



Master's thesis

*The Effectiveness of a Public Commitment via
 Social Media and it's Normative Processes*

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Are there deviations of the Master's thesis from the proposed plan?

☐ No

☒ Yes, please explain below the deviations

There were some deviations in the questionnaire design. Originally, I planned to lead the participants through a virtual Museum exhibition as it was planned by the Discovery Museum. However the exact plans of how the exhibition will look like were not settled yet. Thus, the virtual exhibition would not provide further input but rather unnecessarily increase the length of the questionnaire and in such might demotivate potential participants. In addition, the individual parts did not conceptually match with each other, which could have increased the difficulty to systematically analyse the data. As a result, I decided to significantly simplify the questionnaire and change the informative parts to a list format indicating the impact of each pro-environmental behaviors. In this way, the questionnaire became more concise and easier for participants to follow.

A thesis is an aptitude test for students. The approval of the thesis is proof that the student has sufficient research and reporting skills to graduate but does not guarantee the quality of the research and the results of the research as such, and the thesis is therefore not necessarily suitable to be used as an academic source to refer to. If you would like to know more about the research discussed in this thesis and any publications based on it, to which you could refer, please contact the supervisor mentioned.

Abstract

The aim of this study was to examine the effectiveness of the public commitment strategy via social media platforms on engagement in pro-environmental behaviors. In addition, the underlying normative processes, particularly personal, descriptive and injunctive norms were analyzed. To collect data, an online experiment with three conditions was conducted. In the first questionnaire, participants ($N = 71$) were randomly allocated to either the public commitment condition (sharing of commitment on social media), private commitment condition (keeping commitment private), or the control condition. One week later, participants received the second questionnaire which included the outcome and process variables. While the results need to be interpreted with caution due to low statistical power, the analyses indicated that the act of making a commitment was effective in motivating engagement in pro-environmental behaviors. A public commitment was on average equally as effective as a private commitment. While no mediation through the norm variables was found, the results indicated that descriptive and injunctive norms moderated the effect between commitment and engagement in behavior. Theoretical implications, limitations as well as practical relevance for the Museum exhibition are further discussed in this paper.

Keywords: public commitment, private commitment, social media, social norms, personal norms

Table of Contents

1	Introduction	4
1.1	Commitment Strategy	5
1.2	Normative Approach	7
1.2.1	Social Norms.....	7
1.2.2	Personal Norms	10
2	Hypotheses	10
3	Method	12
3.1	Power Analysis	12
3.2	Participants and Procedure	12
3.2.1	First Questionnaire: Commitment Phase	14
3.2.2	Second Questionnaire: Outcome Measurements	16
4	Results	18
4.1	Confirmatory Analyses.....	18
4.1.1	Descriptive Statistics.....	18
4.1.2	Hypothesis 1 and Hypothesis 2.....	19
4.1.3	Hypotheses 3	20
4.2	Exploratory Analyses	21
4.2.1	Hypothesis 2: Further Analyses	21
4.2.2	Hypothesis 3: Further Analyses	22
4.2.3	Moderation Analysis	24
4.2.4	Qualitative Data	25
4.2.5	Perceived Ease	26
4.2.6	Missing Data	27
5	Discussion	28
5.1.1	Effectiveness of the Commitment Strategy	28
5.1.2	Effectiveness of the Public Commitment Strategy	29
5.1.3	Impact of Process Variables.....	31
5.1.4	Limitations and future studies.....	33
5.1.5	Practical Relevance	34
6	Conclusion.....	35
7	Acknowledgements	36
	References.....	37

1 Introduction

Every year the Earth Overshoot Day, the day we used all the resources the earth can generate within a year, falls on an earlier date. This year, the Dutch Earth Overshoot Day fell on April 12th, 2022. This is more than 3 months earlier than the date of the previous year (July 29, 2021; Brinkman, 2022). Clearly, our current consumption behaviors are highly unsustainable and progress in the right direction of mitigating environmental degradation as well as climate change has not been achieved yet. According to an environmental impact assessment, 65% of global Greenhouse Gas Emissions (GHG) and 50 – 80% of material, land, and water use can be directly linked to household consumption (Ivanova et al., 2016). Subsequently, advocating for shifts in household consumption such as transport, home energy, and diet has great potential to reduce the overall impact on current GHG emissions and as such mitigate a major contributor to humanity's negative impact on the environment (Ivanova et al., 2020).

