The role of message framing in the use of reusable coffee cups

Evidence from the Netherlands

Master thesis Marketing

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Abstract

This paper researched the effect of message framing on sustainable behavioral intentions and if reactance mediates this effect. Moreover, current sustainable behavior is tested as a moderator. The study was conducted under people who live in the Netherlands, by using primary data that is gathered through an online survey. The results show that there is a relationship between message framing and reactance. Reactance is the lowest in the reference group, followed by the gain group and it is the highest in the loss group, for people who currently do not use an RCC. In the same subsample, gain messages are more effective in increasing likeliness to start using an RCC than loss and reference messages. However, the estimated effects for the gain and loss message are very similar to each other. In the subsample that already uses an RCC, no significant effects are found. Moreover, the data does not show a significant mediating role of reactance in the relationship between message framing and likeliness to start using an RCC. This study has some limitations, however it gives some valuable insights in the question of how to increase sustainable behavior through message framing. These insights can be used by companies who want to increase sustainable behavior through marketing.

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1. Introduction

In the Netherlands, on average 19 million plastic cups and food packaging are used and thrown away on a daily basis (Bogers, 2023). Multiple companies that sell hot drinks to go, such as AH to go, Kiosk and Starbucks, attempt to change people's environmental behavior[1]. Environmental behavior is the act of "adopting attitudes and behaviors aiming to minimize any adverse effects on natural environment", as described by do Paço and Laurett (2019). Such companies try to change this behavior by offering discounts to people who bring a reusable coffee cup (RCC). Usually, these are discounts of €0,25 (Nederlandse Spoorwegen, n.d.; Kiosk, n.d.). From July 1st, 2023, companies and other organizations in the Netherlands are no longer allowed to give away disposable cups for free, meaning they have to impose a fee whenever someone purchases a drink and needs a disposable cup (Rijksoverheid, 2022). Moreover, companies are obligated to explicitly mention the extra costs, rather than adding them to the price of the product. The goal of this measure is to decrease the amount of plastic waste in the country. To maximize the effect of this measure, it is important to understand how to best convey the message to consumers of hot drinks to go. In my thesis, I want to research if message framing has an effect on the use of reusable cups. That is, do different kinds of messages lead to different effects in terms of the use of RCCs. Moreover, I will investigate if the effect is mediated by reactance and if it is moderated by current sustainable behavior. The research question is:

How does message framing affect the use of reusable coffee cups, is this effect mediated by reactance and is it moderated by current behavior?

This study has a high social relevance. Understanding the effect of framing on the use of reusable cups is crucial in promoting the use of such cups. When we understand how we can influence people's sustainable behavior, we can increase such behaviors

[1] Environmental behavior and sustainable behavior are used interchangeably throughout this paper.

and this will in turn improve the state of our environment. An example of this is the ban on free plastic bags, which was introduced in 2016 in the Netherlands. Since then, the use of plastic bags has fallen with 80 percent. This also had a positive effect on the environment, because the number of bags in litter decreased with about 60 percent (Nederlandse Omroep Stichting, 2020). Moreover, this study also has a managerial relevance. The understanding of framing effects in the setting of disposable cups and RCCs is also very useful for organizations when making marketing decisions. Companies that offer coffee (and other drinks) to go, can use the results in this paper to adjust the way they market the extra charges for disposable cups and therewith motivate customers to engage in sustainable behavior. Additionally, in the long run these marketing insights can also be extended to minimize the sales of other plastic packaging. In addition to the practical benefits of this research, it also has an academic relevance. The research is an extension to the literature that is currently available about this topic. There is no research in the field of sustainability yet that investigates the role that reactance, the motivation to restore a freedom after it has been lost or threatened, plays in the effect of message framing on sustainable behavior. This is however an interesting variable to consider in the model, since it is proven to have an effect in other fields of behavior. Therefore, this research adds novelty to the current literature.

In this paper, the effect of message framing on the likeliness to start using an RCC, the mediating role of reactance and the moderating role of current behavior are investigated. To research this, an experiment is done.

In the remainder of the paper, there will first be background information on plastic, followed by an explanation on prospect theory and framing, and a literature review on the effects of framing on sustainable behavior and the effect of reactance on behavior. After that, the methodology is described. Then, the data is analyzed, the hypotheses are tested and the results are interpreted. This paper ends with a summary and conclusion, a discussion on the paper's validity and limitations and opportunities for future research.

2. Background

In this chapter, it will first be explained what plastics are exactly and what happens to plastics after use. Then it is discussed why plastics are harmful, both globally and locally, and what the Dutch government is imposing to decrease the amount plastic waste. Moreover, prospect theory and framing will be explained. After that, a literature review is given. In this review, the effects of framing on sustainable behavior are explained, as well as the mediating role that reactance plays in the effect of framing on behavior in the health care domain.

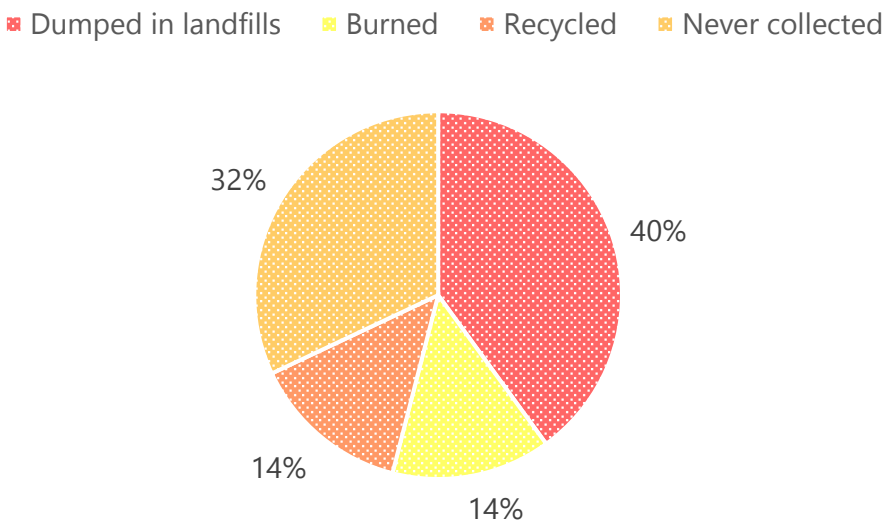
2.1 Plastic

Plastic is a material made of polymers, which are long, flexible chains of chemical compounds. These polymers allow plastics to be easily shaped into all kinds of products, especially under heat and pressure. While there are plastics that come from plants, most plastics used today are man-made and derived from fossil fuels, as they are cheaper. The main sources for plastic are oil and gas, which are converted into ethane and propane, respectively, in refineries. Then, ethane and propane are broken down into smaller molecules, ethylene and propylene. Thereafter, a catalyst is mixed in, linking the molecules together into polymers. We now speak of the materials polyethylene and polypropylene, two kinds of plastic. Small pieces of plastic, called nurdles, are transported to manufacturers who can then mold them into different kinds of plastic products. From all plastics produced, 40% is single use plastic, such as disposable cups, food packaging and plastic straws (National Geographic, 2018).

Since 1950, about 8.3 billion tons of plastic have been produced. Over 6.3 billion tons of that are now waste, of which around 2.15 billion tons were never collected and is now polluting our planet (Borghardt, 2022).

