writing

Linda Lemarié: Definition, Conceptualisation, Writing

Giampaolo Viglia: Writing, Validation, Supervision, Project administration

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Declaration of competing interest

All authors declare that they have no conflict of interest.

Data availability

Data will be made available on request.

Dear Fellow citizen,

This letter is to inform you that starting from next week you can find new bins located in your city for the collection of exhausted batteries. The initiative was carried out to allow citizens to have urban collection points for exhausted batteries to facilitate sustainable disposal.

Incorrect disposal of batteries can cause irreparable damage to the environment and people's health. Consider the fact that a battery contains approximately one gram of mercury, an amount that can pollute a quantity of water equivalent to **7 bath tabs**. Given that in Italy few batteries are disposed of sustainably, we risk polluting the equivalent of **140 Olympic swimming pools** every year.

Before disposing of the batteries in the specific bins, remember to put them in the appropriate envelope that is delivered with this letter. We trust in your cooperation: collecting and disposing of batteries correctly preserves our health and our environment.

Thank you for your attention.

Kind regards,
The Mayor

Numerical information scenario

Dear Fellow citizen,

This letter is to inform you that starting from next week you can find new bins located in your city for the collection of exhausted batteries. The initiative was carried out to allow citizens to have urban collection points for exhausted batteries to facilitate sustainable disposal.

Incorrect disposal of batteries can cause irreparable damage to the environment and people's health. Consider the fact that a battery contains approximately one gram of mercury, an amount that can pollute a quantity of water equivalent to **1.000 litres**. Given that in Italy few batteries are disposed of sustainably, we risk polluting approximately **354.000.000 litres** of water every year.

Before disposing of the batteries in the specific bins, remember to put them in the appropriate envelope that is delivered with this letter. We trust in your cooperation: collecting and disposing of batteries correctly preserves our health and our environment.

Thank you for your attention.

Kind regards,
The Mayor

References

Adaval, Rashmi, Pandelaere, Mario, Briers, Barbara, Lembregts, Christophe, Bagchi, Rajesh, Li, Xingbo, Monga, Ashwani, et al., 2013. Numerosity and consumer behavior. J. Consum. Res. 39 (5).

Albinsson, P.A., Perera, B.Y., 2009. From trash to treasure and beyond: the meaning of voluntary disposition. J. Consum. Behav. 8 (6), 340–353.

Alhassan, H., Kwakwa, P.A., Owusu-Sekyere, E., 2020. Households' source separation behaviour and solid waste disposal options in Ghana's Millennium City. J. Environ. Manag. 259, 110055.

Assembly, U.N.General, 2015. Transforming Our World: The 2030 Agenda for Sustainable Development. A/RES/70/1, available at. https://www.refworld.org/docid/57b6e3e44.html. (Accessed 15 October 2022).

Barnes, S.J., 2019. Out of sight, out of mind: Plastic waste exports, psychological distance and consumer plastic purchasing. Glob. Environ. Chang. 58, 101943.

