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ROOS WAGTEVELD (S3277925)

**THE IMPACT OF GAIN- AND
LOSS-FRAMED MESSAGES ON
PLASTIC BOTTLE AND CAN
RECYCLING INTENTIONS AND
ATTITUDES: THE ROLE OF
ENVIRONMENTAL SELF-
IDENTITY AND MOTIVATION
TYPES**

UNIVERSITY OF TWENTE
FACULTY OF BMS
MSC. COMMUNICATION SCIENCE

Supervisors:
dr. R.J.J. Voorn | dr. A.J. Nanne



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Abstract

TITLE: The Impact of Gain- and Loss-Framed Messages on Plastic Bottle and Can Recycling Intentions and Attitudes: The Role of Environmental Self-Identity and Motivation Types.

BACKGROUND: Recycling plastic bottles and cans is crucial for environmental sustainability, but motivating individuals to engage in this behavior remains a challenge. Previous research highlights that gain- or loss-framed messages can influence pro-environmental behaviors, but this effect may depend on factors like environmental self-identity and motivation type.

OBJECTIVES: This study explored how environmental and monetary gain- or loss-framed messages affect recycling intentions and attitudes, with attention to the moderating roles of environmental self-identity and intrinsic motivation and the mediating role of extrinsic motivation.

METHODS: An experimental design with 202 participants randomly assigned to one of four message frames was employed. The sample included more males (53%) than females (45.5%), with an average age of 29.5 years. Data was collected via a survey distributed through social media and university networks. Statistical analyses, including regression and interaction effects, were conducted to test the hypotheses.

RESULTS: Message framing did not significantly affect recycling intentions or attitudes. Environmental self-identity predicted positive recycling attitudes but did not interact with message framing. Obligation-based intrinsic motivation was a strong predictor of positive recycling attitudes. Extrinsic motivation did not significantly enhance responses to monetary framing.

CONCLUSION: Message framing alone does not significantly influence recycling intentions or attitudes. Future efforts to promote recycling should focus on enhancing personal commitment to environmental behaviors over relying on framing strategies.

Keywords: Recycling, Message Framing, Environmental Self-Identity, Intrinsic Motivation, Extrinsic Motivation, Gain Frame, Loss Frame, Pro-Environmental Behavior, Recycling Attitudes, Recycling Intention

1. Introduction

As climate change intensifies, plastic usage has emerged as a significant contributor to environmental degradation (Robbins, Hintz & Moore, 2022). In the Netherlands alone, the annual influx of over 700 million large plastic bottles, 1 billion small plastic bottles, and 2.5 billion cans worsens CO₂ emissions and environmental challenges (Statiegeld Nederland, 2023; Shen et al., 2020). Despite the pressing need for recycling, habitual disposal remains common, with approximately 50% of waste recycled across the European Union and significant gaps in recycling practices, particularly in the Netherlands, where the lack of recycling infrastructure reflects that recycling is not yet the societal norm (Dijkgraaf & Gradus, 2016; Hahladakis & Iacovidou, 2019).

In July 2021, the Dutch government introduced a deposit system for plastic bottles and later extending it to cans in April 2023. These systems were implemented with the aim of enhancing recycling rates. However, challenges remain, as evidenced by an estimated 374 million Euros in unclaimed deposits due to improper disposal (Van de Pol, 2024; Klein, 2024). While projections aimed for a 90% collection rate, the actual rates were only 71% for plastic bottles and 65% for cans in 2023 (Van de Pol, 2024; Van Mersbergen & Nolles, 2023). This discrepancy highlights the necessity for further research into behavioral strategies that can motivate recycling behaviors (Haj-Salem & Al-Hawari, 2021). Specifically, understanding the social, physical, and emotional dimensions of recycling practices is essential for developing effective interventions that promote individual behavioral changes (Haj-Salem & Al-Hawari, 2021).

Current strategies aimed at influencing recycling behaviors overlook these dimensions, as the "rational choice" model can distort our understanding of ingrained and geographically shaped recycling patterns (Jacoby, 2000). The rational choice model posits that individuals make decisions based on maximizing their own utility or benefits while minimizing costs (Jacoby, 2000). However, returning plastic bottles and cans for recycling involves more than just economic consideration (Haj-Salem & Al-Hawari, 2021). To gain a more accurate understanding of recycling practices, attention should shift towards these inherent social, physical/material, and emotional components of recycling practices.

Over the last decades, various disciplines have explored determinants of pro-environmental behaviors (Campbell et al., 2016). Within the field of marketing, the effectiveness of different messaging strategies in promoting pro-environmental behaviors have been examined, from which framing emerges as a particularly critical component (Zubair et al., 2020). Framing, as defined in communication theory, refers to the way information is presented to influence how recipients interpret it (Guenther et al., 2023). Homar & Cvelbar (2021) found that framing messages as personal or societal benefits effectively promotes pro-environmental behaviors (Homar & Cvelbar, 2021).

Framing becomes pivotal in shaping perceptions of recycling, strategically shaping the context or perspective (Guenther et al., 2023). Despite potential monetary incentives, individuals often refrain from recycling due to perceived inconveniences. Strategic framing by brands on plastic bottles and cans can shape consumer perceptions, correlating with higher rates of intention to return (Campbell et al., 2016).

A notable framing approach aligns with prospect theory, where gain frames emphasize positive outcomes from recycling, and loss frames underscore negative consequences (Kahneman & Tversky, 1979). The prospect theory, as explained by Kahneman & Tversky (1979), plays a crucial role in decision-making, especially in contexts involving financial incentives (Kahneman & Tversky, 1979). The interesting part is whether gain-frames or loss-frames will be most effective for minimizing the mental hurdle associated with the act of recycling, fostering a more positive attitude and intention to participate in recycling plastic bottles and cans.

Extensive research has examined the comparative effectiveness of loss-framed versus gain-framed messages. However, the effectiveness of loss frames compared to gain frames in promoting sustainable behaviors remains uncertain, with unclear conditions under which one may be more effective than the other (O'Keefe & Jensen, 2007; Homar & Cvelbar, 2021; Meyerowitz & Chaiken, 1987; Dedman & Lee, 2023; Laura et al., 2018; O'Keefe & Jensen, 2008; Salovey, Schneider & Apanovitch, 2002).

The effectiveness of framing in promoting recycling behavior depends largely on personal factors such as individuals' values, motivations, and contextual cues (Zubair et al., 2020). A key factor in this is one's environmental self-identity (ESI), which reflects the extent to which

a person sees themselves as environmentally friendly (Dempster et al., 2021; Dijkgraaf & Gradus, 2016; Van Der Werff et al., 2013a). ESI is expected to moderate recycling attitudes and intentions. Individuals with a strong ESI are more likely to engage in pro-environmental actions, including recycling, as these behaviors are perceived as congruent with their self-concept (Clayton & Opatow, 2003). Conversely, those with a weaker ESI may exhibit less motivation to engage in such behaviors or may require different messaging strategies to encourage their participation (Dempster et al., 2021).

Recent research has highlighted the significance of intrinsic and extrinsic motivations in influencing individuals' responses to recycling initiatives, especially in relation to ESI (Van Der Werff et al., 2013a; Yang & Thøgersen, 2022; Cecere et al., 2014). Individuals with a strong ESI often experience intrinsic motivation. Intrinsic motivation is driven by internal values and moral obligations and plays a crucial role in shaping one's intention to recycle (Van Der Werff et al., 2013a). For these individuals, framing recycling initiatives in environmental terms, emphasizing the ecological benefits of recycling, may be more effective in eliciting their participation. Individuals who tend to be influenced by extrinsic motivations may respond more favorably to message framing that emphasizes the financial benefits associated with recycling. These individuals are often motivated by external rewards or recognition (Cecere et al., 2014). This highlights the need for targeted approaches in communication strategies that consider both intrinsic and extrinsic factors in motivating recycling behaviors.

This study experimentally investigates how ESI moderates the influence of monetary and environmental gain- and loss-framed messages on individuals' attitude to recycle and intention to return plastic bottles and cans, considering the interplay between intrinsic values, extrinsic incentives, and pro-environmental behaviors.

RQ: What is the differential effect of environmental and monetary gain- and loss-framed messages on individual's attitude towards recycling and intention to recycle plastic bottles and cans, considering their environmental self-identity, intrinsic and extrinsic motivation?

With sustainability at the forefront of environmental agendas, the European Union (EU) has introduced strict measures to improve the lifespan of plastic packaging. In line with these efforts, it is crucial to encourage better recycling practices among Dutch consumers. To achieve

this, exploring effective communication strategies that can motivate recycling behavior is important (Çevikarslan et al., 2022). This study looks at how gain- and loss frames influence people's attitude towards recycling and intentions to recycle. It also explores how factors such as ESI, as well as intrinsic and extrinsic motivations, impact these attitudes and intentions. By examining the effects of both monetary and environmental framing approaches, this research aims to contribute to more effective communication strategies for promoting recycling practices, in the Netherlands as well as in other contexts.

The following sections will delve into existing research on recycling behaviors, particularly focusing on factors like messaging strategies and ESI. Drawing from this, hypotheses on the impact of gain- and loss-framed messages on recycling attitudes and intentions will be proposed. Then, the methodology will be outlined and the data-results will be presented. Then their implications for promoting recycling among Dutch consumers will be discussed. Ultimately, the insights from this research are particularly relevant to ongoing efforts to encourage Dutch consumers to embrace recycling practices amidst growing environmental concerns. These insights on how to embrace recycling practices amidst growing environmental concerns, can also hold relevance for similar initiatives in other countries.

2. Theoretical Framework

Returning plastic bottles and cans extends beyond rational economic decisions. The process of recycling these items is embedded in multifaceted dimensions such as social, physical/material, and emotional aspects (Haj-Salem & Al-Hawari, 2021). To increase understanding of recycling behaviors, it is crucial to shift the focus toward these inherent components, as they play a significant role in shaping individuals' recycling practices. In the following sections, this study will delve into the constructs central to this research, drawing on relevant literature to provide a comprehensive overview. Building on this foundation, specific hypotheses will be proposed to explore how these constructs interact and influence recycling behaviors.

2.1 Understanding Recycling Behavior through Prospect Theory

Apparently, money alone does not form a big enough reason for people to return their plastic bottles and cans, as evidenced by the substantial unclaimed deposits, totaling 374 million Euros in the period from 2021-2024 (Van de Pol, 2024; Koopman, 2024).

Prospect Theory explains how people make decisions based on potential losses and gains. It posits that individuals evaluate outcomes relative to a reference point (Kahneman & Tversky, 1979). An important aspect of this theory is the concept of loss aversion, which suggests that the psychological impact of a loss is typically greater than that of a corresponding gain (Kahneman & Tversky, 1979). In the context of returning bottles and cans, the effort required to bring them back to a recycling point is perceived as a loss (effort, time, inconvenience). Since the deposit amount (gain) is often relatively small, in case of small plastic bottles and cans about 15 cents, people may weigh the perceived loss against the perceived gain and decide it's not worth the trouble (Kahneman & Tversky, 1979).

This is in line with the definition of 'loss aversion' that states people are more motivated to avoid losses than to acquire equivalent gains (Kahneman & Tversky, 1979). Therefore, the effort involved in returning bottles and cans, which is perceived as a loss, may outweigh the perceived gain of getting the deposit money back (Kahneman & Tversky, 1979).

2.2 The Role of Framing in Shaping Pro-Environmental Behavior

The existing body of literature on solutions that reinforce pro-environmental behavior, underscores the importance of simplifying recycling processes for consumers (Campbell et al., 2016). This aligns with the Prospect Theory which suggests that when the perceived loss of returning bottles is too high, individuals are less likely to participate in recycling. By minimizing the perceived loss of returning bottles, consumers can become more likely to engage in the desired behavior. Research by Campbell et al. (2016) supports this idea. Their research showed that the perceived ease of returning plastic bottles and cans significantly influences individual recycling behaviors. Their research confirms that making the act of recycling as effortless as possible is crucial, as a lower perceived effort positively correlates with higher intention to return rates (Campbell et al., 2016).

This is where the concept of "framing" becomes a valuable tool. In communication theory, framing refers to the way information is presented to influence how recipients interpret it (Guenther et al., 2023). Framing involves strategically shaping the context or perspective through which an issue or action is portrayed (Guenther et al., 2023). In the context of recycling, effective framing can play an important role in shaping individuals' perceptions of the act, making it more accessible and appealing (Guenther et al., 2023). By presenting recycling in a way that aligns with individuals' values and motivations, framing can make pro-environmental behavior feel accessible and socially desirable. This approach moves beyond merely informing people about the environmental impact, focusing on how the information is presented to influence action (Courtenay-Hall & Rogers, 2002; Homar & Cvelbar, 2021).

Levin et al. (1998) identified three key framing types: Risky Choice Framing, Attribute Framing, and Goal Framing (Homar & Cvelbar, 2021). This research focuses on Risky Choice Framing as it directly applies to recycling, where individuals weigh potential gains (e.g., financial rewards, environmental benefits) against perceived losses (e.g., time, effort). Risky Choice Framing leverages people's natural tendency to avoid losses, which often has a stronger influence on behavior than the motivation to achieve gains. When recycling is framed in terms of the risks of not recycling, such as environmental harm or missed financial incentives, individuals may feel more compelled to recycle to avoid these losses (Kahneman & Tversky, 1979; Homar & Cvelbar, 2021).