Figure 1

What happens to plastic after use



The plastics that are being burned after use release climate-wrecking gases and toxic air pollution. The plastics that are dumped in landfills or are never collected end up as plastic waste on the land and in the oceans. After some time, due to sunlight, wind and waves, plastics break down into so-called microplastics, which are virtually impossible to recover (Parker, 2019). Since plastics take over 400 years to decompose, they contribute to environmental degradation (City of Westminster, n.d.).

Plastics are harmful for the environment, because they are most often made from fossil fuels, pollute the earth and are nearly impossible to recover after they have broken down into microplastics, but it is also bad for the wildlife and for humans. Plastics can be consumed by land-based animals, such as elephants, tigers, camels and other mammals (Parker, 2019). Moreover, over 700 aquatic species suffer from plastic waste, because they can get entangled in it or eat it. 9 out of 10 seabirds, 1 out of 2 whales and dolphins and 1 out of 3 sea turtles have plastic in their stomachs (Borghardt, 2022). Once plastic is inside an animal, it can block digestive tracts, pierce organs or cause starvation (Parker, 2019).

In countries where there is poor waste management, like India, people are affected the most due to higher rates of pollution. Moreover, people relying on marine resources have an endangered livelihood due to the plastic waste (Sustainability Times, 2021). Another alarming consequence of the use of plastic is the microplastics that have been found in the air, drinking water systems, fruits and vegetables, but also in human lungs and blood. "It is alarming because we are far into this problem and we still do not understand the consequences, and it is going to be very difficult to back out of it if we have to" says Janice Brahney, biochemist at Utah State University (Parker, 2022).

In the Netherlands, on average 19 million plastic cups and food packaging are used and thrown away on a daily basis (Bogers, 2023). Around 45% of all plastic packaging that is collected is being recycled, which is higher than the average in the European Union and worldwide. However, this also means that 55% is being burned, contributing to climate change and air pollution (Plastics Europe, n.d.). Moreover, a lot of plastics from the Netherlands are exported to other countries. In 2021, over 200 million kilos of plastic from the Netherlands were exported to countries outside the European Union. Almost 70 million kilos were exported to Indonesia and almost 64 million kilos were exported to Vietnam. This makes the Netherlands the third largest plastic waste exporter in the world in 2021, surpassed only by Japan and the United States (Hettema & Hoenders, 2022).

The Dutch government has introduced several initiatives in the recent years to decrease the amount of plastics used. One example is the aforementioned ban on free plastic bags, in 2016. This new law effectively changed behavior, since for 94% of the Dutch population, bringing their own bag to the supermarket is now a habit (Nederlandse Omroep Stichting, 2020). Moreover, since July 2021, it is prohibited to sell certain plastic single-use products, such as plastic cups, straws and cotton swabs. From July 1st, 2023, it is not allowed to give away disposable cups and food packaging for free anymore and from January 2024, it is not allowed to use disposable cups and packaging

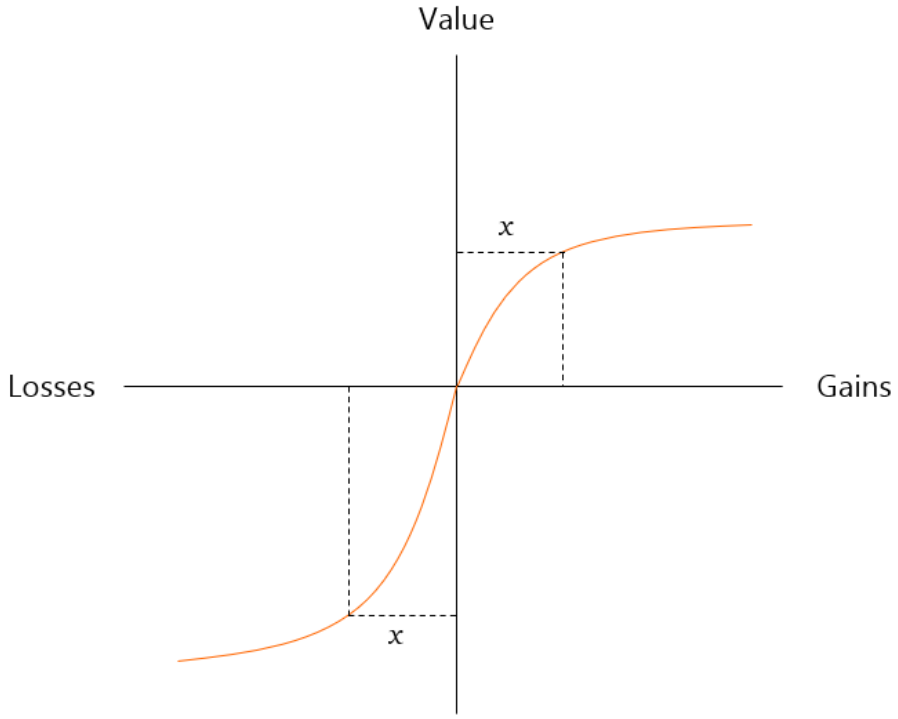
for consumption on site at all anymore. These are locations like offices, sports clubs and bars (Rijksoverheid, n.d.).

2.2 Prospect theory and framing

Kahneman and Tversky's (1979) prospect theory describes how people make decisions under uncertainty. The authors argue that losses have a greater impact than gains of the same amount, and thus people are loss averse. This is reflected in the reluctance that people feel to accept fair bets on a toss of a coin. The authors propose an S-shaped value function, which is concave above the reference point and convex below it, as can be seen in figure 2. As can also be seen in the figure, a gain of x has a smaller positive value than the negative value is of a loss of x.

Figure 2

Tversky & Kahneman's (1981) *value function*



Imbedded in prospect theory is the framing theory (Goffman, 1974; Tversky & Kahneman, 1981), that describes how people respond differently to the same information set, based on how it is explained. When a message is framed as a loss, people tend to respond more heavily to it than when the same information is captured in a gain-framed message.

2.3 Framing and sustainability

When considering the framing theory in the context of the current study, people should be more likely to change their environmental behavior if it will help to avoid a loss (further environmental degradation, compared to the current situation) than if it will help to obtain a gain (environmental restoration, compared to the current situation). This is because people care more about avoiding further losses than about obtaining additional gains.

This theory has often been studied in the sustainability domain. In the literature review by Homar and Cvelbar (2021), 61 studies about the effect of framing on environmental behavior are examined. They found that loss-framing is equally or more effective than gain-framing in all studies that measured behavioral intentions and actual behavior. They did however also find that gain-framed messages were more effective for increasing environmental attitudes. The studies reviewed in their literature review have many differences in terms of methods, samples and variables. Overall, the measured variables range from environmental attitudes and beliefs to behavioral intentions and actual behavior. Some of the used methods are interviews, field experiments, laboratory experiments, surveys and choice experiments. Moreover, the studies are conducted in different countries, such as the United States, Iran, Sweden and the United Kingdom. Even the sample size ranges from 10 to 38.000 and different groups of people were studied, like adults, students, hotel guests and households. That is why it is interesting that, while all studies are very different from each other, the results are the same among every study. Two more prominent studies of those in Homar and

Cvelbar's literature review are the ones by Lord (1994) and Davis (1995), which will be reviewed in more detail.