Barone, M.J., Coulter, K.S., Kulow, K., Li, X., 2022. Location, location, location: when and how low price locations improve consumer price perceptions. Psychol. Mark. 39 (6), 1190–1203.
BBC, 2019. 'Football Pitch' of Amazon Forest Lost Every Minute. Available from. https://www.bbc.co.uk/news/science-environment-48827490.
Bowen, K.T., Musarra, G., Ou, Y.C., 2022. How and when narcissism and faith in humanity drive sustainable consumption. Psychol. Mark. 39, 1706–1724.
Bremer, K., Lee, M., 1997. Metaphors in marketing: review and implications for marketers. ACR North Am. Adv. 24, 419–424.
Chadwick, A.E., 2015. Toward a theory of persuasive hope: effects of cognitive appraisals, hope appeals, and hope in the context of climate change. Health Commun. 30 (6), 598–611.
Cian, L., Krishna, A., Schwarz, N., 2015. Positioning rationality and emotion: rationality is up and emotion is down. J. Consum. Res. 42 (4), 632–651.
Crociata, A., Agovino, M., Sacco, P.L., 2015. Recycling waste: does culture matter? J. Behav. Exp. Econ. 55, 40–47.
Cruz-Cárdenas, J., Arévalo-Chávez, P., 2018. Consumer behavior in the disposal of products: forty years of research. J. Promot. Manag. 24 (5), 617–636.
D'Adamo, I., Gastaldi, M., Rosa, P., 2020. Recycling of end-of-life vehicles: assessing trends and performances in Europe. Technol. Forecast. Soc. Chang. 152, 119887.
Dehay, E.K., Landwehr, J.R., 2019. A MAP for effective advertising: the metaphoric advertising processing model. AMS Rev. 9 (3), 289–303.
DiGiacomo, A., Wu, D.W.L., Lenkic, P., Fraser, B., Zhao, J., Kingstone, A., 2018. Convenience improves composting and recycling rates in high-density residential buildings. J. Environ. Plan. Manag. 61 (2), 309–331.
Dwivedi, Y.K., Hughes, L., Kar, A.K., Baabdullah, A.M., Grover, P., Abbas, R., Wade, M., 2022. Climate change and COP26: are digital technologies and information management part of the problem or the solution? An editorial reflection and call to action. Int. J. Inf. Manag. 63, 102456.
Eurostat, 2022. Waste Statistics - Recycling of Batteries and Accumulators. Available from. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics_-_recycling_of_batteries_and_accumulators&stable=0#:~:text=Highlights&text=In%202019%2C%2051%25%20of%20portable,EU%20were%20collected%20for%20recycling.&text=In%202019%2C%20205%20000%20tonnes,as%20waste%20to%20be%20recycled. (Accessed 6 August 2022).
Fami, H.S., Aramyan, L.H., Sijtsema, S.J., Alambaigi, A., 2021. The relationship between household food waste and food security in Tehran city: the role of urban women in household management. Ind. Mark. Manag. 97, 71–83.
Farquhar, J.D., Rowley, J., 2009. Convenience: a services perspective. Marketing theory 9 (4), 425–438, 2009.
Filieri, R., Javornik, A., Hang, H., Niceta, A., 2021. Environmentally framed eWOM messages of different valence: the role of environmental concerns, moral norms, and product environmental impact. Psychol. Mark. 38 (3), 431–454.
Gilal, F.G., Zhang, J., Gilal, N.G., Gilal, R.G., 2019. Linking self-determined needs and word of mouth to consumer e-waste disposal behaviour: a test of basic psychological needs theory. J. Consum. Behav. 18 (1), 12–24.
Gilliam, D.A., Rockwell, C.C., 2018. Stories and metaphors in retail selling. Int. J. Retail Distrib. Manag. 46 (6), 545–559.
González-Torre, P.L., Adenso-Díaz, B., 2005. Influence of distance on the motivation and frequency of household recycling. Waste Manag. 25 (1), 15–23.
Graf, L.K., Mayer, S., Landwehr, J.R., 2018. Measuring processing fluency: one versus five items. J. Consum. Psychol. 28 (3), 393–411.
Grazzini, L., Rodrigo, P., Aiello, G., Viglia, G., 2018. Loss or gain? The role of message framing in hotel guests' recycling behaviour. J. Sustain. Tour. 26 (11), 1944–1966.
Griskevicius, V., Cantú, S.M., Van Vugt, M., 2012. The evolutionary bases for sustainable behavior: implications for marketing, policy, and social entrepreneurship. J. Public Policy Mark. 31 (1), 115–128.
Gu, F., Guo, J., Yao, X., Summers, P.A., Widijatmoko, S.D., Hall, P., 2017. An investigation of the current status of recycling spent lithium-ion batteries from consumer electronics in China. J. Clean. Prod. 161, 765–780.
Huang, R., Ha, S., 2020. The role of need for cognition in consumers' mental imagery: a study of retail brand's Instagram. Int. J. Retail Distrib. Manag. 49 (2), 242–262.
Invernizzi, A.C., Bellucci, M., Acuti, D., Manetti, G., 2021. Form and substance: visual content in CSR reports and investors' perceptions. Psychol. Mark. 39 (5), 974–989.
Iyer, E.S., Kashyap, R.K., 2007. Consumer recycling: role of incentives, information, and social class. J. Consum. Behav. 6 (1), 32–34.
Karmarkar, U.R., Bollinger, B., 2015. BYOB: how bringing your own shopping bags leads to treating yourself and the environment. J. Mark. 79 (4), 1–15.
King, S., Boxall, N.J., 2019. Lithium battery recycling in Australia: defining the status and identifying opportunities for the development of a new industry. J. Clean. Prod. 215, 1279–1287.
Kumar, A., 2019. Exploring young adults'e-waste recycling behaviour using an extended theory of planned behaviour model: a cross-cultural study. Resour. Conserv. Recycl. 141, 378–389.
Lange, F., Brückner, C., Kröger, B., Beller, J., Eggert, F., 2014. Wasting ways: Perceived distance to the recycling facilities predicts pro-environmental behavior. Resour. Conserv. Recycl. 92, 246–254.
Lee, S.Y., Jung, S., Jung, H.Y., Choi, S.T., Oh, S., 2019. Imagination matters: do consumers' imagery processing and self-regulatory goals affect the persuasiveness of metaphor in advertising? Int. J. Advert. 38 (8), 1173–1201.
Leiserowitz, A., 2006. Climate change risk perception and policy preferences: the role of affect, imagery, and values. Clim. Chang. 77 (1), 45–72.
Lembregts, C., Pandelaere, M., 2019. Falling back on numbers: when preference for numerical product information increases after a personal control threat. J. Mark. Res. 56 (1), 104–122.