In this research, gain frames emphasize the benefits from recycling, while loss frames underscore the negative consequences of not participating (Kahneman & Tversky, 1979). In the context of recycling plastic bottles/cans, framing the act of recycling in a way that

emphasizes minimal effort, reduced inconvenience, or potential gains could effectively lower the psychological barrier to returning items to designated deposit machines. By framing recycling as a smaller loss or, ideally, as a gain, the mental hurdle associated with the act is diminished, fostering a more positive attitude and intention to participate in recycling initiatives.

Given the role of loss aversion in decision-making, loss frames are expected to be more effective than gain frames in motivating recycling behavior. Framing recycling interventions around loss aversion could help bridge the gap between knowledge and action, encouraging more sustainable behaviors on a wider scale (Guenther et al., 2023; Dijkgraaf & Gradus, 2016).

2.3 The Impact of Gain- and Loss-Framed Messages on Recycling Attitudes and Intentions

Extensive research has compared the persuasiveness of gain- versus loss-framed messages (Laura et al., 2018; O’Keefe & Jensen, 2008; Salovey, Schneider & Apanovitch, 2002), but the findings are mixed. Homar & Cvelbar (2021) suggest loss framing is more effective in promoting pro-environmental behaviors, while gain framing may work better for less effort-intensive decisions, such as shaping attitudes.

A meta-analysis by O’Keefe & Jensen (2007) consisting of 93 studies, revealed a marginal preference for gain-framed messages when persuading people to perform a certain action. This meta-analysis was however predominantly focused on disease prevention messages, so it cannot predict if gain-frames would also help persuade people to perform pro-environmental behavior (O’Keefe & Jensen, 2007).

Conversely some studies provide evidence suggesting an overall stronger effectiveness of loss frames (Meyerowitz & Chaiken, 1987; and Tversky & Kahneman, 1981). It is crucial to note that both findings are highly context dependent, as is exemplified in the following pro-environmental studies. On one hand, Dedman & Lee (2023) showed that gain-framed messages were dominant in enhancing private sustainable behaviors (i.e., recycling and household energy consumption). On the other hand, analysis by Homar en Cvelbar (2021) showed that, compared to gain framed messages, loss framed messages were found to be more or equally effective across 61 studies in influencing consumers to engage in pro-environmental behaviors. In conclusion, the effectiveness of loss frames compared to gain frames in promoting sustainable

behaviors remains uncertain, and it is not clear when one might be more effective than the other.

Drawing from the work of Kahneman and Tversky (1979) on loss aversion, there is compelling evidence to support the efficacy of loss-framed messages. For instance, emphasizing the negative consequences of neglecting to return plastic bottles and cans, like losing a small monetary value per item, aligns closely with the concept of loss aversion (Kahneman & Tversky, 1979). This psychological principle suggests that such messaging could resonate more strongly with individuals, potentially motivating them to act (Kahneman & Tversky, 1979). Despite the inconclusive nature of previous research, leveraging the innate human tendency towards loss aversion provides a compelling rationale for expecting higher effectiveness from a loss-framed message. Therefore, the hypothesis poses that individuals exposed to a loss-framed message will exhibit a higher intention to recycle as well as an increased attitude to return plastic bottles and cans for recycling compared to those exposed to a gain-framed message.

H1a: Individuals exposed to a loss-framed message will exhibit a positively increased attitude to recycle plastic bottles and cans compared to those exposed to a gain-framed message.

H1b: Individuals exposed to a loss-framed message will exhibit a positively increased intention to recycle plastic bottles and cans compared to those exposed to a gain-framed message.

2.4 The Role of Environmental Self-Identity in Shaping Responses to Framed Messages

Personal factors are expected to have a moderative effect on recycling intentions as determined by Dempster et al. (2021), Dijkgraaf & Gradus (2016) and Van Der Werff et al. (2013b). Personal factors constitute of one's values and life goals, which may form important aspects of a person's self-concept and thus contribute to one's sense of identity (Verplanken & Holland, 2002; Sparks & Shepherd, 1992). 'Self-identity' is often defined as the label that one uses to describe oneself. Environmental self-identity (ESI) in this study refers to how strongly

individuals perceive themselves as being environmentally friendly (Van Der Werff et al., 2013b).

ESI guides individuals towards behaviors that align with their sense of self, thereby encouraging pro-environmental actions (Clayton & Opatow, 2003). Consequently, individuals with a strong ESI are more inclined to perceive themselves as environmentally conscious and are more likely to engage in behaviors that reflect this identity (Clayton & Opatow, 2003). In consistence with findings from Clayton & Opatow (2003), Van Der Werff et al. (2013b) found that ESI relates to environmental preferences, intentions and behaviors.

While Van Der Werff et al. (2013b) was based on correlational data. The experimental design of this study will allow for more definite conclusions on the effect of ESI on attitude towards recycling and intention to recycle plastic bottles and cans (Dempster et al., 2021; Dijkgraaf & Gradus, 2016; Van Der Werff et al., 2013b).

The strength of a person's ESI is likely to impact the effectiveness of gain and loss framing on their intention to return items (Balundè et al., 2019). For individuals with a stronger ESI, the alignment of the message with their existing values and beliefs may reinforce their commitment to sustainable practices. Therefore, individuals with a stronger ESI will likely show a more significant difference in intention between gain/loss framed messages. One could argue however, that individuals with a stronger ESI may already be inclined to engage in pro-environmental behaviors, regardless of the framing of the message. As a result, the difference in their intentions between gain/loss framed messages might be less pronounced compared to those with a weaker ESI. This perspective suggests that the framing of the message may have less impact on individuals who already strongly identify with environmentally friendly actions.

While it's true that individuals with a stronger ESI may already be motivated to engage in pro-environmental behaviors, the framing of messages can still shape their recycling intentions and attitudes (Van Der Werff et al., 2013b). Emphasizing the potential loss associated with not recycling could further reinforce their commitment to sustainable practices. By highlighting the negative consequences of neglecting recycling, these individuals may feel a stronger sense of responsibility to act in line with their environmental values (Van Der Werff et al., 2013b). Thus, framing messages in terms of potential losses could still lead to a heightened intention and more positive attitude to return plastic bottles and cans among individuals with a strong ESI.

Individuals with a weaker ESI may not exhibit such a strong response to gain or loss framing. Their intentions to recycle might be less influenced by the framing of messages, as their ESI may not play as significant of a role in driving their behaviors. Despite individuals

with a weaker ESI likely being less influenced by the framing of messages, understanding how different frames impact their attitudes and intentions to recycle remains crucial in promoting recycling behaviors across diverse segments of the population.

H2a: Environmental Self-Identity moderates the relationship between loss-framed messages and the attitude to recycle, such that the stronger an individual's ESI, the stronger the positive effect of the loss-framed message on their attitude to recycle.

H2b: Environmental Self-Identity moderates the relationship between loss-framed messages and the intention to recycle, such that the stronger an individual's ESI, the stronger the positive effect of the loss-framed message on their intention to recycle.

2.5 The Role of Intrinsic and Extrinsic Motivations

Based on the conclusions drawn from recent research on pro-environmental behavior, there is substantial evidence suggesting the differential impact of extrinsic and intrinsic motivators on individuals' intentions to engage in waste reduction activities. Studies by Van Der Werff et al. (2013a), Yang & Thøgersen (2022), and Cecere et al. (2014) emphasize the nuanced responses of individuals to various motivational strategies. They indicate that the effectiveness of incentives in promoting recycling behavior varies significantly depending on the individual's underlying motivational orientation. First section 2.5.1 will discuss how extrinsic motivations plays a key role in shaping individuals' pro-environmental behavior. Section 2.5.2 will delve into how intrinsic motivations play a key role in shaping individuals' pro-environmental behavior. These explorations serve to underscore the argument that to enhance the effectiveness of deposit systems, the emphasis should be on using the right type of incentive for the right type of consumer.

2.5.1 Extrinsic Motivation

Extrinsic motivation is the desire to expend effort to obtain outcomes external to the task, such as reward or recognition (Grant, 2008). Since extrinsically motivated individuals are more responsive to visible actions that enable social approval, monetary incentives can act as an external reward to encourage waste reduction behaviors (Cecere et al., 2014; Yang & Thøgersen, 2022).

However, for those who are not extrinsically motivated, monetary incentives might backfire by diminishing their intrinsic motivation to reduce waste, as they are driven by altruistic goals rather than external rewards (Cecere et al., 2014; Van Der Werff et al., 2013a). Moreover, both intrinsically and extrinsically motivated individuals may justify generating more waste if they are paying a fee for it, as the monetary payment reduces feelings of guilt (Cecere et al., 2014; Yang & Thøgersen, 2022). This suggests that monetary incentives, particularly direct fees, can sometimes lead to unintended outcomes by mitigating the moral weight of creating waste.

Extrinsic motivations like convenience and incentives can act as both moderators and mediators in the framing effect on recycling. Mahardika et al., (2020) showed that making recycling more convenient by placing bins closer, moderated the intention-behavior link. This suggests that external factors can override internal recycling intentions. Additionally, Thøgersen (2003) indicated that external incentives such as laws, community pressure, and monetary rewards can mediate the effect on recycling intentions and behavior by increasing

feelings of moral obligation, regardless of whether it is a gain- or a loss-frame. A mediator explains how or why an effect occurs between two variables. In this study, extrinsic motivation, specifically monetary rewards, serves as a mediator. This means that external incentives (like monetary rewards) influence recycling behavior by increasing the level of extrinsic motivation. Therefore, extrinsic motivation helps explain the mechanism through which external incentives lead to higher recycling intentions and actions, regardless of the framing.

This context suggests that monetary frames may increase extrinsic motivation in individuals. This heightened extrinsic motivation, in turn, could lead to stronger positive attitudes and intentions toward recycling. Monetary framing highlights the financial benefits of recycling, such as savings or rewards. This self-focused approach appeals to extrinsic motivation, motivating individuals to recycle primarily for personal financial gain (Lee & Pounders, 2018). In contrast, individuals who are not extrinsically motivated are less affected by these external incentives and may not exhibit the same level of responsiveness to the framing (Cecere et al., 2014; Yang & Thøgersen, 2022). Therefore, the following hypothesis is proposed:

H3: Extrinsic motivation will mediate the relationship between framing and recycling attitudes and intentions.

2.5.2 Intrinsic Motivation

In addition to the extrinsic motivation, intrinsic motivation is also very important (Frey, 1997). Its focus lies primarily on processes within the individual rather than the environment (Deci & Ryan, 1985). Intrinsic motivation is the motivation to meet the inherent human needs for self-determination and competence. When people are intrinsically motivated, they perceive their behavior as being caused by their own choice and as reinforcing their self-identity (Deci & Ryan, 1985; Frey, 1997; Van Der Werff et al., 2013a).

Some people act in an environmentally friendly manner without external incentives (like money) to do so, but rather because they are intrinsically motivated to do so (Van der Linden, 2015). There is some initial evidence to suggest that this is particularly likely for people with a strong ESI. People with a strong ESI are namely more likely to feel a moral obligation or personal norm to engage in pro-environmental behaviors (Van Der Werff et al., 2013a).

The paper by Van Der Werff et al. (2013a), indicates there are two types of intrinsic motivation: enjoyment-based intrinsic motivation and obligation-based intrinsic motivation.

Enjoyment-based intrinsic motivation refers to performing a behavior because it is interesting or enjoyable in itself. Obligation-based intrinsic motivation refers to performing a behavior because one feels morally obliged to do so, even if the behavior itself is not enjoyable (Van Der Werff et al., 2013a).

People with strong hedonic values (who prioritize enjoyment and pleasure) are likely to not perform pro-environmental behavior, probably because these behaviors are not pleasurable or fun or because they reduce comfort (Van Der Werff et al., 2013a). Van Der Werff et al. (2013a) argue that it is less likely that people act in an environmentally friendly way purely for the sake of enjoyment. Van Der Werff et al. (2013a) propose that motivation to engage in such behavior is more often driven by a sense of obligation or responsibility. As obligation-based intrinsic motivation is more relevant in explaining environmentally friendly actions, this paper will specifically refer to "intrinsic motivation" in terms of a sense of duty or responsibility, rather than enjoyment.

2.5.2.2 Obligation-based intrinsic motivation

Environmental framing focuses on the positive impacts of recycling on the environment, emphasizing collective benefits such as sustainability and community well-being. This approach is considered other-focused, appealing to people's intrinsic motivation by encouraging individuals to engage in recycling based on a sense of responsibility toward society and the environment (Wamsler & Brink, 2018).

Intrinsic motivation, such as personal norms, values, and attitudes, predominantly serves as a moderator. This means intrinsic motivation influences the degree to which framing affects recycling intentions and behaviors. For instance, individuals with strong intrinsic motivation may find environmental gain/loss frames more compelling than those motivated by external factors (Van Der Werff et al., 2013a).

