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From Toilet to Table:  
The Effects of Emotions and Emotional Framing on  
Acceptability of and Willingness to Use Sewage-Based  
Drinking Cups

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### **Abstract**

Due to climate change, urgent solutions are necessary for a healthy preservation of our planet. One of these solutions is to promote a circular economy that reduces pollution and waste. Sewage-based products fulfill this need crucially, as they reduce CO<sub>2</sub> emissions and waste production. However, the large-scale implementation of these products is obstructed by low public acceptability that is strongly influenced by disgust, also known as the 'yuck factor'. Based on dual-process decision-making theories, it was expected in this study that moral message framing would increase acceptability and willingness to use, together with actual use of sewage-based drinking cups. Hedonic message framing was expected to do this to a smaller extent. Additionally, it was expected that actively appealing to emotions would further increase acceptability and willingness to use, and that strong perceived moral emotions would enhance this relation. Lastly, it was expected that disgust had a strong negative relation with acceptability and willingness to use, and that weak hedonic emotions would make this relation even stronger. Data of 200 participants was gathered in public spaces using an experimental between-subjects field study. The results of this study supported that moral framing results in higher acceptability of and willingness to use sewage-based cups than hedonic framing, especially when the frame appeals to emotions. Furthermore, weak hedonic emotions strengthened the negative relation between disgust and acceptability. These results imply that emotions are imperative in promoting sewage-based products and therefore green companies can adapt their marketing strategies to better align with consumer motivations.

*Keywords:* sewage-based products, moral emotions, 'yuck factor', acceptability

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Climate change is among the biggest challenges ever faced by humankind (IPCC, 2019; WHO, 2021), calling for immediate government measures and individual pro-environmental behavior. Governments need to address different solutions to reduce the current emissions of greenhouse gases. One of these solutions could be promoting a circular economy, which aims to increase energy reuse, reprocess materials and minimize waste (Geissdoerfer et al., 2017). In practice, an example of developing a circular economy is the use of recycled sewage-based products. These products are made from dried and sterilized cellulose fibers, which are retrieved from used toilet paper. From cellulose, an array of products can be manufactured, such as insulation material, tabletops, flowerpots and drinking cups, among others. Ideally, consumers would collectively adopt these products, which in turn will decrease their carbon footprint and, on a bigger scale, reduce logging and the need to import building materials from abroad, which saves CO<sub>2</sub> emissions (Li et al., 2022). Moreover, due to their biodegradability, sewage-based products produce less waste which further benefits the environment (Abdul Khalil et al., 2012). However, public acceptability of sewage-based products is often negatively influenced by the so-called ‘yuck factor’, which is the activation of feelings of disgust towards sewage-based products (Powell et al., 2019). This is problematic because public acceptance is vital in the long-term success of sustainable water initiatives (Mankad, 2012).

The ‘yuck factor’ is an example of how emotions play a key role in acceptability of and willingness to use sustainable products (Phillips & Baumgartner, 2002; Powell et al., 2019). Disgust has specific relevance to consumption behaviors as it is an emotion that biologically evolved to decrease the risk of harmful pathogen contamination (Cochran et al.,

2018). Consequently, disgust negatively influences the acceptability of and willingness to use sustainable products, such as sewage-based products (Egolf et al., 2019; Rozin et al., 2015).

However, even though the base for pathogen disgust may be an evolved part of our psyche, the expression and experience of that disgust is a socialized aspect of our culture (Russel & Lux, 2009; Wester et al., 2016). Therefore, the perception of disgust can be changed, which can result in more positive intentions towards sewage-based products. For that reason, the purpose of this thesis is to further focus on how expression and experience of disgust can be altered, to ultimately increase acceptability of and willingness to use sewage-based products.

### **Emotions and Decision-Making**

According to dual-process decision-making theories, emotions serve as rapid, automatic, unconscious responses that interact with deliberate cognitive mechanisms (Kahneman, 2003). They are states of conscious feelings as a result of people's evaluations or appraisals of stimuli (Baumeister et al., 2007). In particular, emotions can direct and prioritize cognitive processes, impact long-term behavioral intention, enhance goal formation and construct heuristics for decision-making (Armony et al., 1997; Baumgartner et al., 2008; Bülbül & Menon, 2010). Furthermore, emotions influence affect and mood, which are key factors in altering perceptions or behavior (Serby, 2003). Therefore, it is essential to focus on emotions in marketing messages to possibly enhance positive perceptions of consumers towards green products or sustainable initiatives. Unfortunately, emotions are overlooked to a relatively large extent, given that in Western societies many practitioners prefer to focus on reason as a decision-making tool (Burningham et al., 2015). Practitioners often have difficulty handling people's emotional responses adequately (Cass & Walker, 2009). Consequently, the wrong conclusions are drawn about people's behavior (e.g., it is assumed that people are overreactive or irrational). This often results in practitioners responding to emotions in

ineffective or even counter-effective ways, limiting effective strategies to promote desired behavior (Perlaviciute et al., 2018). As a result, marketing strategies that aim to motivate pro-environmental behavior might also face difficulties in achieving this goal due to consumers' emotions not aligning with the marketing message.

### **Emotions and Pro-Environmental Decision-Making**

In regard to pro-environmental behavior, emotions summarize complex information regarding environmental concerns and moreover they function as a motivator in engagement of pro-environmental behavior (Mankad, 2012). Especially moral emotions such as pride and ethical feelings are imperative in predicting pro-environmental behavior because they reflect acceptance of ecological norms and responsibilities (Koenig-Lewis et al., 2014). This stems from the self-transcendent values found within the nature of people's moral decisions, which implies that people consider the interest of the collective when making choices (Steg et al., 2014). Especially biospheric (i.e., environmental) values, which are a type of self-transcending values, have high predictivity of pro-environmental beliefs, attitudes and behaviors (De Groot & Steg, 2007). Since emotions are intimately tied to values (Steinert & Roeser, 2020), the self-transcending behaviors people engage in may also elicit positive moral emotions. Conformingly, positive emotions elicited by sustainable actions have been found as these actions make people feel good about themselves because they make a morally-good choice (Judge et al., 2021; Venhoeven et al., 2020). However, whether these findings also translate towards moral emotions in relation to the specific pro-environmental behavior of using sewage-based products remains rather unclear, since there is only a small body of literature specifically linking moral emotions to sewage-based products. For example, Judge et al. (2021) did find that biospheric values were associated with more positive emotions towards sewage-based flowerpots and tabletops, but what specific contribution moral emotions and moral feelings made to this association remains unclear.

In research about negative moral emotions, there are findings that support disgust plays a key role in the acceptance of atypical (e.g., misshapen or sewage-based) products, as discussed before with the ‘yuck factor’ (Powell et al., 2019; Wester et al., 2016). Meng and Leary (2019) found that clothing made from recycled plastic elicited disgust, which was related to lower purchase intentions of consumers. Moreover, Powell and colleagues (2019) also found that malformed vegetables elicited disgust in consumers, which was ultimately associated with lower purchase intentions. These examples show that perceived disgust can undermine the self-transcending feeling of making a morally-good choice, ultimately reducing the acceptability of and willingness to use sewage-based products. Nevertheless, disgust is not the only emotion that occurs when consumers evaluate these products. Namely, people also experience feelings such as discomfort or uneasiness, which are influenced by their feelings of hedonic self-enhancement.

Hedonic self-enhancement implies that individuals consider their perceived pleasure and comfort when making choices (De Groot & Steg, 2007; Steg et al., 2014). Alongside the self-transcending nature of moral emotions such as pride, the self-enhancement of hedonic emotions is also an important factor in motivating pro-environmental behavior. Consequently, people who endorse hedonic values act pro-environmentally when behavior is perceived to be an improvement for one’s feelings and when that behavior demands low effort (Steg et al., 2014). However, if people do not perceive strong and positive hedonic emotions (e.g., comfort or pleasure) as a consequence of their actions, they will also be less likely to engage in these actions (Steg et al., 2014). This finding is especially prevalent in pro-environmental behaviors, where comfort often has to be traded for environmental benefits. For example, turning down the thermostat is beneficial for the environment, but it may reduce comfort, and using a sewage-based product benefits the environment but people might feel uncomfortable when using such a product. As follows, the relation between hedonic emotions, acceptability

of, and willingness to use sewage-based products does not result in strong positive relations. However, this weak relation might also be explained by the fact that sewage-based products such as tabletops, insulation material, flowerpots and drinking cups do not particularly feature hedonic traits such as comfort, fun and pleasure. Nevertheless, hedonic emotions have been found to be a motivating factor for consumers to purchase green products if they experience comfort or perceive the beneficial characteristics (Nilsson et al., 2014; Rezvani et al., 2018). Therefore, a slightly different approach might be necessary to enhance hedonic feelings and emotions towards sewage-based products. To conform to the essence of sewage-based products, in addition to approaching them as fun, cool, or pleasurable, portraying sewage-based products as consumer-friendly and innovative might result in more positive consumer evaluations (Kim & Petitjean, 2021). Perhaps hedonic emotions and feelings do have a strong effect in regard to increasing acceptability of and willingness to use sewage-based products, but a different approach is needed to entail their true potential.