Li, Y., Johnson, E.J., Zaval, L., 2011. Local warming: daily temperature change influences belief in global warming. Psychol. Sci. 22 (4), 454–459.
Li, D., Zhao, L., Ma, S., Shao, S., Zhang, L., 2019. What influences an individual's pro-environmental behavior? A literature review. Resour. Conserv. Recycl. 146, 28–34.
López-Mosquera, N., Lera-López, F., Sánchez, M., 2015. Key factors to explain recycling, car use and environmentally responsible purchase behaviors: a comparative perspective. Resour. Conserv. Recycl. 99, 29–39.
Luffarelli, J., Feiereisen, S., Zoghaib, A., 2021. More innovative but less socially responsible: the influence of using metaphors in marketing communications on product perception, choice, and adoption intention. Psychol. Mark. 38 (11), 1973–1989.
Mauri, C., Grazzini, L., Ulqinaku, A., Poletti, E., 2021. The effect of front-of-package nutrition labels on the choice of low sugar products. Psychol. Mark. 38 (8), 1323–1339.
Osner, R., 1982. Food wastage. J. Nutr. Food Sci. 82 (4), 13–16.
Peer, E., Brandimarte, L., Samat, S., Acquisti, A., 2017. Beyond the Turk: alternative platforms for crowdsourcing behavioral research. J. Exp. Soc. Psychol. 70, 153–163.
Pieters, R., Wedel, M., Batra, R., 2010. The stopping power of advertising: measures and effects of visual complexity. Journal of Marketing 74 (5), 48–60, 2010.
Principato, L., Mattia, G., Di Leo, A., Pratesi, C.A., 2021. The household wasteful behaviour framework: a systematic review of consumer food waste. Ind. Mark. Manag. 93, 641–649.
Ramayah, T., Lee, J.W.C., Lim, S., 2012. Sustaining the environment through recycling: an empirical study. J. Environ. Manag. 102, 141–147.
Rhodes, R.E., Beauchamp, M.R., Conner, M., de Bruijn, G.J., Kaushal, N., Latimer-Cheung, A., 2015. Prediction of depot-based specialty recycling behavior using an extended theory of planned behavior. Environ. Behav. 47 (9), 1001–1023.
Santana, S., Thomas, M., Morwitz, V.G., 2020. The role of numbers in the customer journey. J. Retail. 96 (1), 138–154.
Sarkar, J.G., Sarkar, A., Dwivedi, Y.K., Balaji, M.S., 2022. Sweat it for sustainability: impact of physical activity/exercise on sustainable consumption. Psychol. Mark. 39 (11), 2184–2199.
Scannell, L., Gifford, R., 2013. Personally relevant climate change: the role of place attachment and local versus global message framing in engagement. Environ. Behav. 45 (1), 60–85.
Schwarz, N., Jalbert, M., Noah, T., Zhang, L., 2021. Metacognitive experiences as information: processing fluency in consumer judgment and decision making. Consum. Psychol. Rev. 4 (1), 4–25.
Seacat, J.D., Boileau, N., 2018. Demographic and community-level predictors of recycling behavior: a statewide, assessment. J. Environ. Psychol. 56, 12–19.
Septianto, F., Pontes, N., Tjiptono, F., 2022. The persuasiveness of metaphor in advertising. Psychol. Mark. 39 (5), 951–961.
Sidique, S.F., Lupi, F., Joshi, S.V., 2010. The effects of behavior and attitudes on drop-off recycling activities. Resour. Conserv. Recycl. 54 (3), 163–170.
Silva, R.R., Topolinski, S., 2018. My username is IN! The influence of inward vs. Outward wandering usernames on judgments of online seller trustworthiness. Psychol. Mark. 35 (4), 307–319.
Sorkun, M.F., 2018. How do social norms influence recycling behavior in a collectivistic society? A case study from Turkey. Waste Manag. 80, 359–370.
Stancu, V., Haugaard, P., Lähteenmäki, L., 2016. Determinants of consumer food waste behaviour: two routes to food waste. Appetite 96, 7–17.
The Guardian, 2021. TheAmazon Rainforest is Losing About 10,000 Acres a Day. Soon It Will be Too Late. Available from. https://www.theguardian.com/commentisfree/2021/oct/07/the-amazon-rain-forest-is-losing-200000-acres-a-day-soon-it-will-be-too-late.
Trudel, R., Argo, J.J., Meng, M.D., 2016. The recycled self: consumers' disposal decisions of identity-linked products. J. Consum. Res. 43 (2), 246–264.
Van Rompay, T.J., Veltkamp, M., 2014. Product packaging metaphors: effects of ambiguity and explanatory information on consumer appreciation and brand perception. Psychol. Mark. 31 (6), 404–415.
VanEpps, E.M., Downs, J.S., Loewenstein, G., 2016. Calorie label formats: using numeric and traffic light calorie labels to reduce lunch calories. J. Public Policy Mark. 35 (1), 26–36.
Viglia, G., Dolnicar, S., 2020. A review of experiments in tourism and hospitality. Ann. Tour. Res. 80, 102858.
Viglia, G., Zaefarian, G., Ulqinaku, A., 2021. How to design good experiments in marketing: types, examples, and methods. Ind. Mark. Manag. 98, 193–206.
Wagner, T.P., 2011. Compact fluorescent lights and the impact of convenience and knowledge on household recycling rates. Waste Manag. 31 (6), 1300–1306.
Wang, Z., Zhang, B., Yin, J., Zhang, X., 2011. Willingness and behavior towards e-waste recycling for residents in Beijing cityChina. Journal of Cleaner Production 19 (9–10), 977–984.
Wang, Z., Guo, D., Wang, X., 2016. Determinants of residents' e-waste recycling behaviour intentions: evidence from China. J. Clean. Prod. 137, 850–860.
Wang, T., Mukhopadhyay, A., Patrick, V.M., 2017. Getting consumers to recycle NOW! When and why cuteness appeals influence prosocial and sustainable behavior. J. Public Policy Mark. 36 (2), 269–283.
Wang, Y., Tian, H., Sarigöllü, E., Xu, W., 2020. Nostalgia prompts sustainable product disposal. J. Consum. Behav. 19 (6), 570–580.
Wang, X., Tzeng, S.Y., Mardani, A., 2022. Spatial differentiation and driving mechanisms of urban household waste separation behavior in ShanghaiChina. Technological Forecasting and Social Change 181, 121753.
White, K., MacDonnell, R., Dahl, D.W., 2011. It's the mind-set that matters: the role of construal level and message framing in influencing consumer efficacy and conservation behaviors. J. Mark. Res. 48 (3), 472–485.