Many private, as well as public entities, have joined the efforts of advocating for as well as educating the public on a transition to more sustainable behaviors. Among them, is the Discovery Museum located in Kerkrade, Netherlands. The museum is currently developing and planning an exhibition with the aim to raise awareness of how our daily choices and behaviors affect the environment. Based on current research, the museum proposed to include a commitment intervention at the end of their exhibition. This would mean that before leaving the museum, visitors are asked to make a personal commitment to a pro-environmental behavior of their choice.

The plan of the Discovery Museum to integrate the commitment intervention into their exhibition raises questions about how the commitment strategy could become more effective to motivate visitors to consistently engage in pro-environmental behavior.

Considering the museum context, I propose to take the commitment strategy a step further by

asking visitors not only to make a private commitment, but to share their commitment with family, friends, and followers on their social media platforms, thus, making a public commitment. Subsequently, the aim of this study is to examine this proposal in a systematic manner using an online experiment. The first research question is whether a public commitment via social media could increase the effectiveness of the commitment strategy to motivate engagement in pro-environmental behaviors compared to a private commitment.

Next, the usage of social media to examine the public commitment strategy provides a cost-efficient and effective way to further examine the underlying processes of the relationship between commitments and engagement in pro-environmental behaviors. So far, studies on public commitments have mainly asked participants to make commitments in person and in small groups (e.g. Lokhorst et al., 2009). Thus, I will extend previous research and theory by using a novel, more public way to make a public commitment, via social media platforms. In this study, I will particularly focus on the normative processes namely personal, descriptive and injunctive norms. Following, the second research question of this study is whether normative processes underlie / mediate the relationship between making a public or a private commitment and engagement in pro-environmental behaviors.

1.1 Commitment Strategy

A number of intervention strategies have been used to motivate individuals to voluntarily change their behaviors to more sustainable practices (see overview Abrahamse et al., 2005). One of such strategies which has been proven to be beneficial in this regard is the commitment strategy. A commitment is defined as an oral or written promise to change behavior. Generally, there are two types of commitments. A private commitment is a promise or pledge to oneself. A public commitment is a commitment made public by, for instance, making an announcement in the newspaper (Abrahamse et al., 2005).

Several studies have suggested that the commitment strategy is very beneficial in encouraging individual behavior change (Abrahamse et al., 2005; 2013; Cialdini, 2001; 2003; Pallak & Cummings, 1976; Lokhorst et al., 2011). This includes promoting pro-environmental behaviors such as recycling (Bryce et al., 1997; Cobern et al., 1995; Werner et al., 1995), switching to more sustainable ways of transportation (Bachman & Katzey, 1982; Matthies et al., 2006), and saving energy (Boudet et al., 2016). The conducted studies offer some insight into the underlying mechanisms that account for the impact of commitment on behavior. Three potential mediators are commonly proposed (Lokhorst et al., 2015). First, making a commitment may alter people's perceptions of what they value. If they feel they voluntarily choose to modify their behavior in response to a certain objective (e.g. start recycling) then the goal (e.g. reducing climate change), must be significant to them. People are taught to be consistent, thus, they will be driven to change their behavior according to their perceived values (Cialdini, 2001). Second, research suggests that making a commitment triggers a cognitive elaboration process that leads to self-persuasion (Cialdini, 2003). It is important here that people believe they are making their commitment voluntarily, as this will motivate them to adjust their behavior to match their assessment of the goal and eventually transform their short-term commitment into long-term self-directed behavior. In other words, they will persuade themselves that the commitment and resulting adjusted behavior are worthwhile. Finally, there is the prospect of a normative process where personal norms (feelings of moral obligations to do the right thing) and social norms (rules and standards that are understood by members of a group). The normative processes will be the main focal point of this study and discussed in more detail below.