### **Present Study**

Existing literature about acceptance of sewage-based products has mostly focused on positive and negative emotions, and hedonic and moral values (e.g., Judge et al., 2021; Mankad, 2012; Powell et al., 2019; Wester et al., 2016). This study will build further upon that by specifically looking at perceived moral and hedonic emotions, as well as disgust as predictors of acceptability of and willingness to use sewage-based products. Consequently, this study will test in a field-setting if moral and hedonic emotions can be harnessed via interventions to promote acceptability of sewage-based products. Specifically, the current study will focus on sewage-based drinking cups because cups are high-contact use products (Bruvold, 1988; Judge et al., 2021). Generally, high (physical) contact uses in sewage-water recycling (e.g., showering and drinking) are less accepted than low contact uses such as toilet flushing (Bruvold, 1988). However, high contact uses are especially important because



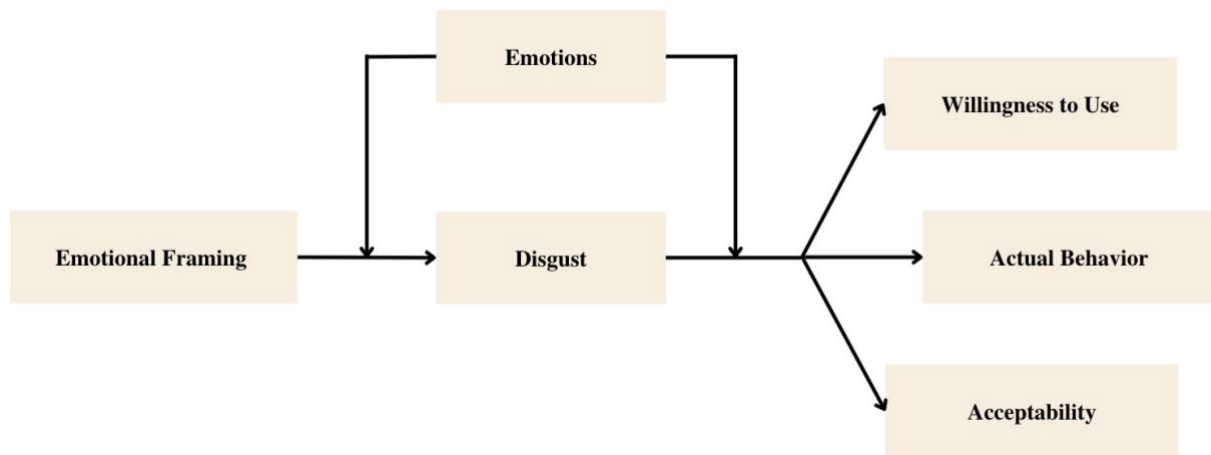
merely focusing on low contact uses severely limits its potential applications (Wester et al., 2016).

To promote the sewage-based drinking cups, infographics are an effective and proven way to elicit more favorable responses and positive emotions because marketing messages are commonly used to advertise the benefits of products to consumers (Judge et al., 2021). Interestingly, environmental campaigns have been found to be more effective when the message aligns with biospheric and moral values (Judge et al., 2021). Since sewage-based cups positively impact the environment, emphasizing these environmental benefits might increase the self-transcending perception of making a morally-good choice among participants. This could in turn increase the acceptability of and willingness to use the cup. To test this, the current study will use infographics to create three conditions: one condition where hedonic emotions and feelings are targeted (i.e., ‘Hedonic + Emotion’), one condition where moral emotions and feelings are targeted (i.e., ‘Moral + Emotion’) and one condition that is pro-environmentally framed but without actively targeting moral emotions or feelings (i.e., ‘Moral + Neutral’).

Lastly, to further understand the motivations of consumers, actual behavior will be measured by asking participants to actually drink from a sewage-based cup. This could, in turn, give insights into whether intentions also result in actions, or whether more effort is needed to encourage people to show actual pro-environmental behavior and hence drink from the cup. Furthermore, researching actual behavior might give theoretical and practical insights on new variables that could be relevant in motivating people to use sewage-based products. Ultimately, green businesses could benefit from such understanding by aligning their marketing strategies to consumer motivations.

**Figure 1**

*Proposed model for the relationship between all variables*



### Hypotheses

**Hypothesis 1:** Participants within morally-framed conditions experience a greater acceptability of **(H1a)** and willingness to use **(H1b)** sewage-based drinking cups than participants in the hedonically-framed condition.

**Hypothesis 2:** Participants in the Moral + Emotion condition experience a greater acceptability of **(H2a)** and willingness to use **(H2b)** sewage-based drinking cups than participants in the Hedonic + Emotion and in the Moral + Neutral conditions, especially participants with stronger perceived moral emotions **(H2c)**.

**Hypothesis 3:** The emotion of disgust is negatively associated with acceptability of **(H3a)** and willingness to use **(H3b)** sewage-based drinking cups, especially among participants with weaker perceived hedonic emotions **(H3c)**.

**Hypothesis 4:** The emotion of disgust fully mediates the relation between framing and acceptability of **(H4a)** and between framing and willingness to use **(H4b)** sewage-based drinking cups.

**Hypothesis 5:** Participants in the Moral + Emotion condition have a significantly higher chance to actually drink from the sewage-based cup than participants in the Hedonic + Emotion and Moral + Neutral conditions.

## Methods

### Participants and Procedure

A total of 200 participants were recruited in the current study. 95 of these participants were in a group, and 105 participants were alone. 50.5% identified as male ( $n = 101$ ), 48% identified as female ( $n = 96$ ) and 1.5% identified as non-binary ( $n = 3$ ). The mean age of the participants was 35.5 years ( $SD = 13.8$ ), ranging from 18 to 82 years old. 76% of participants came from the Netherlands ( $n = 152$ ), and 24% came from abroad ( $n = 48$ ). 2% of the participants reported that their highest achieved studies were primary studies ( $n = 3$ ), 32% reported that their highest achieved studies were secondary studies ( $n = 64$ ), 37% reported their highest achieved studies were the bachelor ( $n = 74$ ), 22% reported their highest achieved studies were the master ( $n = 44$ ) and for 2% the highest achieved studies were the PhD ( $n = 4$ ). Six participants (3%) ended up being excluded from the dataset as they did not correctly answer the attention check.

After the Ethics Committee of Psychology approved this research, I approached participants in public spaces such as markets, parks and sports clubs, among others. Nearly everyone from the general population was eligible for the current study; only minors (i.e., below 18 years old) could not participate. I did not give a reward to participants for participating. To achieve random allocation to conditions, I showed participants the white backsides of the three infographics and they had to pick one of the infographics randomly. If participants were in a group, one of the group members could randomly pick an infographic and accordingly I would give identical copies of that infographic to the other group members. I furthermore informed each group member that they could not collaborate with each other until each group member answered all the questions.

When I approached participants, I told them the study was about the public opinion on drinking cups made from recycled sewage-based material. I furthermore informed the

participants that the study would take about five to ten minutes and that the purpose of the study was to better understand opinions about products such as this cup. Moreover, I emphasized that participation was entirely voluntary and that answers would be anonymized. If the participants agreed to take part in the study, I would provide them with the necessary materials (a sewage-based cup, a questionnaire, a pen, and one of the three infographics they picked randomly). To minimize social desirability, I told participants that there were no right or wrong answers, and that their honest opinion would be most helpful. At any time, participants could ask questions or stop participating for any reason without consequences. Once the questionnaire was filled in, I personally asked participants if they would like to actually drink from the cup. Participants who wanted to drink from the cup were given a cup filled with water. After drinking from the cup, or after rejecting the offer, I asked participants why they decided to (not) drink from the cup. Lastly, I asked participants who drank from the cup to give a grade that represented their drinking experience. After answering all the questions, I debriefed the participants by explaining to them that I was researching the effects of different types of message framing on acceptability of and willingness to use sewage-based cups. Additionally, I showed the other infographics that the participants could have picked and thereby I explained the manipulation of the study. Finally, I asked if the participants had additional questions or comments.

In regard to the safety of the participants' identities, I ensured anonymization of the data by avoiding any questions that could identify the participants.

## **Design**

In this study, the independent variable was emotional message framing, consisting of three conditions: Hedonic + Emotion, Moral + Neutral, and Moral + Emotion. The dependent variables were acceptability, willingness to use, and actual behavior. Lastly, disgust was examined as a mediator, and moral and hedonic emotions were measured as moderators.

The current study applied a between-subjects experimental design to test the hypotheses using three conditions of one independent variable. Since participants were randomly allocated to only one of the conditions, the manipulation of this study is the emotional message framing.

### **Materials and Instruments**

The primary materials that were used during data collection were the sewage-based cups (Appendix A, Figure A1), the infographics (Appendix A, Figures A2, A3, A4), a bottle of water and printed Dutch and English questionnaires (Appendix A, Figure A5).

In regard to the differences among the infographics, the Moral + Emotion condition actively appealed to moral emotions by mentioning participants can be proud of themselves when using the cup and that they contribute to a healthier planet. The Hedonic + Emotion condition actively appealed to hedonic emotions by framing the sewage-based cup as innovative, qualitative and consumer-friendly. The Moral + Neutral condition acknowledged the environmental benefits as a consequence of using the cup, but moral emotions were not actively appealed to. Alongside these textual differences, there were also changes made in color schemes and images per each condition to amplify their intended effect (e.g., green color schemes for the moral conditions with leaves, and a navy-blue color scheme with happy images for the hedonic condition).

After reading one of the infographics, participants filled in the questionnaire. In the first block, participants were asked to what extent they experienced positive or negative emotions when thinking about the sewage-based cup. They could answer on a five-point Likert Scale (1 = *Not at all*, 5 = *Very strongly*). The scale of moral emotions consisted of three items: *Proud*, *Righteous*, and *Ethical* ( $M = 3.40$ ,  $SD = 1.04$ ,  $\alpha = .85$ ), and the scale of hedonic emotions consisted of seven items: *Happy*, *Comfortable*, *Excited*, *Inspired*, *Relaxed*, *Enthusiastic* and *Uncomfortable (reversed)* ( $M = 3.69$ ,  $SD = .77$ ,  $\alpha = .88$ ). Disgust was

measured using a single item called *Disgusted* ( $M = 1.69$ ,  $SD = .87$ ). Since disgust is measured by one item, no Cronbach's Alpha is available for this construct.

The second block of the questionnaire measured willingness to use the sewage-based cup and consisted of three items. The first item asked "*Imagine you go to a coffeeshop, and you had the choice between a conventional cup and this sewage-based cup. Which cup would have your preference?*". Participants could answer on a seven-point Likert scale (1 = *Strong preference for the conventional cup*, 7 = *Strong preference for the sewage-based cup*). The second item asked participants "*How much more extra money would you be willing to pay for a conventional cup, if you were offered this sewage-based cup?*". Participants could answer on a five-point Likert scale (1 = *€0 extra*, 5 = *More than €2 extra*). This item was reversed when constructing the scale of willingness to use. The third item asked participants "*Would you recommend this sewage-based cup to friends and family?*". Participants could answer on a seven-point Likert scale (1 = *Absolutely not*, 7 = *Absolutely*). The means for the willingness to use scale were standardized, since one of the items used a smaller Likert scale. There was a high reliability for the scale of willingness to use ( $M = .03$ ,  $SD = .84$ ,  $\alpha = .83$ ).