Lord (1994) researched the effects of different message and source strategies on recycling behavior. He used a quasi-experimental field study with a 3 (message sources are an advertisement, a newspaper article and a personal letter from an acquaintance) x 2 (message frames are positive and negative) design. There was also a control group that did not receive any message. He compared the recycling behavior before and after the intervention and compared these differences within the subjects across the manipulation groups. In this study, actual behavior was measured by observing the contents of 140 households' recycling bins, in a northeastern metropolitan community served by a curbside recycling program in the United States. Lord measured a variety of variables, including beliefs in the arguments raised in the message, attitudes towards recycling, attitudes towards the message and a set of demographic variables. The hypotheses were tested with ANOVA. The study shows that there is a significant increase in both the number of items being recycled and the number of recycling categories for households receiving an advocacy message. There were no significant changes in the control group. This implies that advocacy messages, both positive and negative, have a positive effect on sustainable behavior. Moreover, the data partially supports the claim that negatively framed messages are more effective than positively framed messages in increasing recycling behavior.

The study conducted by Davis (1995) researched the effect of different messages on different kinds of environmental behavior. He used an experimental 2 (message frames are positive and negative) x 2 (targets are current and future generations) x 2 (recommended activities are taking less and doing more) design. In this study, environmental behavior was measured by questioning 218 undergraduate, liberal art majors at a large Western University in the United States. Davis measured attitudes towards the advertisement, three behavioral intentions, which are conservation, recycling and green shopping and a set of demographic variables. The hypotheses were

tested with ANOVA. The study shows that the sample is the most favorable towards, and more influenced by, loss-framed messages focused on the current generation. This implies that such a message is the most effective in increasing sustainability behavior.

Both studies are summarized in table 1 below.

Table 1

Research table comparing Lord (1994) and Davis (1995)

	Independent variables	Dependent variables	Method	Context
Author, year	- Main variable - Secondary variables	- Outcome variable - Type of green behavior	Method of data collection	- Country - Sample size - Sample characteristics
Lord, 1994	- Message framing (fear, satisfaction) - Message source (advertising, publicity, personal)	- Behavior and attitudes - Number of recycled products and number of recycling categories	Quasi-experimental field study	- United States - 140 - Households
Davis, 1995	- Message framing (gains, losses) - Target (current, future) - Activities (conservation, recycling)	- Intention and attitudes - Conservation, recycling and green shopping	Survey	- Unites States - 218 - Students

Based on the finding of Lord (1994) that positive advocacy messages lead to an increase in sustainable behavior and several other papers that are reviewed in Homar and Cvelbar (2021) that conclude that gain messages have a positive effect on sustainable behavior, the first hypothesis is:

H1: The gain-framed message has a positive effect on people's likeliness to start using an RCC.

The study by Davis (1995) and the literature review by Homar and Cvelbar (2021) both conclude that negative messages lead to improved sustainable behaviors, resulting in the following hypothesis:

H2: The loss-framed message has a positive effect on people's likeliness to start using an RCC.

Homar and Cvelbar (2021) found that loss-framing is equally or more effective than gain-framing in all studies that measured behavioral intentions and actual behavior, which results in the third hypothesis:

H3: The effect of the loss-framed message is bigger than the effect of the gain-framed message.

2.4 Reactance

The reactance theory was first proposed by Brehm in 1966. In this theory, it is explained that when people feel like their freedom is under threat or lost, they are motivated to restore that freedom. Some examples of this threat to freedom are being forced to pay tuition fees, not being allowed to use a phone during classes and being instructed to do work for your boss. The amount of reactance depends on different aspects, such as the importance of the threatened freedom and the magnitude of the threat. Reactance has been studied in combination with persuasive health communications, such as persuading people to wear sunscreen or become an organ donor. Health campaigns and messages frequently discourage unhealthy/undesirable behaviors or imply discouragement of unhealthy/undesirable behaviors by promoting healthy/desirable ones. However, these persuasive messages may be perceived as a threat to someone's freedom. This creates a fundamental contradiction in writing persuasive health communications. They must directly advocate for the recommended action, while also taking into consideration people's perceived threat to freedom (Reynolds-Tylus, 2019).

Research shows that, if persuasion poses a threat to someone's freedom, they feel more negative attitudes towards it and are less likely to be persuaded to do what the message says they should do (Brehm, 1966; Steindl, Jonas, Sittenthaler, Traut-Mattausch, & Greenberg, 2015). In the sustainable behavior domain, this indicates that policies that are too forceful might have a negative effect, because people might feel more threatened than stimulated by the policies.

Cho and Sands (2011) researched the effect of gain-loss framing on perceived threat of freedom in relation to sun safety messages. The authors found that the loss-framed message produces a greater perceived reactance than the gain-framed message. Cho and Sands suspect that this has to do with the fact that loss-framed messages might sound more forceful than gain-framed messages, even if the message is actually the same in both situations. In other words, the positive frame can be perceived as an offer, while the negative frame can be perceived as a command that people must answer. Other research about the effect of gain-loss framing, in this case on organ donation, used psychological reactance as a mediator (Reinhart, Marshall, Feeley, & Tutzauer, 2007). The authors found that gain-framed messages yield more positive message reactions than loss-framed messages. Moreover, they found that gain-framed messages yield lower levels of reactance than loss-framed messages. Both papers show that framing has an effect on people's perceived reactance, and that it also influences their behavioral intentions through this mechanism. Therefore, the effect of framing on sustainable behavior is possibly mediated by the perceived reactance. This leads to the following hypothesis:

H4: Perceived reactance mediates the effect of the messages on people's likeliness to start using an RCC, in the way that, when reactance increases, people's likeliness decreases.

The findings of Cho and Sands (2011) and Reinhart et al. (2007) contradict those in the research by Lord (1994), Davis (1995) and Homar and Cvelbar (2021). This might be

because the study domain moderates the relationship between reactance and behavior. People seem to respond differently to framing effects based on the field that it is used in, thus it is likely that the respondents in this research will respond more similar to other studies in the sustainability domain than to studies in the health care domain.

In addition to the mediator, a moderator is added to the model. This moderator is someone's previous sustainable behavior, namely if someone already uses an RCC or not. While there is no literature available that proves that previous behavior moderates the effect of framing on sustainable behavior, it can reasonably be assumed. When someone already uses an RCC, they will likely score their likeliness to use an RCC after the manipulation a 5, or at least significantly higher than people who do not use an RCC already. Moreover, they probably will perceive the framing messages like less of a threat than people who currently do not use an RCC, as they are already engaging in the desired behavior.