White, K., Habib, R., Hardisty, D.J., 2019. How to SHIFT consumer behaviors to be more sustainable: a literature review and guiding framework. J. Mark. 83 (3), 22–49.
Whitmarsh, L., O'Neill, S., 2010. Green identity, green living? The role of proenvironmental self-identity in determining consistency across diverse proenvironmental behaviours. J. Environ. Psychol. 30, 305–314.
Winterich, K.P., Nenkov, G.Y., Gonzales, G.E., 2019. Knowing what it makes: how product transformation salience increases recycling. J. Mark. 83 (4), 21–37.
Wu, D.W.L., Lenkic, P.J., DiGiacomo, A., Cech, P., Zhao, J., Kingstone, A., 2018. How does the design of waste disposal signage influence waste disposal behavior? J. Environ. Psychol. 58, 77–85.
Zeng, T., Durif, F., Robinot, E., 2021. Can eco-design packaging reduce consumer food waste? An experimental study. Technol. Forecast. Soc. Chang. 162, 120342.
Zhang, B., Du, Z., Wang, B., Wang, Z., 2019. Motivation and challenges for e-commerce in e-waste recycling under "Big data" context: a perspective from household willingness in China. Technol. Forecast. Soc. Chang. 144, 436–444.
Zhang, X., Gong, X., Jiang, J., 2021. Dump or recycle? Nostalgia and consumer recycling behavior. J. Bus. Res. 132, 594–603.