In the third block of the questionnaire, acceptability of the sewage-based cup was measured using a five-item scale that was partially adapted from Judge and colleagues (2021) with an alpha of  $\alpha = .89$  in their study. For this study, one item about perceived hygiene was added. The current scale consisted of five seven-point Likert scale questions that targeted different aspects of acceptability. First, participants were asked if they thought the sewage-based cup is *hygienic* (1 = *Not at all hygienic*, 7 = *Very hygienic*). Second, it was asked if the cup was *bad* or *good* (1 = *Very bad*, 7 = *Very good*). The third item directly asked if the cup was *acceptable* (1 = *Not at all acceptable*, 7 = *Very acceptable*). The fourth item asked if the cup was *necessary* (1 = *Very unnecessary*, 7 = *Very necessary*). The last item asked if the

opinion of the participants of the cup was *positive* or *negative* (1 = *Very negative*, 7 = *Very positive*). The reliability of this scale was high ( $M = 5.56$ ,  $SD = 1.21$ ,  $\alpha = .93$ ).

At the end of the questionnaire, a manipulation check was added to examine if the different infographics elicited the responses they were aiming at. Via a five-point Likert scale, participants could answer to what extent they perceive the cup to have moral and hedonic characteristics (1 = *Not at all*, 5 = *Very strongly*). The manipulation check for moral characteristics consisted of three items: *Sustainable*, *Pro-Environmental* and *Ecological* ( $M = 4.14$ ,  $SD = .89$ ,  $\alpha = .95$ ). The manipulation check for hedonic characteristics also consisted of three items: *Fun*, *Innovative* and *Consumer-friendly* ( $M = 3.62$ ,  $SD = .83$ ,  $\alpha = .76$ ).

To determine if each participant carefully read their infographic, an attention check was added with three items that each represented one condition. The item corresponding to the Hedonic + Emotion condition was “*I read about how this cup is new and innovative*”. The item corresponding to the Moral + Neutral condition was “*I read about how this cup is good for the environment*”. The item corresponding to the Moral + Emotion condition was “*I read about how this cup is good for the environment, and that I can be proud if I use this cup*”.

Lastly, actual behavior was measured by asking participants if (1) they would drink from the cup (77% ( $n = 149$ ) drank), (2) why they do or do not want to drink from the cup, and (3), if they drank from the cup, what grade they would give their drinking experience (1 = *Very unpleasant*, 10 = *Very pleasant*). The average given grade was 8.26 ( $SD = 1.08$ ).

## Results

Before focusing on the analyses of the hypotheses, I evaluated the answers on the attention check to determine if participants had to be excluded. In total, 30 participants failed the attention check. However, I ended up excluding six of these participants from my dataset instead of 30 because most failed attention checks were made by participants who were in one

of the moral conditions, and thought they were in the other moral condition ( $n = 24$ ). Since the infographics and especially the attention check items of the moral conditions were relatively similar, I decided to not exclude these 24 participants. However, participants that were in either one of the moral conditions, and answered they were in the hedonic condition, and vice versa, were excluded from the dataset ( $n = 6$ ) since the hedonic and moral infographics, along with the hedonic and moral attention check items, were substantially different.

In addition to evaluating the attention check, I also checked if participants who were in a group did not statistically differ in any of the variables of this study compared to participants who were alone. An independent samples t-test revealed there were no significant differences in any of the variables of this study depending on whether the participant was alone or not.

### Descriptive Statistics

I began my statistical analyses by calculating correlations of my main quantitative variables (emotions, willingness to use, acceptability and disgust) to get an idea of the strength and direction of the relations. As can be observed from Table 1, all correlations were significant at a  $p < .001$  level. Furthermore, all variables except for disgust show large and positive correlations. Disgust was negatively, but also strongly, related to the other variables.

**Table 1**

*Bivariate Spearman's Rho Correlations between All Variables*

	1	2	3	4	5
1. Hedonic Emotions	1				
2. Moral Emotions	.71**	1			
3. Willingness to Use	.77**	.60**	1		
4. Acceptability	.77**	.71**	.84**	1	
5. Disgust	-.58**	-.39**	-.62**	-.62**	1

*Note.* Actual Behavior is excluded since there was no appropriate scale for correlational analysis.

*Note.* \*\* =  $p < .001$



## Manipulation Check

Before testing the hypotheses, I wanted to ensure that the different types of framing influenced the participants accordingly and hence each condition would be effective in its intended message. Therefore, I tested whether participants in the moral conditions perceived the cup as more moral than participants in the hedonic condition, and if participants in the hedonic condition perceived the cup as more hedonic than participants in the moral conditions. For the moral manipulation, participants in the moral conditions perceived their message frame as significantly more moral than participants in the hedonic condition,  $U(2, 192) = 60.82, p < .001$ . For the hedonic manipulation, participants in the hedonic condition did not perceive their message frame as significantly more hedonic than participants in the moral conditions ( $p = .17$ ). Therefore, the moral manipulation was successful in fulfilling its intended message but the hedonic manipulation was not.

## Testing the Hypotheses

### *The Effects of Framing on Acceptability and Willingness to Use*

After orientating myself on the data with descriptive statistics and the manipulation check, I tested the hypotheses. First, I wanted to find out if moral framing resulted in higher acceptability of and willingness to use the sewage-based cup compared to hedonic framing, regardless of the framing appealing to emotions or being neutral. Therefore, to test this hypothesis, I merged the Moral + Neutral condition and the Moral + Emotion condition. This entailed that I needed to conduct a t-test, and more specifically a non-parametric Mann-Whitney U test since there was a violation of the normality assumption for the acceptability and willingness to use scales (Shapiro-Wilk: Acceptability:  $SW(194) = .94, p < .001$ ; Willingness to Use:  $SW(194) = .90, p < .001$ ).

As expected, participants in the moral conditions reported higher acceptability ( $M = 5.82, SD = 1.04$ ) than participants in the hedonic condition ( $M = 5.00, SD = 1.35$ ),  $U(2, 192)$

= 5640.50,  $p < .001$ . Likewise, participants in the moral conditions reported higher willingness to use ( $M = .18$ ,  $SD = .78$ ) than participants in the hedonic condition ( $M = -.28$ ,  $SD = .90$ ),  $U(2, 192) = 5323.50$ ,  $p < .001$ . Therefore, H1 was fully supported.

After comparing the means of the moral versus hedonic framing in general, I took a narrower look into the different conditions to find out if actively appealing to emotions in the moral framing (i.e., the Moral + Emotion condition) would result in higher acceptability of and willingness to use the cup compared to Moral + Neutral and Hedonic + Emotion framing. Since I found a violation of the normality assumption in the first hypothesis, I used a Kruskal-Wallis H test instead of a one-way ANOVA to conduct the analyses between the three experimental conditions.

I first tested if there was a significant difference across the experimental conditions for acceptability. A Kruskal-Wallis H test revealed that there was a significant difference for the means of acceptability between at least two conditions,  $H(2, 192) = 18.89$ ,  $p < .001$ ,  $\eta^2 = .10$ . Since I was comparing three groups, I corrected for family-wise error using the Bonferroni method. Accordingly, a Kruskal-Wallis H test found that acceptability was reported significantly higher by participants in the Moral + Emotion condition ( $M = 5.93$ ,  $SD = .88$ ) than participants in the Hedonic + Emotion condition ( $M = 5.00$ ,  $SD = 1.35$ ),  $H(2, 192) = 40.85$ ,  $p < .001$ . Likewise, participants in the Moral + Neutral condition reported higher acceptability ( $M = 5.69$ ,  $SD = 1.18$ ) than participants in the Hedonic + Emotion condition,  $H(2, 192) = 32.3$ ,  $p = .004$ . However, there was no significant difference in acceptability between participants in the Moral + Emotion and participants in the Moral + Neutral condition ( $p > .999$ ). Therefore, H2a was partially supported.

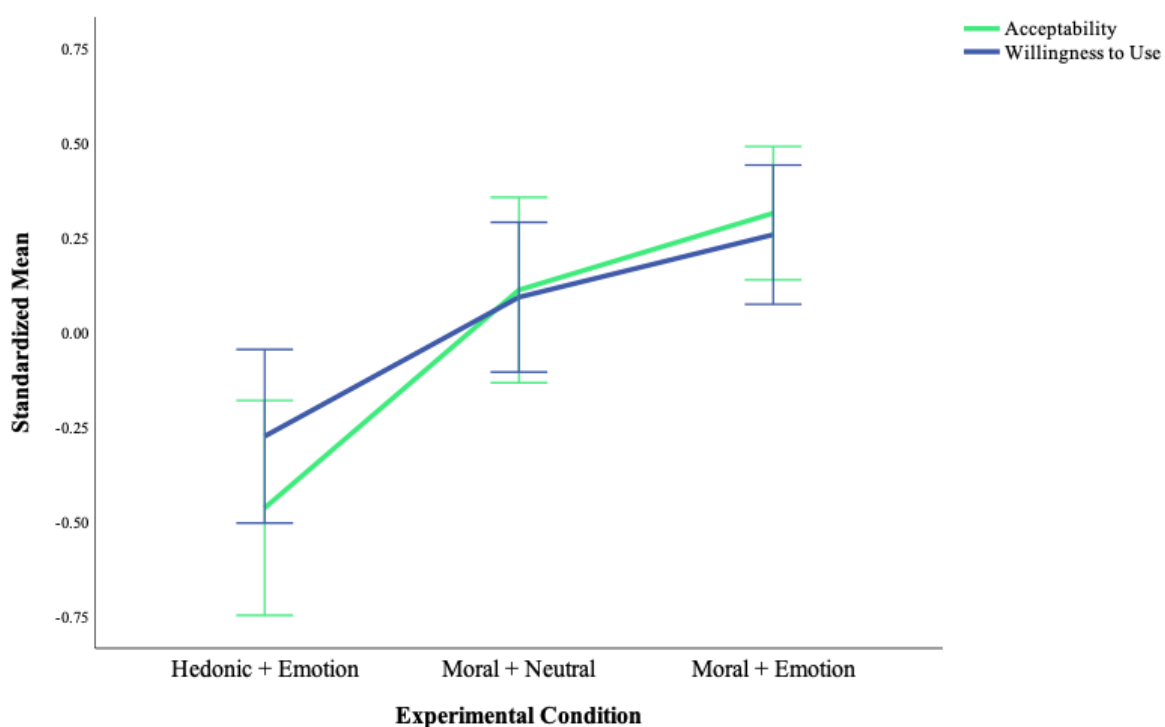
For willingness to use, I applied the same method I used for acceptability to test significance. A Kruskal-Wallis H test revealed that there was a significant difference between at least two conditions for the means of willingness to use,  $H(2, 192) = 12.78$ ,  $p = .002$ ,  $\eta^2 =$

.07. After correcting for family-wise error using the Bonferroni method, a Kruskal-Wallis H test found that willingness to use was reported significantly higher by participants in the Moral + Emotion condition ( $M = .22$ ,  $SD = .81$ ) than participants in the Hedonic + Emotion condition ( $M = -.28$ ,  $SD = .90$ ),  $H(2,192) = -34.69$ ,  $p < .001$ . However, there was no significant difference in willingness to use between participants in the Moral + Emotion condition and participants in the Moral + Neutral condition ( $p = .736$ ). Moreover, there was also no significant difference in willingness to use between participants in the Hedonic + Emotion condition and participants in the Moral + Neutral condition ( $p = .058$ ). Therefore, H2b was partially supported.