3. Data and Methodology

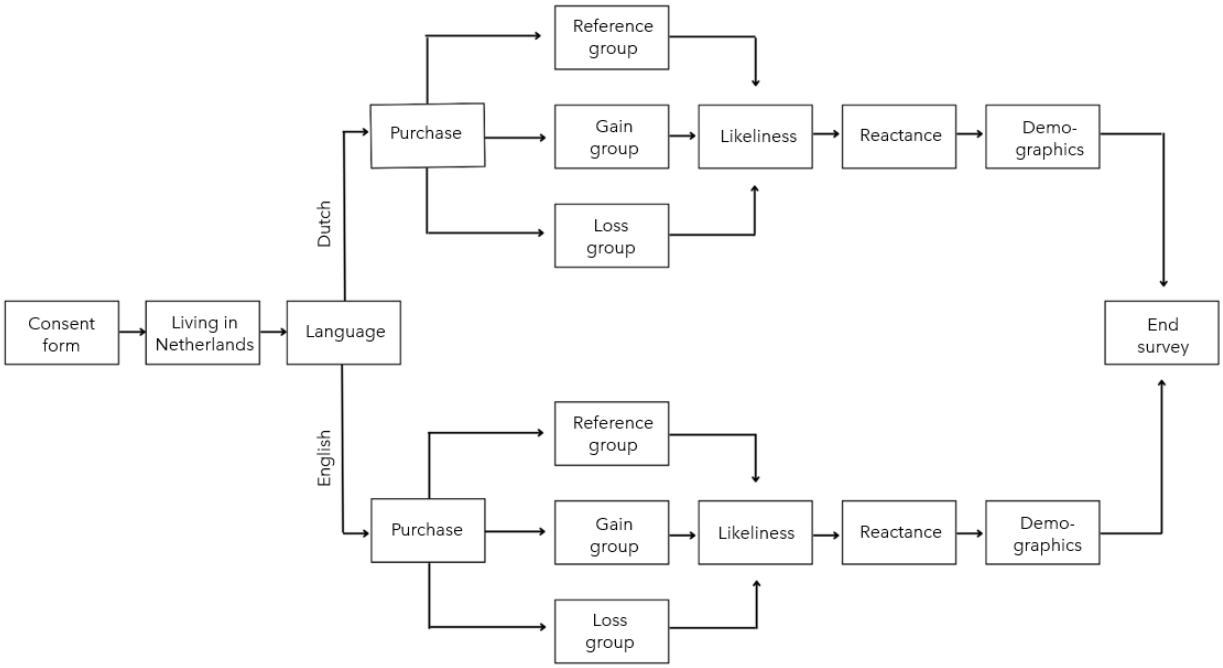
To test the hypotheses, an experiment was conducted for which primary data was collected through a survey. The data was collected through the online platform Qualtrics. The survey, which was available in both Dutch and English (Language), consisted of demographic questions and a treatment to test the effect of framing. The survey was available in two languages, because the target group for this research is people who live in the Netherlands. Allowing people to do the survey in their first language eliminates the possibility that people do not understand the message, due to poor command of the English language. The survey was shared through convenience sampling.

There are three groups in this experiment, namely a control group and two treatment groups. The control group saw a message that only says that people have to start

paying extra from July 1st for disposable cups. The first treatment group saw a message in which it is explained that people have to start paying extra money for a disposable cup, as this will help to preserve the environment (obtain a gain), while the second treatment group saw a message in which it is explained that people have to start paying extra money for a disposable cup, as this will prevent environmental degradation (avoid a loss). All questions, including the messages for all groups, are shown in Appendix A. The difference between the two treatment groups is how the message is framed, using prospect theory and the framing effect (Kahneman & Tversky, 1979; 1981). The survey flow is displayed below in figure 3.

Figure 3

Survey flow



This research has the likeliness that the respondents start using an RCC (Likeliness) as an outcome variable. People's perceived reactance (Reactance) is the mediator in this model. Additionally, the model has a moderator, namely if someone already uses an RCC or not (RCC). How often someone purchases to go drinks (Purchase), gender

(Female), age and education level (Education) are variables that will be used to perform a balance test, assessing whether the two treatment groups share the same characteristics on average. A summary of all variables and how they were measured in this research is given in table 2.

Table 2

Research variables and measurement methods

Variable	Measurement method
Likeliness	5-Point Likert scale
RCC	0 = no, 1 = yes
Purchase	1 = never, 2 = sometimes (less than 4 times a month), 3 = regularly (4 to 9 times a month), 4 = often (10 to 15 times a month), 5 = very often (more than 15 times a month)
Reactance	
This message threatened my freedom to choose	5-Point Likert scale
This message tried to make a decision for me	5-Point Likert scale
This message tried to manipulate me	5-Point Likert scale
This message tried to pressure me	5-Point Likert scale
Language	0 = English, 1 = Dutch
Age	Continuous
Female	0 = male, 1 = female, 2 = other
Education	1 = primary education, 2 = prevocational secondary education (VMBO), 3 = senior general secondary education (HAVO), 4 = pre-university education (VWO), 5 = senior secondary vocational education (MBO), 6 = higher vocational education (HBO), 7 = university education (WO), 8 = PhD

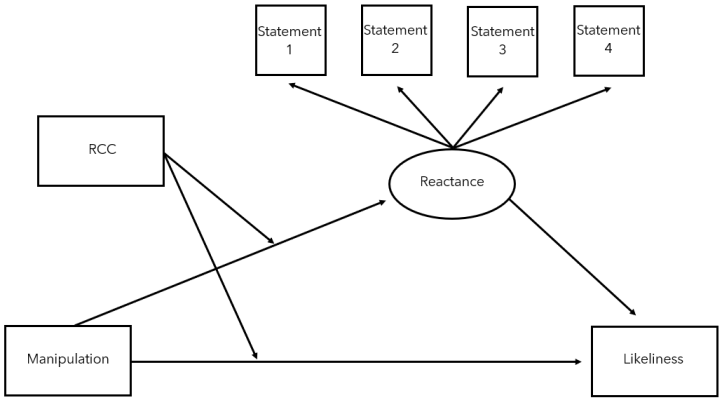
Note. Reactance is a latent variable, that is measured through the four listed statements. The education levels shown on the Statistics Netherlands (n.d.) website are used for the variable education, except for PhD.

The variable Reactance is a latent variable that was measured through the scale that is developed by Dillard and Shen (2005) (n = 155, M = 2.50, SD = 0.73, α = 0.79). The specific statements are listed in table 1 above. The average of the four variables is calculated for each respondent, with higher values meaning a higher perceived threat. This variable is used to properly understand the moderator and relate is to the 5-Point Likert scales that are used to measure the statements. Moreover, through factor analysis, the variable Reactance will be standardized. These predicted factor scores will be used in the analysis.

The hypotheses will be tested using structural equation modeling (SEM). SEM is a multivariate statistical model that analyzes relationships between measured variables and latent constructs. The model in this study is quite extensive as it consists of a direct effect, a latent mediator and a moderator. In SEM, the full model can be tested for causal relationships in one analysis (Statistics Solutions, n.d.). The model that will be tested is graphically shown in figure 4 below.

Figure 4

Research model[2]



[2] This model is also known as model 8 in Process.

4. Results

4.1 Descriptive Analysis

4.1.1 Sample characteristics

174 responses were gathered. After removing incomplete responses, 154 responses remained. 9.1% answered the survey questions in English, and the other 90.9% answered it in Dutch.

No one answered 'other' in the Female question, so it is dropped from the research. Therefore, Female is 0 when someone is male, and 1 when someone is female.

Moreover, no one answered 'PhD' in the Education question, so this option is also dropped from the research.

In table 3 below, the descriptive statistics for the sample are given. They are given for the whole sample, as well as for each manipulation group separately. Moreover, in the table the results for the ANOVA analysis are shown, comparing the means across the three manipulation groups.