An important part to consider when using the commitment strategy in practice and in research is the factors that increase the effectiveness of a commitment. Cialdini (2001) has identified four important factors that likely increase the chances of long-term engagement in

the desired behavior. He found that a commitment should be active rather than passive, publicized, effortful, as well as voluntary. Using social media to make a commitment public covers all the identified factors by Cialdini. The commitment is active in the sense that participants have to create the social media posts, public since the post is shared with friends and followers as well as remains voluntary. Furthermore, the pro-environmental behaviors used in the study are relatively effortful and require some time investment, however, they are not too difficult so that participants would not find them impossible. Additional studies have further identified that a commitment is more effective when it is not anonymous (McCaul & Kopp, 1982) as well as hard to deny (Lokhorst et al., 2011). Thus, social media provides an ideal platform to increase the effectiveness of the commitment.

1.2 Normative Approach

The main mechanism underlying the impact of commitment on behavior that will be explored in this study is the normative process which includes social norms and personal norms. Social norms have been a long-standing topic in psychology and were found to have a significant impact on a wide range of human behaviors including pro-environmental behaviors (Bergquist et al., 2019; De Groot et al., 2021; Farrow et al., 2017; Perry et al., 2020). Adopting social norms for interventions has received great attention throughout the years. However, evidence of their effectiveness seems inconsistent (Abrahamse & Steg, 2013; De Groot et al., 2021). Thus, it was proposed that personal norms should be considered in addition since they determine pre-existing attitudes about a topic (De Groot et al., 2021). Following, I will further discuss the two constructs and their relevance to this study.

1.2.1 Social Norms

Social norms are “... rules and standards that are understood by members of a group, and that guide and/or constrain social behavior without the force of law” (Cialdini & Trost, 1998, pp. 152). In other words, social norms can be described as a social navigation tool that

influences our decisions and guides us to behave in socially appropriate ways (Morris et al., 2015). There are several manifestations of social norms, including repeated patterns of behavior and formalized rule sets (Morris et al., 2015).

Social norms can be further divided into descriptive norms, which refer to the common or usual behavior in a given context (what other people do), and injunctive norms, which refer to other people's approval or disapproval (what other people think you should or should not do; Morris et al., 2015). It was found that the division into injunctive norms and descriptive norms is especially important when examining conformity to social norms and the underlying motives. Conformity to descriptive norms is motivated by the intrapersonal goal of behaving accurately in a given context (Jacobson et al., 2011). This is considered an external type of motivation because it is freely available in the outside world (Thøgersen, 2006). Injunctive norms on the other hand are motivated by the interpersonal goal of establishing and maintaining social relationships (Jacobson et al., 2011). They are also externally motivated but less so than descriptive norms because they are influenced by our own perception and individually relevant social reality (Thøgersen, 2006).

Motivation to conform to social norms becomes clearer when we view the opposite side of the coin which is norm violation. It was found, that individuals who violate norms tend to expose themselves to negative responses from others, including punishments (Fehr & Fischbacher, 2004), negative emotions (e.g. anger and disgust; Gutierrez et al., 2007), scolding (Vaish et al., 2011), gossip (Beersma & Van Kleef, 2012), and unfavorable social perceptions (Van Kleef et al., 2011). Thus, conforming to social norms is usually the safer option for individuals to avoid punishments.

Using social media to make a commitment public has the advantage that more people will become aware of the participant's commitment which could in turn strengthen a person's descriptive and injunctive norms to engage in the desirable behavior. The fulfillment of an

agreement or promise is governed by strong prescriptive social norms. Meaning, that when someone makes a commitment or promise, it is the social norm within western cultures that the individual fulfills the created obligation (Krupka & Weber, 2013). The committed individual could become especially aware of the expectations others might have as well as reflect on what others might do in this situation due to the public commitment, which could in turn serve as a motivation to not break one's pledge and potentially risk reputational damage. The perceived expectations could then motivate the individual to consistently engage in the committed behaviors in order to avoid disapproval from significant others (Lokhorst et al., 2011).

On the other hand, the public social media commitment may be less impactful when the actual behavior is not visible to others, which could be the case as people may be mostly connected to people they do not see regularly and leading a 'double life' on social media is relatively easy these days. Many pro-environmental behaviors are performed in private, out of the public's view. For example, whether I decide to take the car to quickly go to the supermarket rather than the bicycle, or whether I consume less meat and dairy products is often not visible to the public, especially in more anonymous settings such as big cities. Sharing a commitment "publicly" with immediate friends and families might then in turn be more impactful than a commitment shared on social media because the pro-environmental behaviors are more visible to people in the immediate environment.