To clarify, since many comparisons have been reported, Figure 2 below provides a graphical overview to illustrate the significant differences between the three experimental conditions of acceptability of and willingness to use the sewage-based cup.

**Figure 2**

*Standardized Mean Differences of Acceptability of and Willingness to Use the Sewage-Based cup Across Emotional-Framing Conditions.*



*Note.* Means are standardized since willingness to use was measured with a smaller Likert scale.

*Note.* Error bars represent 95% confidence intervals.

In addition to exploring differences between the three conditions in acceptability of and willingness to use the sewage-based cup, I conducted a moderation analysis using PROCESS macro from Hayes (2018) to test if the effect of framing on acceptability of and willingness to use the cup is stronger when moral emotions are stronger. Contrary to the expectations, participants with stronger perceived moral emotions did not experience higher acceptability ( $p = .12$ ) or willingness to use ( $p = .21$ ) than participants who perceived weaker moral emotions. Therefore, H2c was not supported.

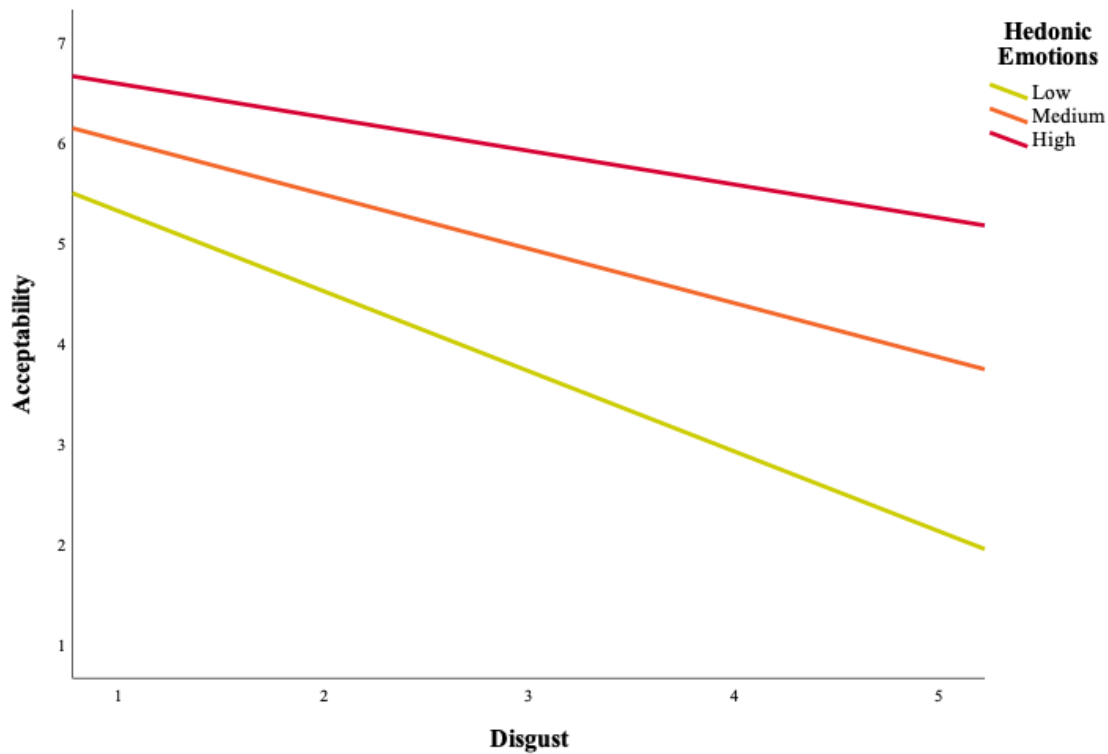
### ***The Effects of Disgust on Acceptability and Willingness to Use***

In line with the ‘yuck factor’, I expected that disgust would be negatively related to acceptability and willingness to use the cup. Conformingly, a strong negative correlation was found between disgust and acceptability ( $r = -.62, p < .001$ ), and likewise between disgust and willingness to use ( $r = -.62, p < .001$ ) Therefore, H3a and H3b were fully supported.

Additionally, I conducted a moderation analysis using PROCESS macro from Hayes (2018) to test my expectations that the negative effect of disgust on acceptability and willingness to use is stronger when hedonic emotions are weaker. In line with my expectations, there was a significant moderation by hedonic emotions for acceptability ( $b = .26, t(190) = 2.43, p = .02$ ). This implies that the negative relation between disgust and acceptability was stronger when hedonic emotions were perceived weaker. To provide a visual understanding of this, Figure 3 below illustrates the moderation. Contrary to the expectations however, there was no significant moderation effect found for willingness to use by hedonic emotions ( $p = .86$ ). Therefore, H3c was partially supported.

**Figure 3**

*Mean differences of Acceptability Moderated by Hedonic Emotions Across Different Disgust Levels.*



*Note.* The y-axis represents the Likert scale of acceptability, the x-axis represents the Likert scale of disgust.

The final step in my analysis of disgust lied in testing if it fully mediates the relation between message framing and acceptability of the cup, and message framing and willingness to use the cup. Using PROCESS macro from Hayes (2018), mediation was analyzed by first making dummy variables of the multi-categorical independent variable. Accordingly, the Hedonic + Emotion condition became the reference group when comparing it with the Moral + Neutral condition and the Moral + Emotion condition.

Even though the experimental conditions modified the acceptability of the sewage-based cups, I did not find that disgust significantly mediated the effect of framing on acceptability when comparing the effect of the Hedonic + Emotion condition versus the Moral + Neutral condition ( $X1$  indirect = .24,  $SE$  = .16, 95% CI [-.07, .56]), nor when comparing the

effect of the Hedonic + Emotion condition versus the Moral + Emotion condition (X2 indirect = .28,  $SE = .16$ , 95% CI [-.02; .59]). Therefore, H4a was not supported.

Similarly, I also did not find that disgust significantly mediated the effect of framing on willingness to use when comparing the effect of the Hedonic + Emotion condition versus the Moral + Neutral condition (X1 indirect = .15;  $SE = .13$ ; 95% CI [-.11, .39]), nor when comparing the effect of the Hedonic + Emotion condition versus the Moral + Emotion condition (X2 indirect = .19;  $SE = .12$ ; 95% CI [-.05, .42]). Therefore, H4b was not supported. Consequently, I did not find any mediation by disgust on acceptability of or willingness to use the sewage-based cup.

### ***Quantitative Analysis of Actual Behavior***

For my final hypothesis, I tested if the different message frames had an effect on the chances of participants deciding to drink from the cup or not. In response to the question “*Will you drink from the cup?*”, 77% of all the participants said yes and actually drank from the cup ( $n = 149$ ) and 23% answered no and did not drink from the cup ( $n = 43$ ). Specifically, in the Hedonic + Emotion condition 68% drank from the cup ( $n = 42$ ), in the Moral + Neutral condition 78% ( $n = 49$ ), and in the Moral + Emotion condition 87% actually drank from the cup ( $n = 58$ ).

A Chi-Square test indicated that there was a significant difference in the chances of participants choosing to drink from the cup depending on the emotional frame ( $\chi^2 = 6.57$ ,  $df = 2$ ,  $p = .04$ ). Specifically, based on the odds ratio, participants in the Moral + Emotion condition had a 3.1 times higher chance of drinking from the cup than participants in the Hedonic + Emotion condition (OR = 3.07; 95% CI [1.27, 7.41];  $p = .01$ ). However, no significant differences were detected in chances to actually drink from the cup between the Moral + Emotion and the Moral + Neutral condition ( $p = .19$ ). Likewise, no significant differences were detected in chances to actually drink from the cup between the Moral +

Neutral and the Hedonic + Emotion condition ( $p = .21$ ). Therefore, H5 was partially supported.

### ***Qualitative Analysis of Actual Behavior***

To gain a deeper understanding of participants' motivations to (not) drink from the cup, I asked participants what their reasons were to drink or not drink. Pie charts of all reported reasons of participants to drink or not drink from the cup can be found in Figure B1, B2, B3 and B4 in Appendix B. The top two reported reasons to drink from the cup were the same in all conditions, namely curiosity and environmental benefits. Other common reported reasons among all conditions were to help with my research or because the participants said they liked the concept of the cup. In regard to the reported reasons why not to drink, all conditions shared the same top reasons: disgust, uncomfortableness and having no interest. However, disgust was the top reported reason to not drink from the cup in the hedonic condition (35% of participants), while lack of interest and uncomfortableness were the top reported reasons in the moral conditions (each 26.1% of participants).

When grading the pleasure of their drinking experience, across all conditions the participants gave high scores: participants in the Hedonic + Emotion condition scored an 8.0 average ( $SD = 1.07$ ), in the Moral + Neutral condition an 8.4 average ( $SD = 1.03$ ) and in the Moral + Emotion condition an 8.3 average ( $SD = 1.09$ ). These grades did not significantly differ from each other ( $p = .43$ ).

## **Discussion**

The purpose of this study was to research the effects of moral and hedonic emotions as well as disgust on the acceptability of, willingness to use and actual usage of sewage-based drinking cups. In line with my expectations, acceptability of and willingness to use sewage-based cups were significantly higher when emphasizing the environmental benefits compared to emphasizing hedonic benefits (when controlling for emotional framing). This also aligns

with previous research that found people to be generally more accepting towards sewage-based products when these products are framed pro-environmentally, because it enhances the feeling of making a morally right decision (Judge et al., 2021; Mankad, 2012).