Table 3

Descriptive statistics for the whole sample and per manipulation group

	All	Manipulation group		
		Reference	Gain	Loss
RCC	0.188	0.189	0.140	0.235
No RCC	0.812	0.811	0.860	0.765
Purchase				
Never	0.292	0.321	0.240	0.314
Sometimes	0.513	0.585	0.520	0.431
Regularly	0.143	0.057	0.180	0.196
Often	0.045	0.038	0.060	0.039
Very often	0.006	0	0	0.020

Language				
Dutch	0.909	0.925	0.900	0.902
English	0.091	0.075	0.100	0.098
Age	33.45	34.60	32.84	32.86
Gender				
Female	0.617	0.528	0.720	0.608
Male	0.383	0.472	0.280	0.392
Education				
Primary	0.013	0	0.020	0.020
Prevocational	0.065	0.057	0.080	0.059
Senior secondary general	0.078	0.132	0.020	0.078
Pre-university	0.045	0.113	0.020	0
Senior secondary vocational	0.227	0.226	0.260	0.196
Higher vocational	0.266	0.245	0.320	0.235
University	0.305	0.226	0.280	0.412
Observations	154	53	50	51

Note. Age is the mean age in the groups. All other variables are proportions. *** p<0.01, ** p<0.05, * p<0.1.

As can be seen in the table above, there are no variables with significantly different means or distributions across the three manipulation conditions. Therefore, it can be concluded that randomization has been successful.

4.1.2 Characteristics for the variables of interest

Now, we will look at the variables of interest, Likeliness and Reactance.

Firstly, Cronbach's alpha for Reactance is high at a value of 0.828, showing that the internal consistency or reliability of the scale is high.

The descriptive statistics are shown in table 4.

Table 4

Descriptive statistics for the whole sample and per manipulation group

	All	Manipulation group		
		Reference	Gain	Loss
Likeliness	3.190	2.830	3.300	3.450
Reactance (average)	2.364	2.151	2.305	2.642
Reactance (factor scores)	0	-0.217	-0.059	0.283
Observations	154	53	50	51

Note. All values are the means of the groups.

Now, ANOVA analysis is performed on the variables of interest. The results are shown in Table 5 below.

Table 5

ANOVA results for the variables of interest

		Sum of squares	df	Mean square	F	Sig.
Likeliness	Between groups	10.940	2	5.470	2.748	0.067
	Within groups	300.599	151	1.991		
	Total	311.539	153			
Reactance (factor scores)	Between groups	6.757	2	3.378	3.488	0.033
	Within groups	146.243	151	0.968		
	Total	153.000	153			

Note. Results of ANOVA analysis comparing all variable means between the reference, gain and loss group. Results are shown for the whole sample.

The overall test in table 5 shows that the model is significant since there are significant differences in the variables of interest between the different manipulation conditions.

In table 6 below, the results for the Tukey post hoc test are given. This test shows where in the three groups the significant differences are.

Table 6

Tukey post hoc test results

	(I) Manipulation	(J) Manipulation	(I-J) Mean difference	Std. error	Sig.	95% confidence interval	
						Lower bound	Upper bound
Likeliness	Reference	Loss	-0.621*	0.277	0.067	-1.280	0.030
		Gain	-0.470	0.278	0.213	-1.130	0.190
	Gain	Reference	0.470	0.278	0.213	-0.190	1.130
		Loss	-0.151	0.281	0.853	-0.820	0.510
	Loss	Reference	0.621*	0.277	0.067	-0.030	1.280
		Gain	0.151	0.281	0.853	-0.510	0.820
Reactance (factor scores)	Reference	Loss	-0.500**	0.193	0.028	-0.957	-0.043
		Gain	-0.157	0.194	0.697	-0.616	0.302
	Gain	Reference	0.157	0.194	0.697	-0.302	0.616
		Loss	-0.343	0.196	0.190	-0.806	0.121
	Loss	Reference	0.500**	0.193	0.028	0.043	0.957
		Gain	0.343	0.196	0.190	-0.121	0.806

Note. *** p<0.01, ** p<0.05, * p<0.1.

As can be seen in the table, there are significant differences in both Likeliness and Reactance between the loss and the reference group.

4.2 Reactance

When running the moderated mediation model in figure 4, the first part leads to the results in table 7 on the next page.

Table 7

SEM results for Reactance in the moderated mediation model

	Coefficient	P-value	LLCI	ULCI
Reactance				
Constant	-0.370**	0.013	-0.661	-0.080
Loss	0.795***	0.000	0.374	1.216
Gain	0.332	0.113	-0.079	0.742
RCC	0.815**	0.017	0.146	1.483
Loss * RCC	-1.415***	0.003	-2.333	-0.498
Gain * RCC	-0.963*	0.065	-1.987	0.061

Note. Results are for Process model 8 in SPSS. *** p<0.01, ** p<0.05, * p<0.1.

The results show that reactance is the lowest in the reference group, when looking at the people who do not use an RCC already. Their average reactance is -0.370. For people in the loss group, the reactance is on average 0.795 higher and this difference is significantly higher than the reference group. The message in the gain group is associated with an average increase of 0.332 in reactance, although this effect is not significant. These results are shown graphically in figure 5, on the left side.

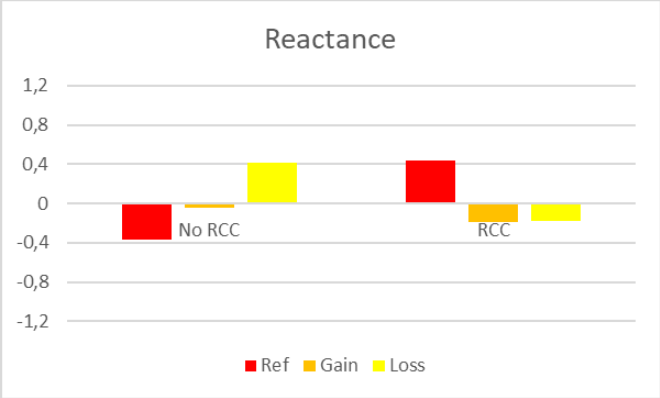
When comparing people who do not have an RCC to people who do have an RCC, the results show that people in the reference group experience a reactance that is 0.815 points higher when they already have an RCC. For people in the loss and gain group, the average reactance decreases with 0.6 (0.815 – 1.415) and 0.148 (0.815 – 0.963) respectively when they use an RCC, compared to those in the loss and gain group who do not use an RCC. This can also be seen in figure 5, when comparing the left and right graphs with each other.

Reactance will now be reviewed in more detail for the respondents who already have an RCC. Reactance is the highest in the reference group, at an average value of 0.445, followed by the loss group whose reactance is 0.621 lower (p-value = 0.135) and then by the gain group whose reactance is 0.632 lower than in the reference group (p-value

= 0.186), although these estimates are not significantly different from the reference group. These results can be seen graphically in the right graph in figure 5 below.

Figure 5

Reactance in the three manipulation groups, split by the RCC variable



4.3 Likeliness

When running the moderated mediation model in figure 4, the second part leads to the results that are shown in table 8.