Among other studies, a study conducted by Steinhorst & Klöckner (2017) also found that environmentally framed messages increased pro-environmental intrinsic motivation, which mediated effects on behavioral intentions. Environmental framing of behavioral interventions may be preferred when promoting long-term pro-environmental behavior without continuous monetary benefits. Thus, the following research hypothesizes that people motivated by their intrinsic motivation regarding pro-environmental behavior, will be more highly motivated to recycle because of the environmental aspect as opposed to monetary aspects.

H4: (Obligation-Based) Intrinsic motivation will moderate the relationship between framing and recycling attitudes and intentions, with people who are more intrinsically motivated exhibiting stronger positive attitude and intention to recycle when exposed to environmental gain/loss frames compared to monetary gain/loss frames.

To summarize; extrinsic and intrinsic motivations have distinct impacts on how individuals react to gain- and loss-framed messages concerning recycling behaviors. Understanding the mediating role of extrinsic motivation and the moderating role of intrinsic motivation is crucial for crafting effective recycling campaigns. By tailoring messages to align with individuals' intrinsic or extrinsic motivations, it could be possible to enhance the impact of gain- and loss-framed messages. For example, emphasizing the personal financial benefits of recycling might resonate more with extrinsically motivated individuals, while highlighting the environmental benefits could be more effective for those intrinsically motivated. Recognizing these nuances could enable more targeted and effective strategies to promote pro-environmental behaviors.

3. Conceptual Framework and Hypotheses

Figure 1:

Hypothesized Conceptual Model

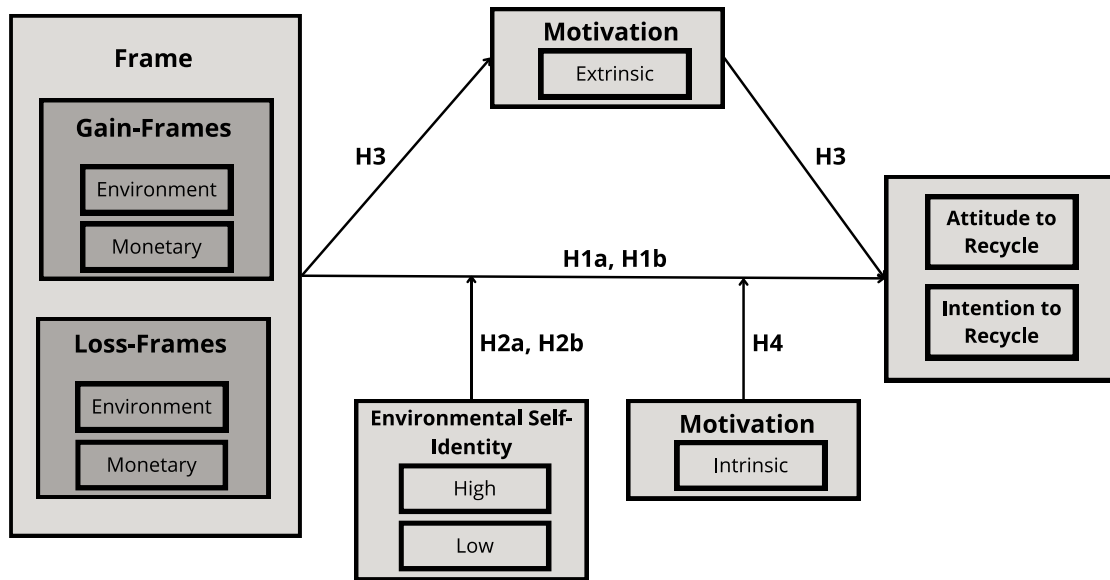


Table 1

Overview of Hypotheses

Overview of Hypotheses	
H1a	<i>Individuals exposed to a loss-framed message will exhibit a positively increased attitude to recycle plastic bottles and cans compared to those exposed to a gain-framed message.</i>
H1b	<i>Individuals exposed to a loss-framed message will exhibit a positively increased intention to recycle plastic bottles and cans compared to those exposed to a gain-framed message.</i>
H2a	<i>Environmental Self-Identity moderates the relationship between loss-framed messages and the attitude to recycle, such that the stronger an individual's ESI, the stronger the positive effect of the loss-framed message on their attitude to recycle.</i>
H2b	<i>Environmental Self-Identity moderates the relationship between loss-framed messages and the intention to recycle, such that the stronger an individual's ESI, the stronger the positive effect of the loss-framed message on their intention to recycle.</i>
H3	<i>Extrinsic motivation will mediate the relationship between framing and recycling attitudes and intentions.</i>
H4	<i>(Obligation-Based) Intrinsic motivation will moderate the relationship between framing and recycling attitudes and intentions, with people who are intrinsically motivated exhibiting stronger positive attitude and intention to recycle when exposed to environmental gain/loss frames compared to monetary gain/loss frames.</i>

4. Method

4.1 Research Design

This study aims to explore the impact of monetary and environmental gain and loss frames, along with extrinsic and intrinsic motivation and ESI, on individuals' recycling intentions and attitudes towards recycling. The study is organized as an online between-subjects experiment. The experiment employs a 2 (gain vs. loss frame) x 2 (monetary vs. environment) factorial design with ESI and intrinsic motivation as moderating variables, extrinsic motivation as a mediating variable, and recycling attitude and intention as dependent variables. A visual representation of this research model is presented in Figure 1.

The four different conditions represent the different types of labels that could potentially be placed on plastic Coca Cola bottles in store. The conditions consider a monetary gain-framed slogan, an environmental gain-framed slogan, a monetary loss-framed slogan and an environmental-loss framed slogan. A central aspect of this exploration will be to understand the interplay between the frames and the types of motivation and level of ESI and how this ultimately impacts consumers attitude towards recycling and intention to recycle. This research seeks to understand how different framing techniques such as gain vs. loss frames and monetary vs. environmental frames affect recycling attitudes and intentions. The aim of this experiment is to identify the most effective messaging strategies to enhance recycling attitudes and intentions, thereby reducing environmental impact and promoting more sustainable consumption patterns. Understanding these effects is crucial for developing targeted interventions that promote responsible recycling practices, thereby helping to protect the planet and conserve natural resources.

Prior to performing the actual experiment, a test was performed for selecting the most clear, credible and authentic frame per condition. The steps taken in the stimulus development test will be outlined first, followed by a detailed explanation of the actual experiment.

4.2 Stimulus development

Various gain- and loss-frames were developed, and 11 fellow marketing communication students were provided with the criteria that define a gain- and loss-frame before providing their quality-ratings. They evaluated these frames on a 10-point scale, and the frames that best aligned with the criteria of a gain- and loss-frame, got the highest rating and were subsequently

selected for the actual experiment. The criteria of gain- and loss-frame can be found in Appendix A.

This stimulus development test was presented to participants in the form of a Qualtrics survey. As Qualtrics does not allow to ask enough questions to put all the questions regarding the monetary and environmental gain- and loss-frames in the same questionnaire, the stimulus development test was divided over two questionnaires. One questionnaire focused on the monetary and environmental gain-frames. The other questionnaire focused on the monetary and environmental loss-frames. Participants were asked to fill in both questionnaires. The decision to involve 11 participants in the scoring experiment was based on practical considerations. While larger sample sizes can provide more robust data, a smaller number of participants was chosen for feasibility reasons. With 11 participants, it is manageable to gather feedback efficiently and analyze the results effectively within the constraints of time and resources available for this study.

4.2.1. Selecting Gain- and Loss-Frames and Manipulation Check

The six monetary gain-frames, six monetary loss-frames, six environmental gain-frames and six environmental loss-frames, were based on the criteria for gain- and loss-frames inspired by Kahneman and Tversky (1979). ChatGPT was used to generate 15 frames for each condition based on these criteria. The researcher then critically evaluated the generated frames per condition and consequently selected the five frames that were deemed most suitable for the study, along with an additional frame that was used as a control frame for another condition. The researcher refrained from using one of the five selected frames as a control frame to avoid potential recognition bias, which could distort the results. By ensuring that the control frame was distinct from the selected frames, the researcher minimized the likelihood that participants would recognize or recall the control frame, thus maintaining the integrity of the evaluation process and ensuring that any observed effects could be attributed solely to the experimental conditions.

Participants were first asked to provide ethical approval for their participation. Then participants were presented with the criteria that define gain-frames, followed by a list of 12 frames (including two control loss-frames). The first six frames focused on monetary incentives, while the next six centered on the environment. Participants rated each frame on a 10-point scale, where 1 indicated a frame that does not align with the criteria of a gain-frame, and 10 indicated full alignment. The control frames were included in the lists to ensure

participant response accuracy. In order for a participant to show a clear understanding of the gain-frame criteria, the monetary loss-frame and an environmental loss-frame were expected to be scored the lowest.

The same process was applied for selecting loss-frames. In this case, participants rated 12 loss-frames, with six frames focused on monetary incentives and six frames on the environment. A monetary gain-frame and an environmental gain-frame were included to assess participant response accuracy.

Participants who failed to correctly identify the control frame among the various specific frames (monetary/environmental gain/loss) two or more times were excluded from the sample. A failure to recognize the control frame was defined as rating it a 7 or higher, as a low rating would indicate that the participant understands the control frame is not a good example of the specific frame. If this occurred twice or more, the participant was excluded. This exclusion was necessary as their responses were considered unreliable, indicating a lack of understanding of the different framing types. Initially, 11 marketing communication specialists completed the survey. However, based on this criterion, the responses from 3 participants were deemed unreliable. Consequently, the final sample size was adjusted to 8 participants.

The average scores for the frames regarding credibility, clarity, and adherence to criteria were calculated. The highest-scoring monetary and environmental gain- and loss-frames were selected for the final experiment. Data analysis of the stimulus development test was conducted using SPSS, which integrates seamlessly with Qualtrics.

4.3 Results of Stimulus Design and Testing

Ultimately the frames with the highest mean score were selected to be placed on a plastic bottle. The following sentence was selected as the monetary gain-frame: *“Earn 15 Cents with Every Recycled Bottle! Turn your trash into cash.”* As it had a highest mean score ($M = 8.54$, $SD = .971$), indicating that people found this the most clear and recognizable monetary gain-frame out of the 5 monetary gain-frame options (see Appendix F). As the environmental gain-frame *“Protect Our Planet! Recycle this bottle to help preserve the environment.”* was selected, due to it having the highest mean score ($M = 8.32$, $SD = 1.074$) (see Appendix F). For the monetary loss-frame *“Avoid Losing Money! Recycle your bottle and avoid losing 15 cents.”* got the highest mean score ($M = 8.29$, $SD = .907$) (see Appendix F). And for the environmental loss-frame the following frame got the highest mean score ($M = 8.63$, $SD = 1.088$): *“Harming Our Earth! Failing to recycle this bottle damages the environment.”* (see Appendix F). Participants in the stimulus development test initially encountered the different frames presented as plain text. Once the highest-scoring frames were identified, they were incorporated into the label of the Coca-Cola bottle. In the subsequent phase of the actual experiment, participants were randomly assigned to view one of these frames displayed on a Coca-Cola bottle. The final design of the stimuli used in the experiment is presented in Figure 2. It is important to note that the examples on the next page are not scaled accurately to the sizes at which participants viewed them. Depending on the screen dimensions used for the survey, participants viewed the bottles either at the same size as the example or larger.

Figure 1

Final Design Stimuli



a) Monetary Gain-Frame

b) Environmental Gain-Frame



c) Monetary Loss-Frame



d) Environmental Loss-Frame

4.4 Final Experiment

4.4.1 Sampling Procedure

Convenience sampling was employed to recruit the more than 200 participants. The survey was distributed via the researcher's WhatsApp and Instagram, as well as through the BMS Lab at the University of Twente. This approach ensured that the survey reached its target population, which consisted of individuals who understand English and are responsible for their own waste disposal. The survey was conducted in English to facilitate the comparison of findings with potential studies conducted in other countries, ultimately contributing to the development of effective strategies for promoting sustainable practices in the Netherlands and surrounding countries. Participants that were recruited via the BMS lab received participant points for their participation. Participants that were recruited through the other means, outside of the BMS lab, did not receive any incentive for their participation in this research.

4.4.2 Experimental Procedure

Ethical approval for this research study was obtained from the Ethics Committee at the University of Twente. The main data collection method for this study was an online survey conducted via Qualtrics. The questionnaire assessed consumers' recycling attitudes and intentions after viewing a Coca-Cola bottle featuring one of four different conditional frames: environmental/monetary gain-frames or environmental/monetary loss-frame (Brybaert, 2019). 202 participants were randomly assigned to one of the four conditions. Each condition consisted of about 50 participants, who viewed identical bottles with a monetary or environmental gain-frame or monetary or environmental loss-framed message (Brybaert, 2019). The random assignment ensured that observed differences in outcomes were attributed to the framing manipulation.