Going into further detail, acceptability and willingness to use were especially high if cups were framed pro-environmentally and emotions were actively appealed to. Interestingly, moral message framing without appealing to emotions only resulted in higher acceptability than hedonic framing, but not in higher willingness to use. However, the two moral frames never differed significantly from each other (regarding the hypotheses). So, even though the moral conditions did not statistically differ from each other, the Moral + Neutral condition did not elicit responses as strong as the Moral + Emotion condition when being compared to the hedonic condition. One potential explanation for this difference is that the design of the Moral + Emotion condition was a bit more refined compared to the Moral + Neutral condition. For example, in the Moral + Emotion condition, the individual contribution to the environment was highlighted even stronger, there was more depth in the color scheme which made it aesthetically more appealing and the images also provided stronger support for the moral message (e.g., a boy hugging the Earth). Another explanation why the Moral + Emotion condition had a stronger effect than the other two conditions on acceptability and willingness to use is that it contained both the core elements of the current manipulation: morality and emotional appeals. In contrast, the Hedonic + Emotion condition lacked the morality element and the Moral + Neutral condition was not as effective because it lacked the emotional appeal element.

Further, in contrast to my expectations, strong moral emotions did not result in a stronger effect of message framing on acceptability of or willingness to use the sewage-based cup. A possible explanation for this finding is that pride, righteousness and ethics are relatively profound emotions and feelings. Pride is for example experienced when someone



achieves their goals and feelings of ethics or righteousness are experienced when someone perceives their actions to contribute significantly to, for example, saving the environment (Aziz et al., 2021; van Osch et al., 2016). Perhaps drinking from a single-use drinking cup did not elicit these rather intense feelings. This also aligns with my observations throughout the field study, as during the questionnaire many participants (also those who were very positive about the cup) thought out loud or gave feedback that “*it’s just a drinking cup*” or “*why would I be proud of simply using a cup?*”. Therefore, the environmental impact that the sewage-based cup makes might have been perceived to a small extent, which weakened the impact of moral emotions on the effect of message framing in relation to acceptability and willingness to use.

The results supported my expectations that disgust would be negatively associated with acceptability of and willingness to use the sewage-based cup. This also aligns with the body of literature emphasizing the impact of the ‘yuck factor’ on atypical products such as sewage-based products (e.g., Powell et al., 2019; Wester et al., 2016). More specifically, the results showed support for a moderating role of hedonic emotions on the relation between acceptability and disgust, but not for willingness to use. This implies that, in this study, disgust is a stronger predictor of acceptability when feelings of comfort or pleasure are experienced to a weaker extent. This finding can be supported by the fact that disgust often comes with feelings of uncomfortableness, which is also implied by the strong negative relation between hedonic emotions and disgust ( $r = -.58$ ).

Lastly, the results supported the expectation that participants in the Moral + Emotion condition would have a higher chance of actually drinking from the cup than participants in the Hedonic + Emotion condition. Therefore, not only does moral and emotional framing result in higher intentions on Likert scales compared to hedonic framing, it also results in higher chances of showing actual behavior.

Interestingly, even though acceptability of and willingness to use the cup were significantly higher in the moral conditions compared to the hedonic condition, the primary reasons that participants reported to drink from the cup did not fully align with these findings. Instead of wanting to drink from the cup for environmental reasons, in all conditions the top given reason was curiosity to try the cup. This potentially implies that curiosity is another motivator to use sewage-based products. However, these reasons and their rankings have to be interpreted with care as I only noted the first reasons that participants provided. Participants frequently gave multiple reasons for drinking from the cup (e.g., out of curiosity but also to support the environment and to help my research), but to give equal weight to each participant I noted only the first reason.

### **Implications**

Theoretically, this study contributes to a further understanding of the effect of emotions and feelings on acceptability of and willingness to use sewage-based products. First of all, this study supports existing dual-process decision-making theories that besides reason, people are also influenced by their perceived emotions and feelings, as shown by the positive and strong correlations between moral emotions, hedonic emotions, acceptability and willingness to use. Since there is no elaborate amount of existing research specifically relating moral and hedonic emotions to the acceptance and usage of sewage-based products, this study may provide a feasible theoretical framework on how to approach moral and hedonic emotions in future research. Furthermore, this study supports further understanding of the ‘yuck factor’ by showing that higher perceived disgust is negatively related to acceptability of and willingness to use sewage-based products. Consequently, this study amplifies the importance of taking negative emotions such as disgust into account when promoting sewage-based products. More importantly, despite the strong negative effect of disgust this study

provides a plausible method of increasing acceptability and willingness to use by accentuating environmental benefits of sewage-based products

Further, this study gives theoretical support to self-transcendent values influencing pro-environmental behavior as the moral frames had a strong effect on higher acceptability and willingness to use. This also became apparent in the provided reasons participants gave to drink from the cup, as about one third of all participants who drank from the cup said they wanted to drink because it would benefit the environment (inducing biospheric values) or because they said they wanted to help me and my research (inducing altruism).

Another strength of the current study is that with a relatively small manipulation of an infographic, consistent and convincing differences have been found in intention behaviors and actual behavior across the different experimental conditions. Not only did participants in the morally and emotionally framed condition consistently report higher acceptability and willingness to use than participants in the hedonic condition; they also translated these intentions to actual behavior by having a three times higher chance to drink from the cup than participants in the hedonic condition. This shows that, in this study, with a simple change of words (and potentially visuals), people can be motivated to a significantly greater extent to use sewage-based cups.

Furthermore, by conducting a field study, the chances increased that participants answered the questionnaire based on their actual experiences with the sewage-based cup, rather than a hypothetical evaluation as in for example online studies. Moreover, conducting a field study ultimately decreased the impact of the intention-behavior gap that is commonly found within environmental psychology research (Wyss, Knoch & Berger, 2022). Consequently, this field study strengthened the generalizability of the results. Additionally, conducting a field study allowed me to study actual behavior which is imperative in an applied research field such as environmental psychology. Especially in regard to the urgency

of promoting a circular economy, and thereby trying to make people actually use sewage-based products, this study contributes to research on how to influence people to adopt new ways of pro-environmental behavior.

Practically, this study provides a framework for companies to align their marketing strategies and thereby increase the acceptability towards sewage-based cups in particular. One main problem that companies face, especially in the circular economy branch, is the strict legislation that hinders them from developing innovations to further promote a circular economy (Dunphy & Herbig, 1995). Acceptance of sewage-based products is thereby vital in changing legislation; as it shows that consumers feel a need for circular economy innovations. Though this is only one study, and therefore we should not extrapolate the results, this study does provide a push in the right direction on how green companies can adjust their marketing strategies for sewage-based products

### **Limitations**

A first limitation of the current study is the potentially biased sample. Even though I tried to realize a high external validity by conducting a field study, the sample still had certain patterns. For example, most opinions found in this study were relatively positive, which can be concluded from the high means on acceptability, willingness to use, the amount of people agreeing to actually drink from the cup (77%), and the relatively low disgust among all conditions. This either indicates that disgust towards sewage-based cups is generally low or that there is a certain bias in the current sample. Taking the existing literature into consideration, and from my observations during data collection the sample bias explanation is more plausible. Namely, especially high-contact use products such as sewage-based drinking cups elicit more disgust and lower acceptability than low-contact use products such as flowerpots (Bruvold, 1988; Wester et al., 2016; Judge et al., 2021). Therefore, it seems unlikely that the relatively low perceived disgust in this sample represents the general

population. Moreover, besides 200 participants agreeing on participating, there were also many people who did not want to participate in the study because they were not interested, said that I was joking, or found it unacceptable that these products even exist. This could imply that people who experience stronger negative feelings and lower acceptability towards sewage-based products are underrepresented within the current sample and they might be motivated by different reasons than the ones included in this study. Therefore, the results might not be fully generalizable.

A second limitation of this study is that the hedonic manipulation did not achieve its intended goal; implying that participants in the hedonic condition did not have a significant higher perception of hedonism than participants in any of the moral conditions. Therefore, despite the attempt of this study to approach hedonism more suitably by describing the cup as consumer-friendly and innovative, it did not result in a significantly higher hedonic perception for participants in the hedonic condition. A possible reason for this is that the manipulation check items for hedonism (*Fun*, *Innovative* and *Consumer-friendly*) are rather generic traits that could also be perceived without literally informing the participants in the message frame that the cups are innovative, qualitative and consumer-friendly (such as in the moral conditions). For example, in the informed consent, and by me personally, it was mentioned that the cup is made from recycled sewage material (endorsing innovation) and that it has been cleaned thoroughly so there are no harmful pathogens (endorsing consumer friendliness). Therefore, different approaches are needed to accentuate the hedonic manipulation (e.g., not mentioning in moral conditions that the cup is clean).

A final limitation of this study is that moral emotions have not been measured very accurately and therefore the construct validity of moral emotions is not strong. The current study namely analyzed moral emotions as a scale consisting of feeling ethical, righteous and proud. However, 'righteous' and 'ethical' are not emotions; they are feelings. Therefore,

emotions and feelings need to be equated in the context of this study to be able to claim the study found full support on emotions having a significant effect on acceptability of and willingness to use sewage-based cups.

### **Future Directions**

If this study would be replicated or taken as inspiration, a first recommendation would be to create a Hedonic + Neutral condition. In the current study this was not possible since adding another condition would greatly increase the number of participants needed for a sufficient power, which would go beyond the workload of this thesis project, as I was the only person collecting data in this field study. By creating a Hedonic + Neutral condition, more information can be acquired if appealing to emotions is indeed the deciding factor that explains the increased effect of framing on acceptability of and willingness to use sewage-based products.

Following up on making additions to the current study, future research could also include other types of sewage-based products besides the drinking cup. Similarly to the previous recommendation, having multiple sewage-based products in the current study was not plausible since it would result in a too large sample size. However, researching the effects of the frames used in this study on other sewage-based products might provide additional insights if these message frames are effective in promoting sewage-based products in general, or if motivations differ depending on the type of sewage-based products and different approaches are needed.

A third recommendation would be to continue conducting a field study or perhaps to even conduct a qualitative study to gain a further understanding of other factors that motivate people to use or not use sewage-based products. Within the field of environmental psychology, and especially regarding acceptability of sewage-based products, it is vital to discover what specific factors motivate but also discourage people from enacting pro-

environmentally (Mankad, 2012). In this study, relevant factors have certainly been found, however, taking the calculated eta-square ( $\eta^2 = .10$ ) into consideration, 90% of the variance is not explained by the current model. Therefore, there might be other relevant motivators that researchers are unaware of, such as curiosity which was the primary reported reason of participants to drink from the cup. From my observations during the field study, I can also highly recommend to engage in conversations and find out what people think and say when evaluating products such as the sewage-based drinking cup. This ultimately enhanced the connection between me and my data and I acquired knowledge that I otherwise probably would not have in an online or laboratory study. Therefore, asking the general public's opinion and obtaining new insights in future studies might provide new directions for research on increasing the acceptance and use of sewage-based products.