Table 8

SEM results for Likeliness in the moderated mediation model

	Coefficient	P-value	LLCI	ULCI
Likeliness				
Constant	2.462***	0.000	2.065	2.859
Loss	0.647**	0.032	0.057	1.236
Gain	0.719**	0.011	0.165	1.273
Reactance	-0.135	0.224	-0.352	0.083
RCC	1.798***	0.000	0.886	2.710
Loss * RCC	-0.180	0.779	-1.446	1.086
Gain * RCC	-1.004	0.155	-2.391	0.383

Note. Results are for Process model 8 in SPSS. *** p<0.01, ** p<0.05, * p<0.1.

Table 7 shows that, when looking at the people do not currently use and RCC, average likeliness to start using an RCC is the lowest in the reference group. The estimated value for Likeliness is 2.462 in this group. For the loss group, Likeliness increases with on average 0.647 and for the gain group, Likeliness increases with on average 0.719, compared to the reference group. Both estimates are significant. These results are shown graphically in figure 6 below, in the left graph.

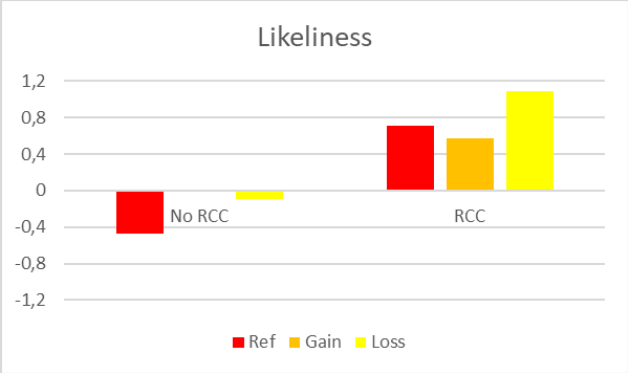
When comparing people who do not have an RCC to people who do have an RCC, the results show that when people in the reference group use an RCC, their likeliness increases with on average 1.798. This estimate is significant.

The other estimates in this part of the model are not significant. Therefore, these estimates will only shortly be explained. A 1-point increase in Reactance is associated with a decrease in Likeliness of 0.135. Moreover, both interaction effects between manipulation group and RCC are also not significant.

The differences across the three manipulation groups are shown graphically in figure 6. Please note that figure 6 shows the standardized Likeliness values, so the values do not align with the values in table 7. However, this does not change the order of the Likeliness values for the different manipulation groups. The left side of the figure is already explained above. In the subsample that already uses an RCC, on the right side of the graph, Likeliness is the lowest in the gain group, followed by the reference group and it is the highest in the loss group.

Figure 6

Likeliness in the three manipulation groups, split by RCC variable



The SEM analysis shows that the loss message is significantly more effective in increasing the likeliness that someone starts using an RCC, in the subsample that does not use an RCC currently, than the message in the reference group. Moreover, the analysis shows that even in the subsample that already uses an RCC, loss messages are associated with a higher likeliness than the messages in the reference group. These conclusions support hypothesis 2, that loss framed messages have a positive effect on the likeliness that people start using an RCC.

The SEM analysis shows that the gain message is also significantly more effective in increasing Likeliness than the reference message in the subsample that does not use an RCC. However, in the subsample that already uses an RCC, the mean in the gain group is lower than the mean in the reference group. The estimates are not significant though. This means that there is only partial support for hypothesis 1, that gain messages have a positive effect on the likeliness that people start using an RCC.

Hypothesis 3 states that the loss framed message is more effective than the gain framed message. When looking at the SEM results for the subsample of interest, the group that does not use an RCC already, estimated effects of the loss and gain message lie close to each other, with the gain message being slightly more effective. Both estimates are significant. In the subsample that uses an RCC already, the loss message

is associated with a higher likeliness than the gain message, but these estimates are not significant. Therefore, there is no support for hypothesis 3.

In this study, there is no evidence found that supports hypothesis 4, that the effect of message framing on the likeliness to start using an RCC is mediated by reactance. Message framing seems to have an effect on reactance, based on the SEM results in table 6, but the estimated effect of Reactance on Likeliness is non-significant, with a p-value of 0.224. However, the non-significant effect is negative, as predicted in the hypothesis. The lack of significance might be due to the small sample size, so the effect might actually exist, even though this research does not find it.

4.4 Alternative model

Since Reactance does not seem to play an important role in this study, but RCC does, I will now run one more model for exploratory purposes. In this model, I test RCC as a moderator between manipulation and Reactance and between manipulation and Likeliness (like in the model above), but also between Reactance and Likeliness.

Table 9

SEM results in the exploratory model

	Coefficient	P-value	LLCI	ULCI
Reactance				
Constant	-0.370	0.013	-0.661	-0.080
Loss	0.795	0.000	0.374	1.216
Gain	0.332	0.113	-0.079	0.742
RCC	0.815	0.017	0.146	1.483
Loss * RCC	-1.415	0.003	-2.333	-0.498
Gain * RCC	-0.963	0.065	-1.987	0.061
Likeliness				
Constant	2.528***	0.000	2.154	2.902

Loss	0.611**	0.024	0.082	1.140
Gain	0.559**	0.033	0.047	1.071
Reactance	-0.120	0.332	-0.362	0.123
RCC	1.468***	0.000	0.937	1.998
Reactance * RCC	-0.007	0.978	-0.535	0.521

Note. Reactance and Likeliness in bold are the outcome variables. Results are for Process model 58 in SPSS. *** p<0.01, ** p<0.05, * p<0.1.

The results in the top part are exactly the same as in the former model.

When comparing the bottom part to the results in table 8, the results are generally the same. The same variables are significant as in the other model and all directions of the effects are the same as well. There are however some slight differences. Firstly, while in the former model the effect of the gain message on Likeliness was the biggest, in this model the effect of the loss message is slightly bigger. This implies that, when using this model, the loss message seems to be more effective than the gain message. Since the differences between the loss and gain group are very small in the original model and reversed in the exploratory model, there seems to be another variable at play here that influences Likeliness more than framing does. The interaction effect between Reactance and RCC is very small and very non-significant. This implies that RCC does not moderate the effect of Reactance on Likeliness.

5. Conclusion and discussion

5.1 Summary and conclusion

In this paper, the effect of message framing on likeliness to start using a reusable coffee cup is studied. Additionally, the moderating role of already using an RCC and the mediating role of reactance are studied. In the Netherlands, on average 19 million plastic cups and food packaging are used and thrown away on a daily basis (Bogers, 2023). To combat this waste, the Dutch government is imposing a new law on July 1st,

stating that companies have to start explicitly charging their customers extra money for products such as disposable cups. Since the goal is to minimize the use of disposable cups as much as possible, it is very important to market this message to the customers in a way that they will decide to start using an RCC. That is where this study comes into play. This study aims to find out which message frame is the most effective in increasing the likeliness to start using an RCC, the reference message, the gain message, or the loss message.

Since 1950, about 8.3 billion tons of plastic have been produced worldwide. Over 6.3 billion tons of it are now waste, of which around 2.15 billion tons were never collected and are now polluting our planet (Borghardt, 2022).

The Netherlands was the third largest plastic waste exporter in the world in 2021, (Hettema & Hoenders, 2022). The Dutch government has introduced several initiatives in the recent years to decrease the amount of plastic used. One example is the very successful ban on free plastic bags, in 2016. This new initiative is supposed to minimize the plastic waste in the Netherlands even further.