Participants first had to answer a few demographic questions, which consisted of age and gender. After that the strength of the participants' ESI was assessed, as well as their level of extrinsic motivation and level of intrinsic motivation, as this may pose an influence individuals' responses to gain/loss framing in messages related to the return of plastic bottles and cans for recycling (Van Der Werff et al., 2013b). Then participants were shown a Coca-Cola bottle with a monetary gain-frame, environmental gain-frame, monetary loss-frame or environmental loss-frame. After exposure to one of these four conditions, participants were asked to rate their attitude towards recycling as well as their intention to recycle. The survey utilized five-point Likert scales to assess participants' ESI as well as their extrinsic and intrinsic

motivation and their intentions to recycle and attitude towards recycling the bottle (Arli et al., 2019; Smith et al., 1994). All questions/scales that were used in the online experiment can be found in Appendix B.

At the conclusion of the survey, participants were thanked for their participation and provided with a concise debriefing that explained the aim of the research.

4.4.3 Participants

The survey was conducted between the 17th of June and the 2nd of July 2024. The main study consisted of an online questionnaire with four manipulations. Individuals took part in the online experiment and were randomly assigned to one of the four manipulations. In total there were 227 clicks on the survey link. However only the completed surveys were considered as valid, resulting in 202 participants ($N=202$). While participants were randomly assigned to one of the four conditions using the Qualtrics platform, the distribution across groups was not perfectly equal, resulting in variations in the number of participants per group, ranging from 46 to 60 (see Appendix G). This discrepancy is likely due to the randomization algorithm used by Qualtrics, which does not always guarantee perfectly equal group sizes, especially in cases where participant drop-off occurs or when the survey is completed over an extended period. Thus, it is important to acknowledge that while randomization was used, the resulting in group sizes may not be perfectly equal, which is a common occurrence in online experimental research (Gainsight, 2021).

The survey included more male participants (53%) than female (45,5%). The average age of participants was $M = 29.5$ years. $SD = 16.20$, with ages ranging from 17 to 91 years.

4.5 Materials and Stimuli

The online experiment was conducted using Qualtrics, a customizable platform employed by the University of Twente.

A bottle of Coca Cola was chosen as the product of interest because Coca-Cola bottles have a standardized packaging format, which ensures consistency across experimental conditions when applying different frames (gain vs. loss and monetary vs. environmental). As frequently purchased and disposed-of items, Coca-Cola bottles are ideal for studying recycling behaviors. The high turnover rate namely ensures that participants most likely have had substantial experience with the product, which is beneficial for examining habitual behaviors like recycling (Van Mersbergen & Nolles, 2023; Miloš, 2021; Walls, 2011). As Coca-Cola is a dominant player in the beverage industry, particularly in the market for plastic bottles and cans, studying a product from such a significant market player ensures that the findings are relevant to a large portion of the market (Miloš, 2021). The global recognition of Coca-Cola means that the study can be replicated in different countries with minimal adjustments, enhancing the external validity and generalizability of the findings (Miloš, 2021).

4.6 Measures

This study employed five-point Likert scales to assess participants' intentions and attitudes regarding recycling plastic bottles and cans (Arli et al., 2019; Smith et al., 1994). The Likert scale was chosen because it allows for a nuanced understanding of participants' attitudes, capturing a range of agreement or disagreement that is crucial for assessing subtle variations in environmental behavior. This type of scale is particularly effective in social and behavioral research, as it enables the measurement of attitudes and intentions that are often complex and multifaceted.

In the final experiment, five-point Likert scales were deliberately selected over three- or seven-point alternatives for several compelling reasons. Firstly, a five-point scale effectively balances the need for sufficient response options with the importance of minimizing respondent fatigue or indecision that can arise with more extensive scales. The literature indicates that respondents tend to find a five-point scale more straightforward and efficient, potentially enhancing the consistency and reliability of their responses. Furthermore, a five-point scale, with its more limited range of options, helps mitigate the overrepresentation of extreme responses while still preserving the sensitivity necessary to

detect meaningful differences in attitudes (Likert & Roslow, 1934).

The specific items within the scales were carefully selected and adapted to reflect the context of recycling plastic bottles and cans. These items were chosen based on their relevance to the behaviors and motivations being studied, ensuring that the survey accurately captures the factors influencing recycling behavior. The adaptation of these items was essential to align them with the study's focus on understanding the psychological and behavioral aspects of recycling in contemporary context.

4.6.1 Environmental Self-Identity (Moderating Variable)

ESI was assessed through items derived from a scale from Van Der Werff et al. (2013b). Participants are questioned about how environmentally friendly they perceive themselves to be. The scale consisted of items such as, “*Acting environmentally friendly is an important part of who I am*”. An overview of the other items in the scale can be found in Appendix B. The reliability of the scale was reflected in a Cronbach's alpha of $\alpha = .88$ ($N = 3$), indicating good internal consistency, as it falls within the 0.8 to 0.9 range (Van Der Werff et al., 2013b; Bobbitt, 2021). The average score of the ESI scale among participants was quite high ($M = 3.42$, $SD = .73$).

4.6.2 Extrinsic Motivation (Mediating Variable)

Participants' level of extrinsic motivation was assessed through items from the scale developed by Taberero & Hernández (2010), who based their items on the motivation scale by Grant (2008). Participants were presented with the following question: “What are the reasons that would motivate you to recycle?” And participants were then asked to indicate on a scale from 1 to 5 the extent to which the items on the extrinsic motivation scale motivate them to recycle. The extrinsic motivation scale consisted of items such as the following: “*Because I have the possibility of receiving a reward*”. An overview of the other items in the scale can be found in Appendix B. The reliability of the extrinsic motivation scale was assessed using Cronbach's alpha. The scale, consisting of items adapted from Grant (2008) and Taberero & Hernández (2010), showed questionable internal consistency ($\alpha = .658$). Although this Cronbach's alpha value is below the generally accepted threshold for reliability, the scale has been widely utilized in previous research, indicating its' usefulness for measuring extrinsic motivation in similar contexts (Grant, 2008; Taberero & Hernández, 2010; Bobbitt, 2021). The average score of the extrinsic motivation scale among participants was $M = 2.77$, $SD = .86$.

4.6.3 Intrinsic Motivation (Moderating Variable)

The three items for (obligation-based) intrinsic motivation were based on the “Personal Norm Scale” by Van Der Werff et al., (2013a). Personal norm can be defined as ‘the extent to which one feels morally obliged to perform a certain action’ (Van Der Werff et al., 2013a). It reflects feelings of obligation to act in an environmentally friendly manner (Van Der Werff et al., 2013a). Therefore, obligation-based intrinsic motivation can be measured via the personal norm. Participants were, again, first presented with the following question: “What are the reasons that would motivate you to recycle?” And participants were then asked to indicate on a scale from 1 to 5 the extent to which the items on the (Obligation-Based Intrinsic Motivation scale) motivate them to recycle. The extrinsic motivation scale consisted of items such as the following: The (Obligation-Based) Intrinsic Motivation scale consisted of items such as “*Because I feel morally obliged to act in an environmentally friendly manner*”. An overview of the other items in the scale can be found in Appendix B. The reliability of the scale was reflected in a Cronbach's alpha of $\alpha = .62$ ($N = 3$), indicating questionable internal consistency, as it falls within the 0.6 to 0.7 range (Van Der Werff et al., 2013a; Bobbitt, 2021). The average score of the ESI scale among participants was $M = 3.65$, $SD = .76$.

While the Extrinsic Motivation scale and the (Obligation-Based) Intrinsic Motivation scale are both designed to capture motivational factors, they assess different dimensions of motivation. The extrinsic motivation scale focuses on external incentives (like rewards), while the intrinsic motivation scale centers on internal feelings of obligation and moral responsibility.

Despite some overlap in wording or themes (like moral obligations) the distinction lies in the underlying motivation: extrinsic motivations are driven by external rewards or recognition, while intrinsic motivations arise from personal values and beliefs. This differentiation is crucial in understanding the complex interplay between various motivational factors in recycling behavior.

4.6.4 Attitude towards Recycling (Dependent Variable)

Attitude to recycle was assessed through items from the scale by Smith et al. (1994), including “*Recycling is: 1 = bad ... 5 = good*”, “*Recycling is: 1 = foolish, 5 = wise*”, “*Recycling is: 1 = undesirable, 5 = desirable*” and “*Recycling is: 1 = worthless ... 5 = very valuable*”. The reliability of the scale was reflected in a Cronbach's alpha of $\alpha = .84$ ($N = 4$), indicating good internal consistency, as it falls within the 0.8 to 0.9 range (Smith et al., 1994; Bobbitt, 2021). The average score of the ESI scale among participants was $M = 4.43$, $SD = .58$.

4.6.5 Intention to Recycle (Dependent Variable)

Participants' intention to recycle was measured using a scale adapted from Arli et al. (2019) to capture their self-perception of their recycling intentions. The intention to recycle was assessed through three components: self-perceived likelihood of recycling, intention to recycle, and willingness to try to recycle. This section aimed to assess individuals' actual behavioral tendencies towards recycling a plastic Coca-Cola bottle, considering the perceptions formed throughout the survey. The scale consisted of items such as the following: “*How likely are you to recycle your plastic bottles and/or cans at home in the next 4 weeks*” An overview of the other items in the scale can be found in Appendix B. The reliability of the scale was reflected in a Cronbach's alpha of $\alpha = .96$ ($N = 3$), indicating excellent internal consistency, as it falls within the 0.9 to 1.0 range (Arli et al., 2019; Bobbitt, 2021). The average score of the ESI scale among participants was $M = 3.93$, $SD = .75$.

4.7 Data Analysis Plan

The initial phase of the data analysis involves cleaning and screening through the data in SPSS. This step addresses any missing data and identifies outliers that could potentially distort the results, ensuring the reliability of the dataset. Categorical variables, such as monetary and environmental gain and loss frames, will be numerically coded for further analysis.

Participants who did not complete the survey will be excluded from the dataset to maintain the integrity of the results. Subsequently, descriptive statistics will be performed to provide an overview of the data, including means, standard deviations, and frequencies for the four different conditions. This process is crucial for understanding the fundamental characteristics of the dataset and identifying any potential issues before proceeding to more complex analyses.

Firstly, the data must be labelled after the condition groups as either a monetary gain-frame = 1, an environmental gain-frame = 2, a monetary loss-frame = 3 and an environmental loss-frame = 4.

For *Hypotheses 1a and 1b* a Between-Subjects ANOVA will be conducted as it allows for a rigorous comparison of mean intentions and attitudes across different message framing conditions, accounting for variability within groups and providing insights into potential main effects. This makes it an appropriate and effective method for examining the influence of loss-framed versus gain-framed messages on recycling intentions and attitudes. For *Hypotheses 2a and 2b* Multiple Regression Analyses will be performed. Multiple Regression Analysis will be

used to evaluate the effect of ESI, Frame-type, and their interaction on the intention to recycle and attitude towards recycling. Multiple Regression Analysis is deemed appropriate for testing Hypotheses 2a and 2b because it accommodates multiple predictors, allows for the testing of interaction effects, and controls for potential confounding variables. This analytical approach provides a robust method for understanding the combined influence of ESI and message framing on recycling intentions and attitudes.

For Hypotheses 3 and 4 Linear Regression Analyses will be used. Linear regression analysis is deemed as appropriate for testing Hypotheses 3 and 4 because it can model continuous dependent variables and examine the effect of multiple predictors, including their interactions. By using linear regression, the analysis can reveal how different motivations and framing types impact recycling intentions and attitudes.

By following this data analysis plan, the study aims to systematically examine the influence of the four different frame-types on the intention to recycle and attitude towards recycling. The results will offer valuable insight into whether emphasizing environmental gains or losses, or monetary gains or losses, is more effective in motivating individuals with varying levels of ESI and different levels of intrinsic and extrinsic motivation towards recycling.

5 Results

The following section presents the results derived from the online experiment. It presents the findings, offering a detailed understanding of how the variables interact and influence each other.

5.1 Impact of Frame Type on Attitude towards Recycling

Hypothesis 1a states that individuals exposed to a loss-framed message will exhibit a higher attitude to recycle plastic bottles and cans compared to those exposed to a gain-framed message. A Between-Subjects ANOVA was used to understand different framing conditions can influence one's intention to recycle. While this hypothesis involves only two levels (gain and loss frames), using ANOVA enables easier integration with more complex models used later in this study, where interaction effects between framing and intrinsic and extrinsic motivation are explored. Using ANOVA here ensures consistency in the statistical methods across different sections of the analysis, facilitating comparisons across hypotheses. The results show that there is no significant effect of the frame type on the attitude to recycle plastic bottles and cans, $F(2, 200) = 0.284, p = 0.753$ (See Table 7). This means that the hypothesis H1a which posited that a loss frame would positively influence attitudes towards recycling compared to a gain frame, is not supported by the data. The lack of significant differences suggests that the type of framing does not affect recycling attitudes.