A final recommendation would be to manipulate disgust in addition to a moral and emotional message frame. It is evident that moral feelings, values and emotions play a key role in consumers' pro-environmental behavior, and existing literature has mainly focused on researching these motivating aspects (e.g., De Groot & Steg, 2007; Judge et al., 2021; Steg et al., 2014). However, it is also important to see where the boundaries and demotivators are for the public where they start thinking "this is disgusting" and thereby choosing comfort over the morally good choice of using the cup. An example on how to measure this is to have three conditions where one says the cup is recycled, one says the cup is made from recycled waste and the other one says the cup is made from dirty toilet paper that has been retrieved from the sewage. This could ultimately provide an evaluation of what information needs to be shared with consumers in marketing messages of sewage-based products, and what information is better to be left out.

## **Conclusion**

To conclude, this research provides insights into how sewage-based cups are evaluated depending on different types of framing and emotions. In general, this study shows how important it is to not only focus on reason when promoting products, but also to take the emotional and affective side in marketing messages into consideration. Specifically, this study illustrates how framing the same topic differently motivates people to act in distinct ways. In this study, moral framing was superior to hedonic framing for increasing acceptability, as well as willingness to use. Ultimately, by emphasizing environmental contributions and appealing to their emotions, participants also had an increased chance to actually drink from the sewage-based cup. However, limitations should be taken into consideration when interpreting the implications of this study. Nevertheless, by showing how relevant emotional framing and human emotions are, the current study did add another piece to the puzzle of how to operationalize and research effective interventions for the promotion of a circular economy.



## References

- Abdul Khalil, H. P. S., Bhat, H., & Ireana Yusra, A. F. (2012). Green composites from sustainable cellulose nanofibrils: A review. *Carbohydrate Polymers*, 87(2), 963-979. <https://doi.org/10.1016/j.carbpol/2011/08.078>
- Armony, J. L., Servan-Schreiber, D., Cohen, J. D., & Ledoux, J. E. (1997). Computational modeling of emotion: Explorations through the anatomy and physiology of fear conditioning. *Trends in Cognitive Sciences*, 1(1), 28-34. [https://doi.org/10.1016/S1364-6613\(97\)01007-3](https://doi.org/10.1016/S1364-6613(97)01007-3)
- Aziz, F., Md Rami, A. A., Zaremohzzabieh, Z., & Ahrari, S. (2021). Effects of emotions and ethics on pro-environmental behavior of university employees: A model based on the theory of planned behavior. *Sustainability*, 13(13), [7062]. <https://doi.org/10.3390/su13137062>
- Baumeister, R. F., Vohs, K. D., DeWall, C. N., & Zhang, L. (2007). How emotion shapes behavior: Feedback, anticipation, and reflection, rather than direct causation. *Personality and Social Psychology Review*, 11(2), 167-203. <https://doi.org/10.1177/1088868307301033>
- Baumgartner, H., Pieters, R., & Bagozzi, R. P. (2008). Future-oriented emotions: Conceptualization and behavioral effects. *European Journal of Social Psychology*, 38(4), 685-696. <https://doi.org/10.1002/ejsp.467>
- Beck, S. (2009). Between Disgust and Trust: State of Social Science Research on the Implementation and Acceptance of Water and Wastewater Reclamation and Re-use. Retrieved from <http://www.iwrm-smart.org>
- Bruvold, W. H. (1988). Public-Opinion on Water Reuse Options. *Journal of the Water Pollution Control Federation*, 60(1), 45-49.

- Bülbül, C., & Menon, G. (2010). The power of emotional appeals in advertising: The influence of concrete versus abstract affect on time-dependent decisions. *Journal of Advertising Research*, 50(2), 169-180. <https://doi.org/10.2501/S0021849910091336>
- Burningham, K., Barnett, J., & Walker, G. (2015). An array of deficits: Unpacking NIMBY discourses in wind energy developers' conceptualizations of their local opponents. *Society & Natural Resources*, 28(3), 246-260. <https://doi.org/10.1080/08941920.2014.933923>
- Cass, N., & Walker, G. (2009). Emotion and rationality: The characterisation and evaluation of opposition to renewable energy projects. *Emotion, Space and Society*, 2(1), 62-69. <https://doi.org/10.1016/j.jemospa.2009.05.006>
- Cochran, J. R., Kydd, R. R., Lee, J. M. J., Walker, N., & Consedine, N. S. (2018). Disgust but not health anxiety graphic warning labels reduce motivated attention in smokers: A study of P300 and late positive potential responses. *Nicotine & Tobacco Research*, 20, 819-826. <https://doi.org/10.1093/ntr/ntx158>
- COP26 special report on climate change and health: the health argument for climate action. Geneva: World Health Organization; 2021. Licence: CC BY-NC-SA 3.0 IGO. <https://www.who.int/publications/i/item/cop26-special-report>
- De Groot, J. I. M., & Steg, L. (2007). Value orientations and environmental beliefs in five countries: Validity of an instrument to measure egoistic, altruistic and biospheric value orientations. *Journal of Cross-Cultural Psychology*, 38(3), 318-332. <https://doi.org/10.1177/0022022107300278>
- Dunphy, S., Herbig, P. A. (1995). Acceptance of innovations: The customer is key! *The Journal of High Technology Management Research*, 6(2), 193-209. [https://doi.org/10.1016/1047-8310\(95\)90014-4](https://doi.org/10.1016/1047-8310(95)90014-4)

- Egolf, A., Hartmann, C., & Siegrist, M. (2019). When evolution works against the future: Disgust's contribution to the acceptance of new food technologies. *Risk Analysis*, 39(7), 1546-1559. <https://doi.org/10.1111/risa.13279>
- Geissdoerfer, M., Savaget, P., Bocken, N. M., & Hultink, E. J. (2017). The circular economy- a new sustainability paradigm? *Journal of Cleaner Production*, 143, 757-768. <https://doi.org/10.1016/j.jclepro.2016.12.048>
- Hayes, A. F. (2018). *Introduction to mediation, moderation and conditional process analysis: A regression-based approach*. Guilford Press.
- IPCC. (2019). Climate change and land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press
- Judge, M., de Hoog, O., Perlaviciute, G., Contzen, N., & Steg, L. (2021). From toilet to table: Value-tailored messages influence emotional responses to wastewater products. *Biotechnology for Biofuels*, 14(1). <https://doi.org/10.1186/s13068-021-01931-z>
- Kahneman, D. (2003). A perspective on judgement and choice – Mapping bounded rationality. *American Psychologist*, 58(9), 697-720. <https://doi.org/10.1037/0003-066X.58.9.697>
- Kim, T. J., & Petitjean, M. (2021). Atypical package design and product category prestige. *Journal of Product Innovation Management*, 38(3), 379-397. <https://doi.org/10.1111/jpim.12574>

- Koenig-Lewis, N., Palmer, A., Dermody, J., & Urbye A. (2014). Consumers' evaluations of ecological packaging – Rational and emotional approaches. *Journal of Environmental Psychology*, 37, 94-105. <https://doi.org/10.1016/j.jenvp.2013.11.009>
- Li, L., Wang, X., Miao, J., Abulimiti, A., Jing, X., & Ren, N. (2022). Carbon neutrality of wastewater treatment – A systematic concept beyond the plant boundary. *Environmental Science and Ecotechnology*, 11, [100180].  
<https://doi.org/10.1016/j.ese.2022.100180>
- Mankad, A. (2012). Decentralised water systems: Emotional influences on resource decision making. *Environment International*, 44, 128-140.  
<https://doi.org/10.1016/j.envint.2012.01.002>
- Meng, M. D., & Leary, B. R. (2019). It might be ethical, but I won't buy it: Perceived contamination of, and disgust towards, clothing made from recycled plastic bottles. *Psychology & Marketing*, 38(2), 298-312. <https://doi.org/10.1002/mar.21323>
- Nilsson, A., Hansla, A., & Biel, A. (2014). Feeling the green? Value orientation as a moderator of emotional response to green electricity. *Journal of Applied Social Psychology*, 44(10), 672-680. <https://doi.org/10.1111/jasp.12258>
- Perlaviciute, G., Steg, L., Contzen, N., Roeser, S., & Huijts, N. (2018). Emotional responses to energy projects: Insights for responsible decision making in a sustainable energy transition. *Sustainability*, (10)7, 1-12. <https://doi.org/10.3390/su10072526>
- Phillips, D. M., & Baumgartner, H. (2002). The role of consumption emotions in satisfaction response. *Journal of Consumer Psychology*, 12(3), 243-252.  
[https://doi.org/10.1207/S15327663JCP1203\\_06](https://doi.org/10.1207/S15327663JCP1203_06)
- Powell, P. A., Jones, C. R., & Consedine, N. S. (2019). It's not queasy being green: The role of disgust in willingness-to-pay for more sustainable product alternatives. *Food Quality and Preference*, 78. <https://doi.org/10.1016/j.foodqual.2019.103737>

- Rezvani, Z., Jansson, J., & Bengtsson, M. (2018). Consumer motivations for sustainable consumption: The interaction of gain, normative and hedonic motivations on electric vehicle adoption. *Business Strategy and the Environment*, 27(8), 1272-1283.  
<https://doi-org.proxy-ub.rug.nl/10.1002/bse.2074>
- Rozin, P., Haddad, B., Nemeroff, C., & Slovic, P. (2015). Psychological aspects of the rejection of recycled water: Contamination, purification and disgust. *Judgement and Decision Making*, 10(1), 50-63. <https://psycnet.apa.org/record/2015-04044-004>
- Russel, S., & Lux C. (2009). Getting over yuck: Moving from psychological to cultural and sociotechnical analyses of responses to water recycling. *Water Policy*, 11(1), 21-35.  
<https://doi.org/10.2166/wp.2009.007>
- Serby, M. (2003). Psychiatric resident conceptualizations of mood and affect within the mental status examination. *The American Journal of Psychiatry*, 160(8), 1527-1528.  
<https://doi.org/10.1176/appi.ajp.160.8.1527>
- Simpson, J., & Stratton, H. (2011). Talking about water: Words and images that enhance understanding. *Waterlines Report*. Canberra: National Water Commission.
- Steg, L., Perlaviciute, G., Van der Werff, E., & Lurvink, J. (2014). The significance of hedonic values for environmentally relevant attitudes, preferences, and actions. *Environment and Behavior*, 46(2), 163-192.  
<https://doi.org/10.1177/0013916512454730>
- Steinert, S., & Roeser, S. (2020). Emotions, values and technology: Illuminating the blind spots. *Journal of Responsible Innovation*, 7(3), 298-319.  
<https://doi.org/10.1080/23299460.2020.1738024>
- Van Osch, Y., Zeelenberg, M., & Breugelmans, S. M. (2018). The self and others in the experience of pride. *Cognition and Emotion*, 32(2), 404-413.  
<https://doi.org/10.1080/02699931.2017.1290586>

Venhoeven, L. A., Bolderdijk, J. W., & Steg, L. (2020). Why going green feels good. *Journal of Environmental Psychology*, *71*, [101492].