The framing theory is imbedded in Kahneman and Tversky's (1979) prospect theory, which describes how people make decisions under uncertainty. The authors argue that losses have a greater impact than gains of the same amount, and thus people are loss averse. When considering the framing theory in the context of the current study, people should be more likely to change their environmental behavior if it will help to avoid a loss (further environmental degradation, compared to the current situation) than if it will help to obtain a gain (environmental restoration, compared to the current situation).

61 of such studies are summarized in Homar and Cvelbar's (2021) literature review. This review consists out of all kinds of studies, with different methods, samples and variables. The authors found that loss-framing is equally or more effective than gain-framing in all studies that measured behavioral intentions and actual behavior. Two of the 61 studies are those by Lord (1994) and Davis (1995). Lord (1994) researched the

effects of different message and source strategies on recycling behavior. The study shows that there is a significant improve in recycling behavior in households receiving any advocacy message. This implies that advocacy messages, both positive and negative, have a positive effect on sustainable behavior. Moreover, the data partially supports the claim that negatively framed messages are more effective than positively framed messages in increasing recycling behavior. Davis (1995) researched the effect of different messages on different kinds of environmental behavior. The study shows that the sample is the most favorable towards, and more influenced by, loss-framed messages. This implies that such a message is the most effective in increasing sustainable behavior. Based on the studies described above, the first three hypotheses are created. Firstly, the gain-framed message has a positive effect on people's likeliness to start using an RCC. Secondly, the loss-framed message has a positive effect on people's likeliness to start using an RCC. Thirdly, the effect of the loss-framed message is bigger than the effect of the gain-framed message.

This study uses reactance as a mediator. The reactance theory was first proposed by Brehm in 1966. In this theory, it is explained that when people feel like their freedom is under threat or lost, they are motivated to restore that freedom. Cho and Sands (2011) researched the effect of gain-loss framing on perceived threats of freedom in relation to sun safety messages. The authors found that the loss-framed message produces a greater perceived reactance than the gain-framed message. Reinhart et al. (2007) researched the effect of gain-loss framing on organ donation, with psychological reactance as a mediator. The authors found that gain-framed messages yield more positive message reactions than loss-framed messages. Moreover, they found that gain-framed messages yield lower levels of reactance than loss-framed messages. These studies lead to the fourth and last hypothesis, that perceived reactance mediates the effect of the messages on people's likeliness to start using an RCC.

Moreover, this study has a moderator, namely if someone already uses an RCC or not. When someone already uses an RCC, they will likely score their likeliness to use an RCC

after the manipulation a 5, or at least significantly higher than people who do not use an RCC already. Moreover, they probably will perceive the framing messages like less of a threat than people who currently do not use an RCC, as they are already engaging in the desired behavior.

To test the hypotheses, an experiment is conducted for which primary data is collected through a survey. There are three groups in this experiment, namely a control group and two treatment groups. The control group sees a message that only says that people have to start paying extra from July 1st for disposable cups. The first treatment group sees a message on which it is explained that people have to start paying extra money for a disposable cup, as this will help to preserve the environment (obtain a gain), while the second treatment group sees a message on which it is explained that people have to start paying extra money for a disposable cup, as this will prevent environmental degradation (avoid a loss). This research has the likeliness that the respondents start using an RCC as an outcome variable. People's perceived reactance is the mediator in this model. Additionally, the model has a moderator, namely if someone already uses an RCC or not. The hypotheses are tested using structural equation modelling (SEM). The model in this study is quite extensive as it consists of a direct effect, a latent mediator and a moderator. In SEM, the full model can be tested for causal relationships in one analysis (Statistics Solutions, n.d.).

The study has 154 respondents, who are successfully randomized across the three manipulation conditions. Cronbach's alpha for Reactance is high at a value of 0.828, showing that the internal consistency or reliability of the scale is high.

The results of SEM analysis shows that on average, people in the reference group experience the lowest reactance. For people in the loss group, the reactance is on average 0.795 higher, and this difference is significant. The message in the gain group is associated with an average increase of 0.332 in reactance, although this effect is not significant. Moreover, the results show that people in the reference group experience a higher reactance when they already have an RCC. For people in the loss and gain

group, the average reactance decreases with 0.6 and 0.148 respectively when they use an RCC, compared to those in the loss and gain group who do not use an RCC. In summary, in the subsample that does not use an RCC, reactance is the lowest in the reference group, followed by the gain group and that it is the highest in the loss group. In the subsample that does use an RCC, reactance is almost equal in the gain and loss group, and the highest in the reference group.

Moreover, the SEM results show that people in the reference group have the lowest average likeliness to start using an RCC. For the loss group, Likeliness increases with on average 0.647 and for the gain group, Likeliness increases with on average 0.719, compared to the reference group. Both estimates are significant. When people do use an RCC, their likeliness increases significantly with on average 1.798. Additionally, a 1-point increase in Reactance is associated with a decrease in Likeliness of 0.135, but this estimate is not significant. Both interaction effects between manipulation group and RCC are also not significant. In summary, in the subsample that does not use an RCC, Likeliness is the lowest in the reference group, followed by the loss group and it is the highest in the gain group. In the subsample that already uses an RCC, Likeliness is the lowest in the gain group, followed by the reference group and it is the highest in the loss group.

These results support hypothesis 2, that loss framed messages have a positive effect on the likeliness that people start using an RCC. Hypothesis 1, that gain messages have a positive effect on the likeliness that people start using an RCC, is only partially supported by the data. There is no support for hypothesis 3, that the loss framed message is more effective than the gain framed message. There is also no support for hypothesis 4, that the effect of message framing on sustainable behavior is mediated by reactance.

The fact that this study does not find much support for the hypotheses, does not automatically mean that the hypotheses can be rejected. The lack of significant results can be due to other reasons, such as a too small sample size, or inadequate

measurement methods. Thereby, the signs of the estimates are as expected, which is an indicator that there might actually be an effect, even if this study does not yield significant results.

In an alternative model, to further explore the moderating role of current RCC use, the effect of the loss message is slightly bigger than the effect of the gain message. This means that this effect is different from what was observed in the other model. Moreover, the interaction effect between Reactance and RCC is very small and non-significant, implying that RCC use does not moderate the effect of Reactance on Likeliness.

The results of this study have several implications. Firstly, companies can use these results when marketing the extra charges. Most companies these days want their customers to make sustainable choices. Therefore, they should relate the use of an RCC to its contribution to the environment to increase the likeliness that people start using an RCC, rather than accepting the extra charges, as we saw in the loss and gain frames in this study. Moreover, they can extend these insights in the long run to stimulate customers to make even more sustainable choices, like reducing plastic packaging. Secondly, these insights can also be used by governments to encourage sustainable behaviors, for example in ads. However, it is suggested to combine the insights of this study with related studies, possible follow-up studies and possibly even the organizations' own data, since there are some downsides in the current research. The downsides will be elaborated in the following two sections.