Table 7

ANOVA Results for Frame Type and Attitude towards Recycling

<i>Source</i>	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Corrected Model	0.766*	3	0.255	0.766	0.515
Frame_Type	0.189	2	0.095	0.284	0.753
Error	66.028	198	0.334		
Total	4027.875	202			
Corrected Total	66.834	201			

**R Squared = .011 (Adjusted R Squared = -.004)*

5.2 Impact of Frame Type on Intention to Recycle

Hypothesis 1b posits that individuals exposed to a loss-framed message will exhibit a higher intention to recycle plastic bottles and cans compared to those exposed to a gain-framed message. A Between-Subjects ANOVA was used to understand whether different framing conditions can influence one's intention to recycle. Although a MANOVA could have been used to test both intention and attitude simultaneously, this study aims to examine the specific and distinct effects of framing on attitude and intention as separate constructs. By analyzing them independently, a clearer understanding can be created on how framing influences each variable. The findings show that there is no significant effect of frame type (whether gain or loss) on the intention to recycle plastic bottles and cans $F(2,200) = 0.079, p = 0.924$ (See Table 8). This means hypothesis H1a is not supported by the data.

Table 8

ANOVA Results for Frame Type and Intention towards Recycling

<i>Source</i>	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	0.628*	3	0.209	0.368	0.776
Frame_Type (G vs. L)	0.090	2	0.045	0.079	0.924
Error	112.671	198	0.569		
Total	3226.334	202			
Corrected Total	113.299	201			

**R Squared = .006 (Adjusted R Squared = -.010)*

5.3 Moderating Effect of Environmental Self-Identity on Attitude towards Recycling

Hypothesis 2a proposed that the stronger an individual's ESI the stronger the positive effect of a framed message emphasizing potential loss on their attitude towards recycling. To investigate this, a Multiple Regression Analysis was conducted to examine how ESI moderates the direct effect of the message frame on attitudes toward recycling.

The analysis revealed that the model, comprising ESI, framing conditions, and their interaction, explained a modest portion of the variance in attitude towards recycling ($R^2 = .051$). The Adjusted $R^2 = .036$, indicating that the predictors contributed to explaining the variance in attitude towards recycling beyond what would be expected by chance (see Table 9). The combined effect of the predictors was statistically significant, as indicated by the results, $F(3, 198) = 3.53, p = .016$ (see Table 10).

Table 9

Summary of Model Fit Attitude towards Recycling

Model Summary	Value
R	0.225
R²	0.051
Adjusted R²	0.036
Std. Error of the Estimate	0.56604

Table 10

Analysis of Variance (ANOVA) Results Attitude towards Recycling

ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Regression	3.394	3	1.131	3.531	0.016
Residual	63.440	198	0.320		
Total	66.834	201			

Specifically, the coefficient for ESI ($B = 0.286$) was positive and reached statistical significance ($p = .040$), indicating that individuals with a stronger ESI tend to have a more positive attitude towards recycling. However, the coefficient for the framing conditions ($B = 0.135$) did not reach statistical significance ($p = .422$), suggesting that the framing of the message did not significantly impact attitude towards recycling. Similarly, the interaction term between ESI and framing conditions ($B = -0.049$) was not significant ($p = .306$), indicating that the interaction effect was not observed (see Table 11).

Table 11

Regression Coefficients Attitude towards Recycling

<i>Coefficients</i>	B	Std. Error	Beta	t	Sig.
Constant	3.529	0.493		7.163	<.001
Environmental Self-Identity (<i>EnvSelfId</i>)	0.286	0.138	0.364	2.067	0.040
Condition (MG, ML, EG, EL)	0.135	0.168	0.267	0.805	0.422
Interaction (<i>Int_EnvSelfId_Condition</i>)	-0.049	0.047	-0.365	-1.026	0.306

These findings suggest that while ESI is a significant predictor of attitude towards recycling, the anticipated moderation effect of ESI on the impact of framed messages was not supported.

5.4 Moderating Effect of Environmental Self-Identity on Intention to Recycle

Hypothesis 2b proposed that the positive moderating effect of a framed message emphasizing potential loss on an individual's intention to recycle would be more pronounced for those with a stronger ESI. To test this, a Multiple Regression Analysis was employed to explore the moderation of ESI on the effect of framing conditions on recycling intention.

The analysis revealed that the model, comprising ESI, framing conditions, and their interaction, explained a minimal portion of the variance in recycling intention ($R^2 = .004$), indicating that the predictors did not significantly enhance the model's explanatory power compared to a simpler model (see Table 12). The combined effect of the predictors was not statistically significant, as indicated by $F(3, 198) = 0.29, p = .832$ (see Table 13).

Table 12

Summary of Model Fit Intention to Recycle

Model Summary	Value
R	0.066
R²	0.004
Adjusted R²	-0.011
Std. Error of the Estimate	0.75479

Table 13

Analysis of Variance (ANOVA) Results Intention to Recycle

ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.496	3	0.165	0.290	0.832
Residual	112.802	198	0.570		
Total	113.299	201			

This means that adding the variables (ESI, framing conditions, and their interaction) did not result in a significant improvement in explaining the variance in recycling intention. In other words, the complex model did not perform significantly better than a model with fewer predictors (or no predictors), implying that including ESI, framing conditions and their interaction do not have a meaningful effect in this context. The minimal R^2 and non-significant F -value of .290 support this, indicating that the added complexity of including these predictors and their interaction did not contribute valuable explanatory power to the model.

Specifically, the coefficient for ESI ($B = 0.074$) and the coefficient for the framing conditions ($B = 0.120$) were positive but did not reach statistical significance ($p = .688$ and $p = .593$, respectively). Similarly, the interaction term between ESI and framing conditions ($B = -0.023$) was not significant ($p = .716$) (see Table 14).

Table 14

Regression Coefficients Intention to Recycle

<i>Coefficients</i>	B	Std. Error	Beta	t	Sig.
Constant	3.565	0.657		5.426	<.001
Environmental Self-Identity (<i>EnvSelfId</i>)	0.074	0.184	0.072	0.402	0.688
Condition (MG, ML, EG, EL)	0.120	0.224	0.182	0.536	0.593
Interaction (<i>Int_EnvSelfId_Condition</i>)	-0.023	0.063	-0.133	-0.365	0.716

These findings suggest that the anticipated moderation effect of ESI on the impact of framed messages on recycling intention was not observed. This indicates that, in this context, neither ESI nor the framing conditions significantly influenced recycling intention.

5.5 Influence Intrinsic and Extrinsic Motivation

This section will delve into the analysis of how different levels of intrinsic and extrinsic motivation and different types of message framing influence attitude and intention towards recycling. First section 5.5.1 will delve deeper into the mediative effect of extrinsic motivation. Whereas 5.5.2 will delve deeper into the moderative effect of intrinsic motivation.

5.5.1 Extrinsic Motivation as Mediator

Hypothesis 3 hypothesizes that extrinsic motivation will mediate the relationship between framing and recycling attitudes and intentions.

Hypothesis 3 was tested using the analysis strategy for testing mediation hypotheses as outlined by Baron and Kenny (1986). According to this method, mediation is assessed through three regression analyses: (1) the independent variable must significantly predict the dependent variable, (2) the independent variable must significantly predict the mediator, and (3) that when the mediator is added to the model, both the independent variable and the mediator must significantly predict the dependent variable (Moran, 2024).

The first condition for mediation is that the linear regression of the frame type on attitude or intention to recycle must be significant. If this condition is met, the first criterion for mediation is fulfilled. The second condition requires a significant effect of the frames on extrinsic motivation (also assessed through linear regression). The third condition is that extrinsic motivation must significantly predict attitude and/or intention to recycle (again using linear regression). If any of these conditions are not met, mediation cannot be established (Moran, 2024).

In Table 15 the coefficients for the frame type (“Condition”) on attitude is $B = 0.055$, $p = 0.790$, which is not significant ($p > 0.05$). In Table 16, the coefficients for the frame type (“Condition”) on intention is $B = -0.018$, $p = 0.948$, which is also not significant. In this case, since the frame type did not have a significant effect on attitude or intention to recycle, which was the first condition, mediation is not possible by definition (Moran, 2024).

Table 15*Coefficients Attitude towards Recycling*

<i>Coefficients</i>	B	Std. Error	Beta	t	Sig.
Constant	3.625	0.560		6.477	<.001
Intrinsic Motivation (IntrMotiv)	0.331	0.133	0.435	2.492	0.014
Extrinsic Motivation (ExtrMotiv)	-0.102	0.115	-0.153	0.886	0.377
Condition (MG, ML, EG, EL)	0.055	0.205	0.108	0.267	0.790
IntMot_Frame	-0.031	0.049	-0.257	-0.630	0.529
ExtMot_Frame	0.004	0.039	0.030	0.105	0.916

Table 16*Coefficients Intention to Recycle*

<i>Coefficients</i>	B	Std. Error	Beta	t	Sig.
Constant	3.907	0.775		5.041	<.001
Intrinsic Motivation (IntrMotiv)	0.001	0.184	0.001	0.004	0.997
Extrinsic Motivation (ExtrMotiv)	-0.030	0.159	-0.035	-0.190	0.849
Condition (MG, ML, EG, EL)	-0.018	0.284	-0.028	-0.065	0.948
IntMot_Frame	0.022	0.067	0.142	0.327	0.744
ExtMot_Frame	-0.009	0.054	-0.048	-0.158	0.874

Although it is already clear that extrinsic motivation cannot serve as a mediator in this context, the full mediation analysis as outlined by Baron and Kenny (1986) will still be conducted for the sake of completeness (Moran, 2024).

The second condition for mediation is that the frame type must significantly predict the extrinsic motivation. The regression analysis indicated a mean extrinsic motivation score ($M = 2.77$, $SD = 0.86$). The mean score for frame type conditions was ($M = 2.59$, $SD = 1.14$). The results indicated a Pearson correlation of $r = 0.067$ ($p = 0.172$), indicating a very weak positive relationship that is not statistically significant.

In Table 17, ANOVA results confirm that frame type does not significantly predict extrinsic motivation ($F = 0.902, p = 0.343$), with an R^2 of 0.004, meaning that only 0.4% of the variance in extrinsic motivation is explained by frame type.

Thus, since the frame type did not significantly predict extrinsic motivation, the second condition for establishing mediation is not met.

Table 17

Frame Type Predicting Extrinsic Motivation

<i>Statistic</i>	<i>Value</i>
R² (Model Summary)	0.004
ANOVA F-value	0.902
ANOVA Significance (p-value)	0.343
Coefficient for Condition (B)	0.051
Coefficient Significance (p-value)	0.343

The third condition is that extrinsic motivation must significantly predict attitude and/or intention to recycle (again using linear regression). The mean attitude towards recycling was ($M = 4.43, SD = 0.58$), while the mean intention to recycle was ($M = 3.93, SD = 0.75$). The correlation between extrinsic motivation and attitude was -0.095 ($p = 0.089$), indicating a very weak negative relationship, while the correlation between extrinsic motivation and intention was -0.050 ($p = 0.241$), also suggesting a very weak negative relationship. The model summary has an R^2 value of 0.010, indicating that extrinsic motivation explains only 1% of the variance in attitudes and intentions. ANOVA results revealed $F = 1.006$ with a significance level of $p = 0.367$, showing that the regression model is not statistically significant. The coefficients for extrinsic motivation predicting attitudes ($B = -0.133, p = 0.220$) and intentions ($B = -0.036, p = 0.665$) are both negative and not statistically significant, indicating that extrinsic motivation does not have a reliable effect on either attitude or intention to recycle (see Table 18). Since extrinsic motivation does not significantly predict either attitude or intention to recycle, the third condition for establishing mediation is not met (Moran, 2024).

Table 18*Extrinsic Motivation Predicting Attitude and Intention*

<i>Statistic</i>	Coefficient (<i>B</i>)	<i>p</i> -value
Attitude	-0.133	0.220
Intention	-0.036	0.665

In conclusion, since none of the three conditions of the analysis strategy for testing mediation hypotheses were met, it can be concluded that extrinsic motivation cannot act as a mediator in this study. Here, “frame type” (monetary gain/loss or environmental gain/loss) served as the independent variable (X), while “attitude and intention towards recycling” were the dependent variables (Y).

5.5.2 Intrinsic Motivation as Moderator

Hypothesis 4 posits that (Obligation-Based) intrinsic motivation will moderate the relationship between framing and recycling attitudes and intentions, with people who are intrinsically motivated exhibiting stronger positive attitude and intention to recycle when exposed to environmental gain/loss frames compared to monetary gain/loss frames. Linear Regression Analysis was used to examine the effects of (obligation based) intrinsic motivation on attitude and intention to recycle. The results indicate that intrinsic motivation is a significant predictor of attitude towards recycling ($B = 0.331, p = 0.014$) (see Table 15).

Individuals with higher intrinsic motivation tend to have a more positive attitude towards recycling ($r = .308, p < .001$) (see Table 19). However, the interaction between intrinsic motivation and message framing (environmental vs. monetary) does not significantly impact this relationship. This suggests that while obligation-based intrinsic motivation is important in shaping positive attitudes towards recycling plastic bottles and cans, the type of message framing does not further enhance or diminish the effect of intrinsic motivation on recycling attitudes.