<https://doi.org/10.1016/j.jenvp.2020.101492>

Wester, J., Timpano, K. R., Demet, Ç., & Broad, K. (2016). The psychology of recycled water: Factors predicting disgust and willingness to use. *Water Resources Research*, *52*(4), 3212-3226. <https://doi.org/10.1002/2015WR018340>

WHO. (2021). World health statistics 2021: Monitoring health for the SDGs, sustainable development goals. Geneva: World Health Organization 2021.

Wyss, A. M., Knoch, D., & Berger, S. (2022). When and how pro-environmental behavioral attitudes turn into behavior: The role of costs, benefits and self-control. *Journal of Environmental Psychology*, *79*, [101748].

<https://doi.org/10.1016/j.jenvp.2021.101748>

## Appendix A

### Materials

#### Figure A1

*Picture of the sewage-based cup, designed by the author of this thesis.*



**Figure A2**

*The Dutch Hedonic + Emotion condition, designed by the author of this thesis.*



**GENIET VAN EEN INNOVATIEF DRANKJE!**

**WAT IS DIT BEKERTJE?**



Dit consumentvriendelijke bekertje is geheel gemaakt van gerecycled rioolmateriaal, genaamd cellulose. Cellulose wordt uit toilet papier gehaald en vormt de basis voor verschillende innovatieve producten

**HOE IS DIT BEKERTJE GEMAAKT?**

Vezels in het toilet papier worden gescheiden van het rioolwater en worden vervolgens gedroogd en bacterievrij gemaakt. Dit resulteert in een volledig schone drinkbeker die even hygiënisch en kwalitatief is als andere bekertjes



**WAAROM DIT BEKERTJE?**



Het is gaaf om één van de eerste gebruikers te zijn van dit nieuwe product! Door dit bekertje te gebruiken, draagt u ook bij aan onderzoek over consumentvriendelijke producten, wat het nog leuker maakt om te gebruiken!



**Figure A3**

*The Dutch Moral + Neutral condition, designed by the author of this thesis.*



### WAT IS DIT BEKERTJE?



Dit papieren bekertje is geheel gemaakt van gerecycled rioolmateriaal, genaamd cellulose. Cellulose wordt uit toiletpapier gehaald en vormt de basis voor verschillende milieuvriendelijke producten

### HOE IS DIT BEKERTJE GEMAAKT?

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### WAAROM DIT BEKERTJE?



Door dit bekertje te gebruiken helpt u het milieu enorm. U verlaagt uw CO-2 uitstoot en zorgt ervoor dat er minder bomen gekapt hoeven te worden.

**Figure A4**

*The Dutch Moral + Emotion condition, designed by the author of this thesis.*



**DRAAG BIJ AAN EEN GEZONDE PANEET**

### WAT IS DIT BEKERTJE?



Dit papieren bekertje is geheel gemaakt van gerecycled rioolmateriaal, genaamd cellulose. Cellulose wordt uit toilet papier gehaald en vormt de basis voor verschillende milieuvriendelijke producten

### HOE IS DIT BEKERTJE GEMAAKT?

Vezels in het toilet papier worden gescheiden van het rioolwater en worden vervolgens gedroogd en bacterievrij gemaakt. Dit resulteert in een volledig schone drinkbeker die even hygiënisch is als andere bekertjes



### WAAROM DIT BEKERTJE?



Door dit bekertje te gebruiken helpt u het milieu enorm. U verlaagt uw CO-2 uitstoot en zorgt ervoor dat er minder bomen gekapt hoeven te worden. Uw bijdrage is echt iets om trots op te zijn!

**Figure A5***The Dutch questionnaire.*

# rijksuniversiteit groningen

Gerecyclede drinkbekertjes

Vragenlijst

**INFORMATIE OVER HET ONDERZOEK**

**Waarom ontvang ik deze informatie?** U wordt gevraagd om deel te nemen in een onderzoek over uw mening over drinkbekertjes gemaakt van gerecycled toiletpapier. Dit onderzoek zal helpen om meer inzichten te krijgen over hoe mensen deze producten evalueren. De ethische commissie van de Psychologie afdeling van de Rijksuniversiteit Groningen heeft dit onderzoek goedgekeurd. Het onderzoek wordt verricht door Wytse Gorter, masterstudent Milieupsychologie. Wytse Gorter is uw contactpersoon in het geval dat u vragen heeft over dit onderzoek (mail: [w.a.gorter@student.rug.nl](mailto:w.a.gorter@student.rug.nl)).

**Moet ik deelnemen in dit onderzoek?** Deelname aan dit onderzoek is vrijwillig, maar uw toestemming is nodig om mee te doen aan dit onderzoek. Als u besluit om niet deel te nemen, hoeft u geen uitleg te geven en zullen er geen consequenties zijn. Tijdens het onderzoek mag u ook altijd besluiten te stoppen als u niet verder wilt.

**Wat wordt van u gevraagd tijdens dit onderzoek?** Eerst wordt u gevraagd om toestemming te geven voor het deelnemen aan dit onderzoek. Er zal wat demografische informatie van u gevraagd worden zoals geslacht, leeftijd en opleidingsniveau. U zal informatie te lezen krijgen over bekertjes die gemaakt zijn van gerecycled rioolmateriaal en daar zal vervolgens uw mening over gevraagd worden. U heeft ook de mogelijkheid om uiteindelijk uit het bekertje te drinken, wat natuurlijk niet verplicht is. Het onderzoek duurt in totaal 5 tot 10 minuten.

**Wat zijn de consequenties van uw deelname?** Uw deelname draagt bij aan meer kennis over dit onderwerp. Er zijn geen risico's betrokken bij dit onderzoek, maar mocht u toch ongemak ervaren als gevolg van dit onderzoek, informeer alstublieft Wytse Gorter direct of stuur hem een email ([w.a.gorter@student.rug.nl](mailto:w.a.gorter@student.rug.nl))

**Hoe wordt uw data behandeld?** Uw antwoorden zullen bewaard worden op een beveiligd netwerk van de universiteit, die enkel toegankelijk is voor Wytse Gorter en zijn supervisor. De algemene resultaten van dit

onderzoek zullen in een onderzoeksrapport komen te staan, en kunnen publiekelijk gemaakt worden via presentaties en wetenschappelijk publicaties. De data kan openlijk gedeeld worden voor onderzoek, maar dat gebeurt alleen als de identiteit van deelnemers niet achterhaald kan worden. Wees u ervan bewust dat uw data niet uit de analyse gehaald kan worden als uw data is ingeleverd. Dit komt omdat al uw antwoorden anoniem worden gemaakt en er geen mogelijkheid meer is om uw antwoorden aan u te verbinden. Stuur een mail naar Wytse ([w.a.gorter@student.rug.nl](mailto:w.a.gorter@student.rug.nl)) als u graag een notificatie wil ontvangen wanneer het onderzoek is gepubliceerd.

**Wat moet u nog meer weten?** U kan altijd voor, tijdens en na het onderzoek vragen stellen. Als u vragen heeft over uw rechten als deelnemer, dan kan u contact opnemen met de Ethische Commissie van de psychologieafdeling van de Rijksuniversiteit Groningen ([ecp@rug.nl](mailto:ecp@rug.nl)). Als u vragen heeft over uw privacy en hoe uw data wordt onderhouden, kan u contact opnemen met de Functionaris voor Gegevensbescherming van de Rijksuniversiteit Groningen ([privacy@rug.nl](mailto:privacy@rug.nl)). Als u niet wil deelnemen aan het onderzoek, dan kan u nu stoppen. Als u wel wil deelnemen, vul alstublieft de onderstaande bullet-point in.

- Ja, ik geef toestemming om deel te nemen aan dit onderzoek**

#### **Toestemming voor datagebruik**

De verkregen data kan waardevol zijn voor toekomstig onderzoek, zoals een vergelijking met andere culturen. Hebben we toestemming om uw data voor toekomstig onderzoek te gebruiken?

- Ja, ik geef toestemming dat mijn data in de toekomst gebruikt mag worden voor vergelijkbare onderzoeksvragen**

- Nee**

#### **Toestemming voor het verwerken van persoonlijke data**

Deze vragenlijst bevat vragen over persoonlijke informatie, zoals leeftijd en opleidingsniveau. Deze data wordt gebruikt om meer inzicht te krijgen over perspectieven van verschillende populatiegroepen (bijvoorbeeld jonge versus oudere deelnemers). Hebben we toestemming om uw persoonlijke data te verwerken?

- Ja, ik geef toestemming dat mijn persoonlijke data verwerkt mag worden**

- Nee**

#### **Bevestiging van leeftijd**

Dit onderzoek bevat alleen deelnemers van 18 jaar of ouder. Bevestig alstublieft dat u 18 jaar of ouder bent.