5.2 Internal and external validity

The internal validity of this study could have been better. The Cronbach's alpha for the factor analysis is very high at a value of 0.828, which is good for the internal validity. However, the sample size is small, which decreases the precision of the measurements. Moreover, the internal validity could possibly have been higher if Likeliness was

measured through a scale, like Reactance, instead of through only one question. Thereby, Likeliness is a lot lower in the reference group in the subsample that does not use an RCC, compared to the loss and gain groups. This could mean that there is omitted variable bias. While no conclusion can be drawn on which variable is omitted, there is a possibility that the omitted variable is knowledge. The reference message does not give any information on the effect of plastic on the environment, while both the loss and gain messages do give a lot of information on the topic. Therefore, it is very possible that the increased Likeliness is driven by knowledge. There is already a paper that suggests that knowledge and information might play a role in the effect of framing on sustainable behavior. The authors suggest that this is something that is interesting to research (Cheng, Woon, & Lynes, 2011). Other papers, that research environmental behavior without considering framing, find that environmental knowledge has a significant, yet small, effect on sustainable behavior (Heeren, et al., 2015; Ajzen, Joyce, Sheikh, & Cote, 2011).

The external validity of this research is quite high. When looking at the descriptives for the whole sample in table 2, Likeliness is the lowest in the reference group, followed by the gain group and the highest in the loss group. This is in line with other studies that have been done in this field. Moreover, Reactance is also the lowest in the reference group, followed by the gain group and then the loss group. This is also in line with earlier studies. These statistics show that the overall results are in line with similar studies among different samples in different countries and different settings. One element that decreases the external validity of this study is the sample characteristics. This sample is relatively young and highly educated. Therefore, the sample is not representative for the whole population. However, the external validity of this study is still quite high.

5.3 Limitations

There are many possible reasons why some of the estimates are non-significant. One possible reason is that there might actually be no effect. However, before this can be concluded, some other reasons need to be ruled out first. The lack of significance may also be due to a too small sample size. The sample size of 154 is very low, and especially the subsample that already uses an RCC is very small with only 29 respondents. Since this is also the group with the least significant results, there is a high probability that the sample size is the reason why there are non-significant results. Another reason might be that some variables are measured inadequately. This means that for example, using a scale to measure Likeliness instead of just one question can already give different, maybe even significant, results. Another limitation of the study is that it researches behavioral intention instead of actual behavior. This means that whatever people intend to do, might not align with what they will actually do. While this is a limitation of the study, there are many authors who use the same approach in research about sustainable behavior (Javed, Yang, Gilal, & Gilal, 2020; Homar & Cvelbar, 2021). Lastly, there might be social desirability bias at play in this paper. When answering the questions, respondents might not have answered honestly and exaggerated their likeliness to start using an RCC. This bias cannot be tested or corrected for, which is why it limits this study.

5.4 Opportunities for future research

In terms of further research, it would be interesting to do a study with the same manipulations but measuring actual behavior instead of behavioral intentions. This would solve two of the three limitations of the current study. Moreover, by doing the study on a bigger sample size, the last limitation can also be solved. It would be an interesting extension to the current research. Another idea would be to measure knowledge people have on the topic. There is clearly something that drives Likeliness in the current study, but since the differences between the gain and loss group are so

small, it might be something else than framing. One possible explanation is that Likeliness increases with knowledge, since both the gain and the loss message are a lot more informative than the reference message. However, this needs to be studied first before conclusions can be drawn on this.

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Appendices

Appendix A

Dear respondent,

Thank you for helping me by taking part in this study for my master thesis. This research is conducted at Erasmus University Rotterdam and is about hot drinks to go. All information collected in this study is for research purposes only. Participation should take around 5 minutes.

Your participation is voluntary. You may choose to stop participating at any time by closing the browser window. Partial data will not be analyzed.
Your responses are anonymous and strictly confidential. Any reports and presentations about the findings from this study will not include any information that could identify you.

If you have any questions or comments regarding the survey questions, do contact me via e-mail. Thank you in advance for your time and effort.

Sincerely,
Chantal Krans
E-mail: 530080ck@student.eur.nl

- o I consent
- o I do not consent

Are you currently living in the Netherlands?

- o Yes

- No

How often do you purchase hot drinks to go?

- Never
- Sometimes (less than 4 times per month)
- Regularly (4 to 9 times per month)
- Often (10 to 15 times per month)
- Very often (more than 15 times a month)

Do you currently use a reusable coffee cup?

- Yes
- No

Reference message[3]

Starting July 1st, you will be required to pay extra money for every disposable cup you use.

Loss-framed message

[3] Each respondent is either assigned randomly to the reference group, the gain-framed group, or the loss-framed group, meaning that they will only be presented with that message.

Starting July 1st, you will be required to pay extra money for every disposable cup you use.

Almost all plastics are made from chemicals that come from the production of planet-warming fuels (gas, oil and even coal). Part of the plastics are burned after use, releasing climate-wrecking gases and toxic air pollution. The other part ends up as plastic waste on the land and in the oceans, contributing to environmental degradation and harming animals that can mistake the plastic for food. After some time, plastics break down into so-called microplastics. Microplastics have been found in drinking water systems, the air and inside aquatic species, including also the fish, shrimp and mussels that us humans eat. This means that people relying on marine resources also have an endangered livelihood due to the plastic waste.

As an effort to reduce plastic waste in the Netherlands, you will be required to pay extra money for every disposable cup you use. Failing to reduce plastic waste has numerous drawbacks. It increases the amount of new raw materials used, while also consuming energy and thus increasing greenhouse gas emissions.

Failing to take action and thus continuing to use disposable cups **harms** the environment and the wildlife, **increases** pollution and the plastic soup and **affects** many people.

Gain-framed message

Starting July 1st, you will be required to pay extra money for every disposable cup you use.

Almost all plastics are made from chemicals that come from the production of planet-warming fuels (gas, oil and even coal). Part of the plastics are burned after use, releasing climate-wrecking gases and toxic air pollution. The other part ends up as plastic waste

on the land and in the oceans, contributing to environmental degradation and harming animals that can mistake the plastic for food. After some time, plastics break down into so-called microplastics. Microplastics have been found in drinking water systems, the air and inside aquatic species, including also the fish, shrimp and mussels that us humans eat. This means that people relying on marine resources also have an endangered livelihood due to the plastic waste.

As an effort to reduce plastic waste in the Netherlands, you will be required to pay extra money for every disposable cup you use. Reducing plastic waste has numerous benefits. It lessens the amount of new raw materials used, while also saving energy and thus reducing greenhouse gas emissions.

Taking action by switching to a reusable coffee cup **helps** safe the environment and the wildlife, **decreases** pollution and the plastic soup and **benefits** many people.

How likely are you to start using a reusable coffee cup?

Extremely unlikely	Somewhat unlikely	Neither likely nor unlikely	Somewhat likely	Extremely likely
o	o	o	o	o

To what extent do you agree with the following statements?

The message I just read…

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree

threatened my freedom to choose	o	o	o	o	o
tried to make a decision for me	o	o	o	o	o
tried to manipulate me	o	o	o	o	o
tried to pressure me	o	o	o	o	o

How do you identify yourself?

- o Male
- o Female
- o Non-binary / other
- o Prefer not to say

What is your age?

What is the highest level of education you have completed?

- o Primary education
- o Prevocational education
- o Senior general secondary education

- Pre-university education
- Senior secondary vocational education
- Higher vocational education
- University education
- PhD

Thank you for taking part in this survey! If you have any questions or comments, feel free to send an email to 530080ck@student.eur.nl. Please, click the blue button to finish the survey.