Table 19*Influence of Predictors on Attitude*

<i>Predictor</i>	Correlation (r)	Sig.
Intrinsic Motivation (IntrMotiv)	0.308**	<.001
Extrinsic Motivation (ExtrMotiv)	-0.095	0.089
Condition	-0.082	0.122
IntMot_Frame	0.042	0.275
ExtMot_Frame	-0.117*	0.049

*Significant at $p < .05$, **Significant at $p < .001$

The regression analysis indicated that none of the predictors including intrinsic motivation, type of message framing (monetary vs. environmental) or the interaction between the predictors (IntMot_Frame), significantly affect the intention to recycle. The coefficients for these variables were all non-significant (all p -values > 0.05) (see Table 16).

The model's low R^2 value of 0.010, coupled with a non-significant F -value ($F(5,196) = 0.406$, $p = 0.844$), suggests that the predictors do not explain variability in recycling intention effectively (see Table 20 & 21). This indicates that the type of frame (monetary vs. environmental) does not significantly influence individuals' intentions to recycle in this context, even among those with high intrinsic motivation.

5.6 Overview Hypotheses

Table 20 presents a comprehensive overview of the findings related to the hypothesized relationships between the variables in this study.

Table 20

Overview of Hypotheses

Overview of Hypotheses		
H1a	<i>Individuals exposed to a loss-framed message will exhibit a positively increased attitude to recycle plastic bottles and cans compared to those exposed to a gain-framed message.</i>	<i>Rejected</i>
H1b	<i>Individuals exposed to a loss-framed message will exhibit a positively increased intention to recycle plastic bottles and cans compared to those exposed to a gain-framed message.</i>	<i>Rejected</i>
H2a	<i>Environmental Self-Identity moderates the relationship between loss-framed messages and the attitude to recycle, such that the stronger an individual's ESI, the stronger the positive effect of the loss-framed message on their attitude to recycle.</i>	<i>Partially supported</i>
H2b	<i>Environmental Self-Identity moderates the relationship between loss-framed messages and the intention to recycle, such that the stronger an individual's ESI, the stronger the positive effect of the loss-framed message on their intention to recycle.</i>	<i>Rejected</i>
H3	<i>Extrinsic motivation will mediate the relationship between framing and recycling attitudes and intentions.</i>	<i>Rejected</i>
H4	<i>(Obligation-Based) Intrinsic motivation will moderate the relationship between framing and recycling attitudes and intentions, with people who are intrinsically motivated exhibiting stronger positive attitude and intention to recycle when exposed to environmental gain/loss frames compared to monetary gain/loss frames.</i>	<i>Rejected</i>

6 Discussion

This study explored how environmental and monetary gain and loss frames, alongside intrinsic or extrinsic motivation and ESI, influence consumers' intentions and attitudes towards recycling plastic bottles and cans. The researcher was motivated to perform this study to explore how different framing strategies can influence people's attitude towards recycling and intentions to return plastic bottles and cans. The main aim of the researcher was to contribute to the development of more impactful communication strategies that can promote recycling practices both within the Netherlands and internationally.

The study's results show that using monetary or environmental gain or loss frames alone does not influence people's attitude towards recycling or intention to recycle. If one wants to positively influence consumers to recycle their plastic bottles and cans, the focus should be on appealing to their intrinsic motivation.

Obligation-based intrinsic motivation emerged as a significant predictor of positive attitudes towards recycling. This finding aligns with existing research emphasizing the critical role of intrinsic motivation in shaping pro-environmental behaviors (Deci & Ryan, 1985; Frey, 1997; Van Der Werff et al., 2013a). The data suggests that fostering a sense of personal obligation and intrinsic reward is more effective in promoting recycling behaviors than relying solely on message framing.

Regarding the moderating role of ESI, this study found that it does not significantly interact with gain or loss frames to affect recycling intentions. However, ESI itself was a significant predictor of positive attitudes towards recycling, consistent with Van Der Werff et al. (2013b). This suggests that while ESI is crucial for fostering positive attitudes towards recycling plastic bottles and cans, its interaction with message framing is complex and may be influenced by other unmeasured factors.

The study also examined the mediating role of extrinsic motivation and found that monetary gain and loss frames did not significantly impact attitudes or intentions to recycle, through extrinsic motivation. This result contrasts with prior research indicating that monetary incentives can influence recycling behavior (Cecere et al., 2014; Yang & Thøgersen, 2022).

In hypothesis testing, the critical value of t decreases as sample size increases, but this decrease is minimal beyond a certain point. For example, when looking at the t -distribution table (Appendix E), with approximately 50 participants, the critical value of t is about 2.009 (*Students T-table*, 2023). Increasing the sample size to 1000 participants would reduce the

critical value to about 1.962. The marginal reduction in the critical value of t from increasing the sample size is small (from 2.009 to 1.962) (*Students T-table*, 2023). This minor reduction would not likely lead to a different conclusion given the high p -values and low effect sizes observed. Given these findings, increasing the sample size in future research is unlikely to change the conclusion that framing (whether gain or loss, monetary or environmental) does not significantly impact recycling intentions or attitudes.

This next part of the discussion chapter analyzes the study's results by examining the effectiveness of gain and loss frames on individuals' attitudes and intentions to recycle (6.1). Secondly the role of ESI as a moderator will be analyzed (6.2). Finally, the role of extrinsic motivation as a mediator is analyzed, as well as the role of intrinsic motivation as a moderator (6.3). The findings from this research are being compared to the anticipated outcomes based on established theories from prior research. This section aims to provide a nuanced understanding of how the concepts can influence one's attitude towards recycling and intention to recycle. After that, the implications of the study are presented. Finally, limitations are addressed and suggestions for potential areas of exploration in future studies are proposed.

6.1 Effect of Gain and Loss Frames on Attitude and Intention to Recycle

Despite the compelling argument based on the prospect theory by Kahneman and Tversky (1979), the data did not show a significant higher positive effectiveness of loss-framed messages on recycling attitudes or intention than gain-framed messages. This aligns with findings from Eijnsink (2022), which also reported no significant difference in pro-environmental behavior intentions between gain and loss frames. This suggests a potential limitation in applying prospect theory to behaviors like recycling plastic bottles and cans, where factors beyond message framing, such as personal values, social norms, or convenience may play a more prominent role in shaping individuals' recycling attitudes and intentions.

Regarding attitudes towards recycling, environmental gain-framed messages were seen as having a slightly more positive influence on attitude towards recycling compared to loss-framed messages and monetary gain-framed messages. However, this observation was not statistically significant. This aligns with the findings of Blose et al. (2023), who reported that gain-framed messages can foster more positive attitudes towards pro-environmental behaviors. This suggests that environmental gain-framed messages might be more effective in shaping positive attitudes towards recycling, even if the statistical significance was not achieved in this study.

Regarding intention to recycle, no statistically significant evidence was found that loss frames resulted in higher intentions to recycle compared to gain frames. Interestingly this was not in line with findings of O’Keefe & Jensen (2007), whose meta-analysis revealed a marginal preference for gain-framed messages, primarily in disease prevention contexts. While their analysis did not specifically address recycling, it suggests that gain-framed messages might generally be more persuasive. However, in this study's context of recycling intentions, loss framing seems to have the potential for a stronger impact, even though the evidence was not conclusive

A possible explanation for why loss-framed messages did not show a higher effect on recycling attitudes and intentions in this study could have to do with how people perceive recycling behavior. Recycling could be seen by people as a habitual or low-effort task. Recycling may for many people not feel like a high-stakes decision, which means that the emotional impact of potential “losses” may not feel urgent or motivating enough. Maybe factors such as one’s habits or the norm set by one’s social network may outweigh the effect of the message frame. People may be more influenced by how easy it is to recycle or whether they see others around them doing the same, rather than by how the consequences of recycling (or not recycling) are framed.

6.2 Analysis of Influence of Environmental Self-Identity on Intention and Attitude to Recycle

While the interaction term between ESI and the framing condition was not significant, ESI itself was a significant predictor of a positive attitude towards recycling. This suggests that individuals with a stronger ESI have a more positive attitude towards recycling. This is consistent with the theoretical expectations set by Van der Werff et al. (2013b), who found that a strong ESI enhances the positive reception of environmentally framed messages. However, this study found no evidence that the effect of loss-framed messages on recycling attitudes is influenced by ESI. This suggests that the interaction between message framing and ESI on attitudes is more complex than expected, highlighting the need to consider additional moderating factors, such as social norms or demographics (Dempster et al., 2021; Dijkgraaf & Gradus, 2016).

The regression analysis conducted to test Hypothesis 2b did not support the hypothesis. This result contrasts with the findings of Van Der Werff et al. (2013b), who suggested that framing messages in terms of potential losses could heighten the intention to recycle among

individuals with a strong ESI. This study did not find evidence to support this moderating effect. One possible explanation for this discrepancy could be the difference in methodologies. Van Der Werff et al. (2013b) based their study on correlational data, while this research employed an experimental design, which might provide more definitive conclusions. It is also possible that other unmeasured factors, such as contextual or situational variables, could influence the relationship between ESI and message framing in this study. The lack of support for Hypothesis 2a indicates that the positive effect of loss-framed messages on recycling intention is not moderated by ESI, challenging the notion proposed by Van Der Werff et al. (2013b) and Balundé et al. (2019) that framing effects are more pronounced in individuals with a strong ESI.

6.3 Analysis of Motivation type on Attitude and Intention to Recycle

The result of hypothesis 3 is that extrinsic motivation cannot act as a mediator in the context of recycling. This result implies that different message frames do not significantly influence recycling attitudes and intentions through extrinsic motivation. This outcome contradicts prior research, which has suggested that monetary incentives can effectively influence recycling behavior through extrinsic motivation. For example, Cecere et al. (2014) and Yang & Thøgersen (2022) highlighted that extrinsic motivation, especially involving monetary incentives, is effective in encouraging recycling. Their studies demonstrated that financial incentives could drive behavior change by providing tangible rewards or reducing perceived costs, which would, in turn, appeal to one's extrinsic motivation which would then positively affect attitudes and intentions to recycle.

However, as the results of this study diverge from the findings of Cecere et al. (2014) and Yang & Thøgersen (2022), this indicates there exists a more complex interaction between motivation types and framing than initially expected. A possible explanation is that the magnitude of the monetary incentive used in this study might not have been perceived as compelling enough to influence behavior. Research has shown that for monetary incentives to be effective, they need to meet a certain threshold where individuals feel adequately rewarded for their efforts (Bonner & Sprinkle, 2002). The monetary incentive, which was based on real-life monetary rewards, might have been perceived as too small. It therefore may not have generated sufficient motivation to drive change in attitude towards recycling or intention to recycle.

Another explanation for why monetary framing did not have the expected influence on recycling attitudes could be explained by the interaction between intrinsic and extrinsic

motivations. If participants were also driven by intrinsic motivations, the additional impact of monetary framing might have been overshadowed by their existing intrinsic motivations. Prior research has suggested that when individuals are driven by intrinsic motivations, external rewards may not have the intended effect (Deci & Ryan, 1985; Frey, 1997; Van Der Werff et al., 2013a). This is in line with the current study's finding that intrinsic motivation, particularly obligation-based intrinsic motivation, played a key role in shaping positive attitudes toward recycling (see hypothesis 4a) (Deci & Ryan, 1985; Frey, 1997; Van Der Werff et al., 2013a). This research did however not specifically investigate the interaction effect between intrinsic and extrinsic motivations.

The findings did not support hypothesis 4. Neither the environmental nor the monetary framing conditions significantly affected recycling intentions or attitudes, even for participants with strong obligation-based intrinsic motivation. While this study found that obligation-based intrinsic motivation was a significant predictor of positive recycling attitudes overall, the framing of the messages did not create the expected difference in attitude and intention.

The finding that obligation-based intrinsic motivation significantly predicts positive attitudes toward recycling aligns with existing research. This emphasizes the important role of intrinsic motivation in shaping pro-environmental behavior. Specifically, obligation-based intrinsic motivation fosters a positive attitude towards such behavior (Van Der Werff et al., 2013a).

The results however contradict prior research suggesting message framing can influence recycling behavior by appealing to intrinsic motivations. For instance, Steinhorst & Klöckner (2017) and Van Der Werff et al. (2013a) found that if a person already cares about the environment, and you present them with a message that frames recycling in terms of its positive impact on the environment, that message will resonate more deeply with them. This resonance, in turn, may lead to stronger intentions to recycle or increase recycling behavior. In hypothesis 4 it was proposed that people with strong obligation-based intrinsic motivations would respond better to environmental framing than to monetary framing. However, both environmental and monetary framing turned out to have little effect on changing attitudes and intentions to recycle.

The lack of significant impact from both environmental and monetary framing on recycling intentions suggests that framing alone may not be enough to influence recycling behavior significantly. It is possible that the intrinsic motivation of participants, particularly those with strong obligation-based intrinsic motivation, already played a dominant role in

shaping their attitudes and intentions, making additional framing effects less pronounced. This reinforces the notion that while intrinsic motivation is crucial for fostering positive recycling attitudes, its influence may be less susceptible to variations in message framing.

Thus, while this study confirms that obligation-based intrinsic motivation is a significant driver of positive attitudes towards recycling, it did not find significant evidence that message framing (whether environmental or monetary) affected recycling intentions. This finding highlights a potential gap in the effectiveness of framing strategies for influencing recycling intentions and attitudes and underscores the complexity of motivation. The results suggest efforts to enhance recycling attitudes might be more effective if they focus on fostering intrinsic motivation rather than relying on the framing of messages.