- Ja, ik ben 18 jaar of ouder**

**Wanneer u over dit bekertje nadenkt, in hoeverre voelt u zich...**

	Helemaal niet	Een beetje	Matig	Relatief sterk	Erg sterk
Blij	1	2	3	4	5
Comfortabel	1	2	3	4	5
Ethisch	1	2	3	4	5
Opgewekt	1	2	3	4	5
Geïnspireerd	1	2	3	4	5
Relaxed	1	2	3	4	5
Trots	1	2	3	4	5
Rechtvaardig	1	2	3	4	5
Enthousiast	1	2	3	4	5

**Wanneer u over dit bekertje nadenkt, in hoeverre voelt u zich...**

	Helemaal niet	Een beetje	Matig	Relatief sterk	Erg sterk
Angstig	1	2	3	4	5
Gewalgd	1	2	3	4	5
Oncomfortabel	1	2	3	4	5
Ongemakkelijk	1	2	3	4	5
Bang	1	2	3	4	5
Afgestoten	1	2	3	4	5

**Stel u voor dat u in een café iets gaat drinken, waar u de keuze heeft om te drinken uit een gebruikelijk**

**bekertje en dit gerecyclede bekertje. Welke bekertje zou uw voorkeur hebben?**

Sterke voorkeur voor het gebruikelijke bekertje	Voorkeur voor het gebruikelijke bekertje	Kleine voorkeur voor het gebruikelijke bekertje	Geen voorkeur	Kleine voorkeur voor het gerecyclede bekertje	Voorkeur voor het gerecyclede bekertje	Sterke voorkeur voor het gerecyclede bekertje
1	2	3	4	5	6	7

**Hoeveel extra geld zou u willen betalen voor het gebruikelijke bekertje, als u dit gerecyclede bekertje werd aangeboden?**

€0 extra	Tussen €0 en €0.50 extra	Tussen €0.50 en €1 extra	Tussen €1 en €2 extra	Meer dan €2 extra
1	2	3	4	5

**Zou u dit gerecyclede bekertje aanraden aan vrienden en familie?**

Absoluut niet	Nee	Waarschijnlijk niet	Neutraal	Waarschijnlijk wel	Ja	Absoluut
1	2	3	4	5	6	7

**Dit bekertje is naar mijn mening...**

Helemaal niet hygiënisch	Onhygiënisch	Een beetje onhygiënisch	Niet onhygiënisch, noch hygiënisch	Redelijk hygiënisch	Hygiënisch	Erg hygiënisch
1	2	3	4	5	6	7

**Dit bekertje is naar mijn mening...**

Heel slecht	Slecht	Een beetje slecht	Niet slecht, noch goed	Redelijk goed	Goed	Erg goed
1	2	3	4	5	6	7

**Dit bekertje is naar mijn mening...**

Helemaal niet acceptabel	Onacceptabel	Een beetje onacceptabel	Niet onacceptabel, noch acceptabel	Redelijk acceptabel	Acceptabel	Erg acceptabel
1	2	3	4	5	6	7

**Dit bekertje is naar mijn mening...**

Erg onnodig	Onnodig	Een beetje onnodig	Niet onnodig, noch nodig	Redelijk nodig	Nodig	Erg nodig
1	2	3	4	5	6	7

**Mijn mening over dit bekertje is...**

Erg negatief	Negatief	Een beetje negatief	Niet negatief, noch positief	Redelijk positief	Positief	Erg positief
1	2	3	4	5	6	7

**In hoeverre is dit bekertje...**

	Helemaal niet	Een beetje	Matig	Relatief sterk	Erg sterk
Duurzaam	1	2	3	4	5
Leuk	1	2	3	4	5
Milieuvriendelijk	1	2	3	4	5
Innovatief	1	2	3	4	5
Ecologisch	1	2	3	4	5
Consumentvriendelijk	1	2	3	4	5

**Waar heeft u over gelezen in uw flyer? Kies 1 van de 3 antwoordopties.**

Ik heb gelezen hoe dit bekertje nieuw en innovatief is

Ik heb gelezen dat dit bekertje goed is voor het milieu

Ik heb gelezen dat dit bekertje goed is voor het milieu, en dat ik trots kan zijn als ik dit bekertje gebruik

**Wat is uw gender?**

Man

Vrouw

Voorkeur om zelf te omschrijven \_\_\_\_\_

Voorkeur om niet te zeggen

**Hoe oud bent u?****Wat is uw hoogst behaalde diploma?**

Geen studie

Primaire studie

Secundaire studie

Bachelor-diploma

Master-diploma

PhD

**Waar komt u vandaan?**

Nederland

Duitsland

Een ander EU-land

Een niet-EU-land

**Dit is het einde van de vragenlijst! Geef alstublieft uw antwoorden aan de onderzoeker. De onderzoeker heeft nog een enkele vraag voor u en zal daarna het doel van dit onderzoek verder toelichten.**



## Appendix B

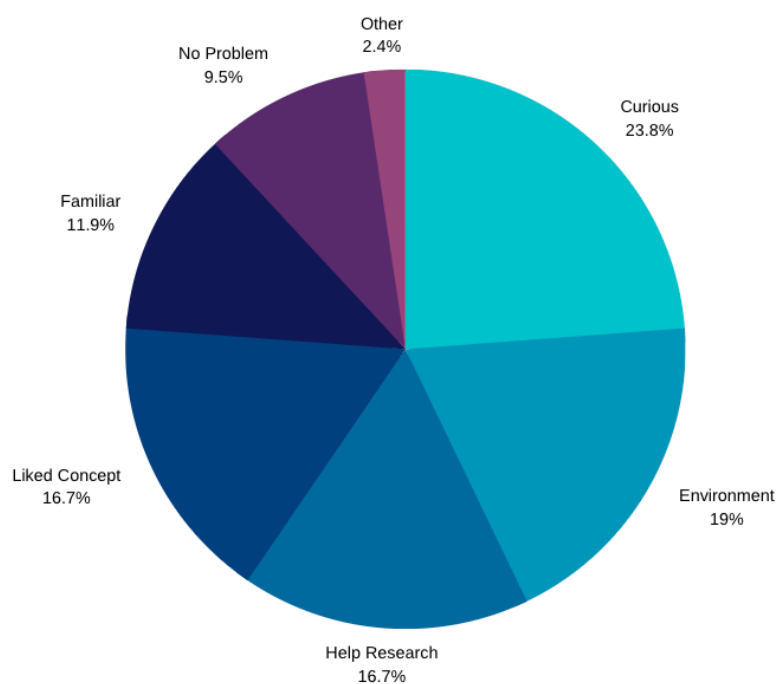
### Primary reasons to Drink from the Sewage-Based Cup

In the four pie charts there are different reasons provided by the participants why they wanted or did not want to drink from the cup. From most to least frequent reasons to drink from the cup: ‘*Curious*’ means that participants wanted to try the cup or wanted a “full experience”, ‘*Environment*’ means that participants wanted to drink from the cup because it benefits the environment, ‘*Help Research*’ means that participants wanted to help me gather data for my research, ‘*Liked Concept*’ means that participants liked the cup, ‘*No Problem*’ means that participants did not care about the cup and that they did not perceive it as harmful.

From most to least frequent reasons to not drink from the cup: ‘*Disgusted*’ means that participants said they were disgusted or said that it was dirty, ‘*Not interested*’ means that participants were not interested to drink from the cup, ‘*Uncomfortable*’ means that participants felt uneasy and uncomfortable and ‘*Not Thirsty*’ means that participants said they were not thirsty.

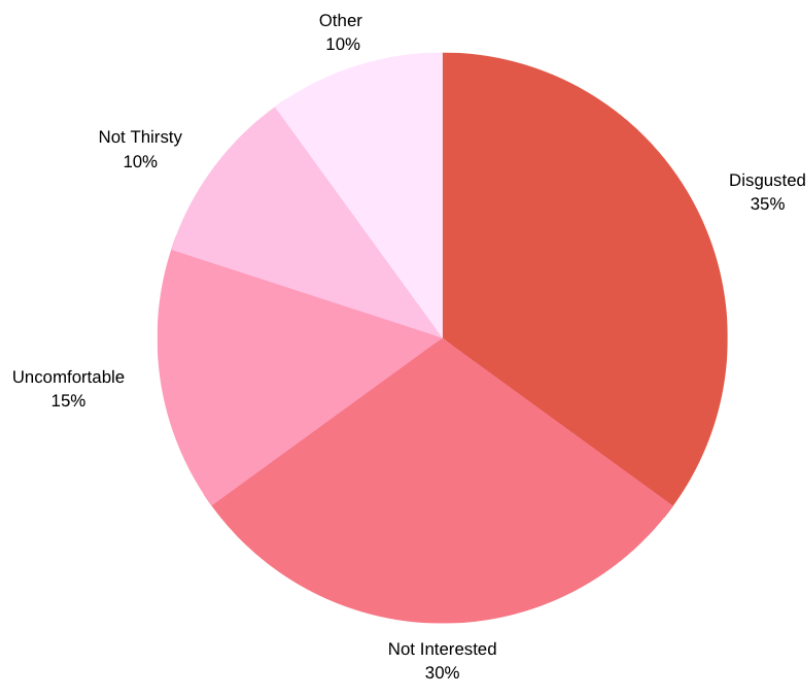
### Figure B1

*Primary reported reasons of participants in the Hedonic + Emotion condition to drink from the cup.*

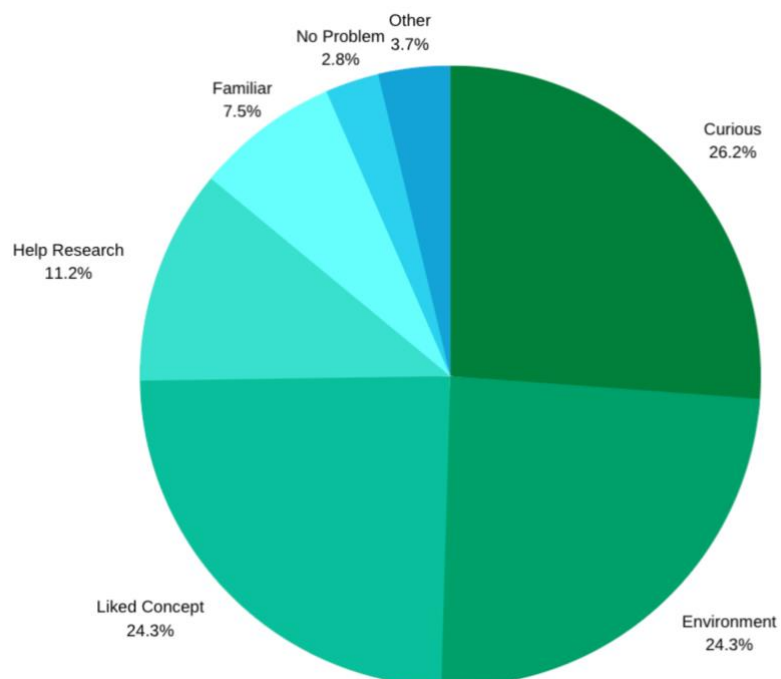


**Figure B2**

*Primary reported reasons of participants in the Hedonic + Emotion condition to not drink from the cup.*

**Figure B3**

*Primary reported reasons of participants in the Moral conditions to drink from the cup.*



**Figure B4**

*Primary reported reasons of participants in the Moral conditions to not drink from the cup.*