6.4 Implications

In this section, the practical takeaways from the study's findings will be explored, focusing on how message framing impacts recycling behaviors. Also, the significance of intrinsic motivation and environmental self-identity (ESI) in designing more effective recycling campaigns will be discussed.

The findings suggest that the framing of recycling messages (whether as gains or losses, and whether focusing on monetary or environmental aspects) does not have a substantial impact on individuals' recycling intentions or attitudes (Tversky & Kahneman, 1981). This could imply that other factors, such as personal values convenience social norms, or intrinsic motivations, may play a more crucial role in determining recycling behaviors (Deci & Ryan, 1985; Frey, 1997; Mahardika et al., 2020; Van Der Werff et al., 2013b). The results underscore the complexity of influencing pro-environmental behaviors and suggest that putting message framing on plastic bottles and cans may not be sufficient to drive significant changes in consumers' recycling habits. This suggests that in the future there might be a need for new theories or the addition of extra variables to the Prospect Theory, that enable better understanding of the dynamics of recycling behaviors in this context.

While the interaction effects between ESI and message framing on intention to recycle and attitude towards recycling were not significant, the results highlight the importance of considering ESI in messaging campaigns. Individuals with a stronger ESI showed a more positive attitude towards recycling (Van Der Werff et al., 2013b). This finding suggests that tailoring messages to resonate deeply with individuals' environmental

values should be a central focus in the design of recycling campaigns in the future. By aligning messaging with the ESI of the target audience, campaigns could significantly enhance their effectiveness, ultimately leading to higher engagement and participation in recycling behaviors.

The results underscore the importance of fostering intrinsic motivation for improving attitudes towards recycling. Programs and interventions aiming to increase recycling might benefit from focusing on enhancing individuals' intrinsic values and personal commitment to environmental protection (Van Der Linden, 2015). Strategies that aim to positively increase recycling behavior of plastic bottles and cans should prioritize intrinsic motivation rather than focusing on different types of frames.

Furthermore, these findings raise important questions regarding the application of prospect theory in environmental behavior contexts. Prospect theory, which states that individuals make decisions based on the potential for gains or losses, is often used to explain how different framing strategies might influence behavior (Kahneman & Tversky, 1979). However, the results of this study suggest that the application of prospect theory might be limited in the context of recycling behaviors, particularly when strong intrinsic motivations are at play.

6.5 Limitations & Future Research Suggestions

This section discusses the key limitations of the study. These limitations are important for accurately interpreting the study's findings and underscore the need for improvements in future research.

Firstly, the data in the final experiment was collected from surveys distributed to personal contacts on Instagram and WhatsApp groups created by study associations at the University of Twente and Wageningen University. This sample, primarily consisting of university-affiliated social media groups, may not fully represent the broader population. University students often have similar experiences, levels of education and knowledge about environmental issues, which can shape their attitudes and motivations towards recycling. Students at universities like the UT and especially Wageningen University, which has a high focus on sustainability, might already care more about the environment compared to the general public. The general population is more varied in age, educational level, jobs and financial situations, which can affect how people think about recycling. For example, older adults, those

with a lower education level or people in rural areas may face different challenges with recycling. Those with lower incomes might focus more on saving money than on environmental issues. Because of these differences, the results from a student sample may not fully reflect the views of the broader population. Future research should take into consideration the need for a more diverse and representative sample, encompassing participants from various demographic backgrounds, geographical locations and social networks to enhance the generalizability of the findings.

Another limitation of this study is that the survey was conducted exclusively in English. This presents a concern given that the predominant demographic of respondents is assumed to be Dutch, thereby introducing a language barrier. Participants were not directly asked about their demographics in the survey, however as they were approached by the researcher directly via for instance her social media platforms, it is highly likely that a large proportion of the sample size speaks Dutch. To mitigate any misunderstandings or ambiguities, there was avoidance of complex terminology throughout the survey. When there was a word or question that might be difficult to understand, an easy explanation of the word would be added. Future studies should consider offering surveys in multiple languages to match participants' language preferences and prevent misunderstandings.

The topic of sustainability is complex and made more complicated by societal pressures to conform to dominant societal norms. This dynamic may lead to discrepancies between the respondents' stated intentions and attitudes and their actual behaviors or beliefs (Zhu et al., 2024). Such discrepancies can be attributed to the social desirability bias, wherein respondents tend to provide answers they believe are socially acceptable (Zhu et al., 2024). Respondents may have felt compelled to answer the survey in ways that they thought were expected to be appropriate. To mitigate this bias, respondents were assured of their anonymity at the start of the survey. Although this strategy does not eliminate social desirability bias, it likely helped to reduce its impact. Future studies could reduce social desirability bias even more by using indirect questioning techniques, that allow participants to respond to sensitive questions in a way that feels less confrontational or judgmental.

Another limitation of the study was that the reliability of the (obligation based) intrinsic motivation scale was reflected in a Cronbach's alpha of $\alpha = .62$ ($N = 3$) and the reliability of the extrinsic motivation scale was $\alpha = .658$ ($N = 3$). Both indicating questionable internal consistency, as these α both fall within the 0.6 to 0.7 range (Van Der Werff et al., 2013a; Bobbitt, 2021). These low α 's suggests that the items on the scale may not consistently measure the same underlying concept, which raises concerns about the accuracy of the results. With

questionable internal consistency, there is a risk that the observed effects might be due to measurement error rather than actual differences in intrinsic motivation or extrinsic motivation. It should be acknowledged that the researcher had limited experience with statistical analysis. Some of these issues, such as the reliability concerns of the scale or even for instance the use of an ANOVA test where in hindsight a t-test would also have sufficed, were noticed too late in the research process to be addressed effectively. As a result, although these motivational scales were deemed the most relevant and applicable tools for measuring obligation-based intrinsic motivation and extrinsic motivation, the reliability issues may have compromised the study's findings in this area. This makes it harder to draw definitive conclusions. Future research should focus on improving these scales or explore alternative methods to measure intrinsic and extrinsic motivation more reliably.

An important limitation of this study lies in the design of the stimulus material and the absence of a manipulation check during the main experiment. The small text size and the subtle nature of the monetary and environmental gain/loss messages on the labels may have made the incentives easy to overlook. This could have resulted in participants not fully noticing or processing the framed messages, which likely reduced the influence of these messages on their intentions and attitudes toward recycling. Although a "stimulus development test" was conducted prior to the experiment to identify the most effective gain and loss frames for both monetary and environmental messages, the main experiment did not include a similar verification process. Without a manipulation check, there was no way to confirm whether participants thoroughly read, understood and remembered the framed messages. As a result, the findings might be compromised by participants who did not fully process the framed messages, thereby potentially weakening the reliability of the conclusions drawn about the impact of message framing on recycling intentions and attitudes. A possible way to implement a manipulation check in similar future researches is to include a brief set of questions immediately after the exposure to the framed messages, asking participants to summarize or paraphrase the key points of the messages they received. Additionally, participants could be asked to rate their understanding and recall of the messages. This approach would provide a means to verify that participants have read the framed messages and correctly interpreted and remembered them, thereby enhancing the reliability of the study's conclusions.

Furthermore, in the actual experiment no questions were asked to the participants regarding whether they thought the labels were authentic. If participants believe that Coca-Cola would not use such slogans as subtitles on their plastic bottles, this raises concerns about the ecological validity of the experiment. Ecological validity refers to the degree to which the

findings of a study can be applied to real-world settings (Schmuckler, 2001). The use of unrealistic or atypical messaging could affect how participants perceive the frames and subsequently affect their attitudes and intentions regarding recycling. Future research should include one or more questions in either the stimulus development test or the actual experiment that ask participants to rate the authenticity of the stimuli. This addition would help enhance the ecological validity of the study.

The incentives used in the experiment, such as the monetary rewards or environmental impacts, may have been too modest to generate a strong motivational effect. If larger financial incentives or more dramatic environmental consequences had been applied, the results could have shown a more significant impact on attitudes and intentions to recycle. Future research should explore the threshold at which monetary incentives become effective, testing various levels to determine what amount meaningfully influences recycling behavior. Additionally, examining the severity of environmental consequences in future studies may reveal whether more serious framing of environmental issues leads to stronger behavioral responses. This could give a better idea of how to make these kinds of messages more effective in promoting recycling.

While this study highlighted obligation-based intrinsic motivation as an important factor influencing positive recycling attitudes, it did not examine the interaction between intrinsic and extrinsic motivations. This creates a gap in understanding how these motivations may interact to influence one's attitude towards recycling and intention to recycle. It might be interesting for future research to focus on investigating how extrinsic rewards might either complement or undermine intrinsic motivation. Gaining insights into these dynamics might be important for developing effective messaging strategies and interventions aimed at promoting positive attitudes and intentions toward recycling.

Furthermore, future research could explore variables or moderators that might interact with ESI to influence recycling behaviors. This could provide deeper insights into how to effectively tailor recycling interventions. Future research could for example explore how convenience interacts with ESI to influence recycling attitudes and intentions. Individuals with a high ESI could be more likely to recycle if they also find it easy to do so. This would help show how both a strong ESI and simple, practical solutions like nearby recycling bins, can work together to increase recycling efforts.

6.6 Conclusion

In conclusion, this research highlights the limitations of relying solely on message framing to influence recycling behaviors. The findings emphasize the importance of intrinsic motivation, particularly a sense of personal obligation, in shaping positive attitudes towards recycling (Deci & Ryan, 1985; Frey, 1997; Van Der Linden, 2015). Future interventions aiming to enhance recycling behaviors should focus on fostering intrinsic motivation rather than depending primarily on framing strategies. This approach possibly provides more effective and sustainable outcomes in promoting the recycling of plastic bottles and cans.

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Appendices

During the preparation of this work the author(s) used ChatGPT in order to rewrite lengthy sentences, making them more understandable. The goal was to enhance the overall readability of this piece and, ultimately, convey the information in a clearer manner to the reader." After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the work.

Appendix A

Criteria for Gain- and Loss-framed messages

Gain Frame Criteria (Kahneman & Tversky, 1979):

1. Focuses on the good things about recycling plastic bottles and cans.
2. Talks about the rewards you get from recycling, like money or helping the environment.
3. Explains why it's good to recycle, like making the environment cleaner or saving resources.
4. Makes you feel hopeful and motivated to recycle more.
5. Shows recycling as something positive and rewarding.

Loss Frame Criteria (Kahneman & Tversky, 1979):

1. Highlights the bad things that happen if you don't recycle plastic bottles and cans.
2. Points out the risks or problems if you don't recycle, like hurting the environment or wasting resources.
3. Explains why it's bad not to recycle, like causing pollution or using up too much of our resources.
4. Makes you feel worried and serious about not recycling.
5. Shows recycling as something important to avoid negative outcomes.

Appendix B

Measurement scales

	Items to measure “Environmental Self-Identity” (Van Der Werff et al., 2013b)
Environmental Self-Identity (Van Der Werff et al., 2013b)	Acting environmentally-friendly is an important part of who I am.
	I am the type of person who acts environmentally-friendly.
	I see myself as an environmentally-friendly person.

1 = strongly disagree, 5 = strongly agree

	Items to measure “Intention to Recycle” (Arli et al., 2019)
Intention to recycle (Arli et al., 2019)	How likely are you to recycle your plastic bottles and/or cans at home in the next 4 weeks.
	I intend to recycle my plastic bottles and/or cans at home every day in the forthcoming month.
	I will try to recycle my plastic bottles and/or cans at home each day in the forthcoming month.

1 = strongly disagree, 5 = strongly agree (gemiddelde nemen, randomizen)

	Items to measure “Credibility” (Appelman & Sundar, 2015)
Credibility (Appelman & Sundar, 2015)	This message is accurate.
	This message is authentic.
	This message is believable.

1 = strongly disagree, 10 = strongly agree

	Items to measure “Clarity”
Clarity	The message is expressed in an easily understandable manner.
	The intended meaning of the message is clear.
	I have no difficulty comprehending the main idea conveyed by the message.

1 = strongly disagree, 10 = strongly agree

Introductory question:

What would motivate you to recycle?

	Items to measure “Extrinsic Motivation for pro-environmental behavior” (Taberbero & Hernández, 2010; Grant, 2008)
Extrinsic Motivation for Pro-Environmental Behavior (Taberbero & Hernández, 2010; Grant, 2008)	Because I have the possibility of receiving a reward.
	Because I have the possibility of avoiding a penalty.
	Because I have the possibility of gaining social acceptance.
	Items to measure “Obligation Based Intrinsic Motivation for Pro-Environmental Behavior” (Van Der Werff et al., 2013a; Grant, 2008)
Obligation-Based Intrinsic Motivation for Pro-Environmental Behavior (Van Der Werff et al., 2013a; Grant, 2008)	Because I feel morally obliged to act in an environmentally-friendly manner.
	Because I would feel guilty if I did not act in an environmentally-friendly manner.
	Because I would be a better person if I would act in an environmentally-friendly manner.

1= strongly disagree, 5 = strongly agree (Likert & Roslow, 1934).

	Items to measure “Attitude towards Recycling” (Smith et al., 1994)
Attitude towards Recycling (Smith et al., 1994)	Recycling is: 1 = bad ... 5 = good
	Recycling is: 1 = foolish ... 5 = wise
	Recycling is: 1 = undesirable ... 5 = desirable
	Recycling is: 1 = worthless ... 5 = very valuable

Appendix C

Bottle Design



Front label bottle with gain-framed message

Appendix D

Stimulus Development Test Framework

List of monetary gain-frames

1. “Earn 15 Cents with Every Recycled Bottle! Turn your trash into cash.”
2. “Get Paid to Recycle! Earn 15 cents for every bottle you return.”
3. “Cash In on Recycling! Get rewarded with 15 cents for every bottle you recycle.”
4. “Make Recycling Rewarding! Get Paid 15 Cents for Every Bottle Recycled.”
5. “Cash Back for Every Bottle! Recycle and Earn 15 Cents Each Time.”

Control frame (monetary loss-frame): “Throwing Away Money! Ignoring Recycling Results in a 15-Cent Loss per Bottle.”

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
FEarn15Cents	8	7	9	8.54	.971
FGetPaidTo	8	7	9	7.77	.760
FCashIn	8	6	9	7.11	.903
FThrowingAway	8	5	8	5.57	1.287
FFinalMakeRecycling	8	6	9	8.21	1.287
FCashBack	8	5	9	7.71	1.329
Valid N (listwise)	8				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Earn15Cents	11	7	9	8.34	1.021
GetPaidTo	11	5	9	7.35	1.100
CashIn	11	5	9	6.84	1.023
ThrowingAway	11	5	9	6.27	1.659
MakeRecycling	11	5	9	7.69	1.538
CashBack	11	5	9	7.78	1.204
Valid N (listwise)	11				

List of environmental gain-frames

1. “Protect Our Planet! Recycle this bottle to help preserve the environment.”
2. “Promote Sustainability! Recycling this bottle conserves natural resources.”
3. “Support Clean Air! Recycling reduces pollution and improves air quality.”
4. “Preserve Nature! Recycling minimizes habitat destruction and preserves ecosystems.”
5. “Combat Climate Change! Recycling helps mitigate global warming and its impacts.”

Control frame (environmental loss-frame): “Not Recycling This Bottle Adds to Pollution and Harms The Environment.”

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
FProtectOurPlanet	8	7	10	8.32	1.074
FPromoteSustainability	8	4	9	6.66	1.828
FSupportCleanAir	8	4	8	6.32	1.618
FPreserveNature	8	4	10	7.13	2.137
FNotRecycling	8	3	9	6.16	1.928
FCombatClimate	8	6	9	6.98	1.006
Valid N (listwise)	8				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ProtectOurPlanet	11	7	10	8.17	.979
PromoteSustainability	11	4	9	6.75	1.712
SupportCleanAir	11	4	8	6.44	1.463
PreserveNature	11	4	10	6.92	1.933
NotRecycling	11	3	9	6.43	1.711
CombatClimate	11	6	9	6.99	.891
Valid N (listwise)	11				

List of monetary loss-frames

1. “Don't Miss Out on 15 Cents per Plastic-Bottle!”
2. “Missing Out on Earnings! Ignoring recycling costs you 15 cents per bottle.”
3. “Avoid Losing Money! Recycle your bottle and avoid losing 15 cents.”
4. “Ignoring Recycling Means Losing 15 Cents per Bottle.”
5. “Cost of Inaction! Each Unrecycled Bottle Costs You 15 Cents.”

Control frame (monetary gain-frame): “Unlock Cash with Every Bottle! Earn 15 Cents for Every Recycled Bottle.”

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
FDontMissOut	8	5	8	6.57	1.544
FMissingOutOn	8	6	9	7.75	1.160
FAvoidLosing	8	7	10	8.29	.907
FIgnoringRecycling	8	5	9	7.59	1.386
FUnlockCash	8	1	7	5.68	1.986
FCostOfInaction	8	6	10	7.27	1.613
Valid N (listwise)	8				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Dontmissout	11	5	9	6.99	1.487
MissingOutON	11	6	9	7.79	.993
AvoidLosing	11	7	10	8.17	.956
IngoingRecycling	11	4	9	7.34	1.544
UnlockCash	11	1	8	6.21	1.903
CostOfInaction	11	4	10	6.97	1.765
Valid N (listwise)	11				

List of environmental loss-frames

6. “Harming Our Earth! Failing to recycle this bottle damages the environment.”
7. “Undermining Sustainability! Not recycling this bottle depletes resources.”
8. “Contributing to Pollution! Discarding this bottle pollutes the air we breathe.”
9. “Threatening Ecosystems! Neglecting to recycle this bottle harms natural habitats.”
10. “Worsening Climate Crisis! Disregarding recycling makes climate change worse.”

Control frame (environmental gain-frame): Save Our Seas! Recycling This Bottle Protects Marine Life Habitats.”

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
FHarmingOurEarth	8	7	10	8.63	1.088
FWorseningClimate	8	3	9	6.75	1.981
FUnderminingSustainability	8	5	9	6.46	1.322
FContributingTO	8	4	8	6.68	1.226
FSaveOurSeas	8	5	9	6.88	1.409
FThreateningEcosystems	8	6	10	7.66	1.479
Valid N (listwise)	8				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
HarmingEarth	11	7	10	8.48	.944
WorseningClimate	11	3	9	6.91	1.721
UnderminingSustainability	11	5	9	6.96	1.413
ContributingPollution	11	4	8	6.73	1.137
SaveOurSeas	11	5	9	7.31	1.428
ThreateningEco	11	6	10	7.88	1.341
Valid N (listwise)	11				

Appendix E

Critical Values of t for two-tailed tests

Critical values of t for two-tailed tests

Significance level (α)

Degrees of freedom (df)	.2	.15	.1	.05	.025	.01	.005	.001
1	3.078	4.165	6.314	12.706	25.452	63.657	127.321	636.619
2	1.886	2.282	2.920	4.303	6.205	9.925	14.089	31.599
3	1.638	1.924	2.353	3.182	4.177	5.841	7.453	12.924
4	1.533	1.778	2.132	2.776	3.495	4.604	5.598	8.610
5	1.476	1.699	2.015	2.571	3.163	4.032	4.773	6.869
6	1.440	1.650	1.943	2.447	2.969	3.707	4.317	5.959
7	1.415	1.617	1.895	2.365	2.841	3.499	4.029	5.408
8	1.397	1.592	1.860	2.306	2.752	3.355	3.833	5.041
9	1.383	1.574	1.833	2.262	2.685	3.250	3.690	4.781
10	1.372	1.559	1.812	2.228	2.634	3.169	3.581	4.587
11	1.363	1.548	1.796	2.201	2.593	3.106	3.497	4.437
12	1.356	1.538	1.782	2.179	2.560	3.055	3.428	4.318
13	1.350	1.530	1.771	2.160	2.533	3.012	3.372	4.221
14	1.345	1.523	1.761	2.145	2.510	2.977	3.326	4.140
15	1.341	1.517	1.753	2.131	2.490	2.947	3.286	4.073
16	1.337	1.512	1.746	2.120	2.473	2.921	3.252	4.015
17	1.333	1.508	1.740	2.110	2.458	2.898	3.222	3.965
18	1.330	1.504	1.734	2.101	2.445	2.878	3.197	3.922
19	1.328	1.500	1.729	2.093	2.433	2.861	3.174	3.883
20	1.325	1.497	1.725	2.086	2.423	2.845	3.153	3.850
21	1.323	1.494	1.721	2.080	2.414	2.831	3.135	3.819
22	1.321	1.492	1.717	2.074	2.405	2.819	3.119	3.792
23	1.319	1.489	1.714	2.069	2.398	2.807	3.104	3.768
24	1.318	1.487	1.711	2.064	2.391	2.797	3.091	3.745
25	1.316	1.485	1.708	2.060	2.385	2.787	3.078	3.725
26	1.315	1.483	1.706	2.056	2.379	2.779	3.067	3.707
27	1.314	1.482	1.703	2.052	2.373	2.771	3.057	3.690
28	1.313	1.480	1.701	2.048	2.368	2.763	3.047	3.674
29	1.311	1.479	1.699	2.045	2.364	2.756	3.038	3.659
30	1.310	1.477	1.697	2.042	2.360	2.750	3.030	3.646
40	1.303	1.468	1.684	2.021	2.329	2.704	2.971	3.551
50	1.299	1.462	1.676	2.009	2.311	2.678	2.937	3.496
60	1.296	1.458	1.671	2.000	2.299	2.660	2.915	3.460
70	1.294	1.456	1.667	1.994	2.291	2.648	2.899	3.435
80	1.292	1.453	1.664	1.990	2.284	2.639	2.887	3.416
100	1.290	1.451	1.660	1.984	2.276	2.626	2.871	3.390
1000	1.282	1.441	1.646	1.962	2.245	2.581	2.813	3.300
Infinite	1.282	1.440	1.645	1.960	2.241	2.576	2.807	3.291



(Students T -table, 2023)

Appendix F

Stimulus Development Test Results

Table 2

List of Monetary Gain-frames

<i>Frame</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
1. "Earn 15 Cents with Every Recycled Bottle! Turn your trash into cash."	8	7	9	8.54	.971
2. "Get Paid to Recycle! Earn 15 cents for every bottle you return."	8	7	9	7.77	.760
3. "Cash In on Recycling! Get rewarded with 15 cents for every bottle you recycle."	8	6	9	7.11	.903
4. "Make Recycling Rewarding! Get Paid 15 Cents for Every Bottle Recycled."	8	6	9	8.21	1.287
5. "Cash Back for Every Bottle! Recycle and Earn 15 Cents Each Time."	8	5	9	7.71	1.329

Control Frame (Monetary Loss-Frame)

<i>Control Frame</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
"Throwing Away Money! Ignoring Recycling Results in	8	5	8	5.57	1.287

a 15-Cent Loss per Bottle.”

Table 3

List of Environmental Gain-frames

<i>Frame</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
1. <i>“Protect Our Planet! Recycle this bottle to help preserve the environment.”</i>	8	7	10	8.32	1.074
2. <i>“Promote Sustainability! Recycling this bottle conserves natural resources.”</i>	8	4	9	6.66	1.828
3. <i>“Support Clean Air! Recycling reduces pollution and improves air quality.”</i>	8	4	8	6.32	1.618
4. <i>“Preserve Nature! Recycling minimizes habitat destruction and preserves ecosystems.”</i>	8	4	10	7.13	2.137
5. <i>“Combat Climate Change! Recycling helps mitigate global warming and its impacts.”</i>	8	6	9	6.98	1.006

Control Frame (Environmental Loss-Frame)

<i>Control Frame</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
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<i>“Not Recycling This Bottle Adds to Pollution and Harms The Environment.”</i>	8	3	9	6.16	1.928
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Table 4

List of Monetary Loss-Frames

	<i>Frame</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
1.	<i>“Don't Miss Out on 15 Cents per Plastic-Bottle!”</i>	8	5	8	6.57	1.544
2.	<i>“Missing Out on Earnings! Ignoring recycling costs you 15 cents per bottle.”</i>	8	6	9	7.75	1.160
3.	<i>“Avoid Losing Money! Recycle your bottle and avoid losing 15 cents.”</i>	8	7	10	8.29	.907
4.	<i>“Ignoring Recycling Means Losing 15 Cents per Bottle.”</i>	8	5	9	7.59	1.386
5.	<i>“Cost of Inaction! Each Unrecycled Bottle Costs You 15 Cents.”</i>	8	6	10	7.27	1.613

Control Frame (Monetary Gain-Frame)

	<i>Control Frame</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
	<i>“Unlock Cash with Every Bottle! Earn 15 Cents for Every Recycled Bottle.”</i>	8	1	7	5.68	1.986

Table 5

List of environmental loss-frames

<i>Frame</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
11. "Harming Our Earth! Failing to recycle this bottle damages the environment."	8	7	10	8.63	1.088
12. "Undermining Sustainability! Not recycling this bottle depletes resources."	8	5	9	6.46	1.322
13. "Contributing to Pollution! Discarding this bottle pollutes the air we breathe."	8	4	8	6.68	1.226
14. "Threatening Ecosystems! Neglecting to recycle this bottle harms natural habitats."	8	5	9	7.59	1.386
15. "Worsening Climate Crisis! Disregarding recycling makes climate change worse."	8	3	9	6.75	1.981

Control Frame (Environmental Gain-Frame)

<i>Control Frame</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
"Save Our Seas! Recycling This Bottle Protects Marine Life Habitats."	8	5	9	6.88	1.409

Appendix G

Groups Final Experiment

		<i>Value Label</i>	<i>Count (N)</i>
Frame Type	1	Gain	96
Simple	2	Loss	106
Frame Type	1	Monetary Gain Frame	46
	2	Environmental Gain Frame	50
	3	Monetary Loss Frame	46
	4	Environmental Loss Frame	60