Hence, the question remains whether making a public commitment via social media would indeed have an impact on behavioral change by strengthening awareness of social norms. Alternatively, personal norms could have a greater impact on engagement in the committed behavior due to the individual's moral convictions.

1.2.2 *Personal Norms*

Like social norms, personal norms were found to be strong predictors of engagement in pro-environmental behaviors (Joanes, 2019; Schultz et al., 2016). Personal norms are defined as feelings of moral obligations to do the right thing (Schwartz & Howard, 1981) and manifest in rules and standards for our own behaviors (Thøgersen, 2009). In other words, personal norms are an internal compass on how to behave morally. According to Schwartz (1973), they express individual values and internalized social norms.

Furthermore, these norms are often followed to avoid guilt. As a result, the norm activation model suggests that personal norms only affect behavior when the individual is aware of the consequences of not following the moral behavior and feels personally responsible for such consequences to occur (Schwartz, 1977). In the context of the environment, individuals must feel that they are in part responsible for climate change but also that their actions are meaningful and can reduce the negative impacts (Steg and Groot, 2010).

It has been proposed that making a commitment promotes behavior change by strengthening personal norms (Abrahamse et al., 2005; Lokhorst et al., 2011; 2013). Van der Werff and colleagues (2019) found, that the act of making a commitment indeed leads individuals to feel morally obliged to engage in the committed behavior and in such impact behavior change. However, whether this is the case for a public commitment has not been systematically tested yet. Publicity of a commitment could further increase personal norms due to an increased salience of moral convictions.

2 Hypotheses

The aim of this study is to systematically test whether a public commitment strategy via social media platforms has increased effectiveness compared to a private commitment strategy. Furthermore, I aim to analyze the underlying normative processes which could

mediate the relationship between commitment and engagement in pro-environmental behaviors (see Figure 1). The following hypothesis will be tested:

H1: Individuals who make a private commitment or a public commitment shows on average an increased engagement in pro-environmental behaviors compared to people who do not make a commitment.

H2: Individuals who share their commitment of social media platforms will show on average an increased engagement in the committed pro-environmental behaviors compared to individuals who keep their commitment private.

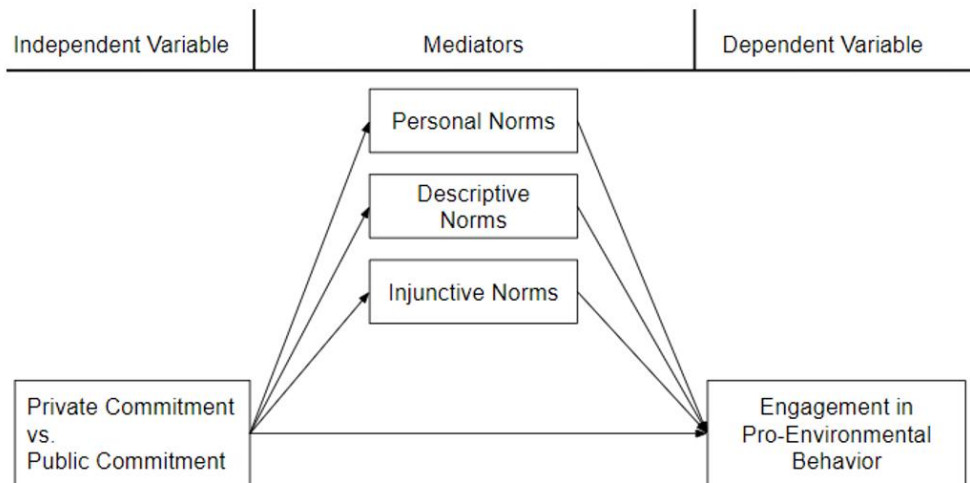
H3a: Personal Norms mediate the relationship between commitment and engagement in pro-environmental behaviors when contrasting the private and public commitment condition.

H3b: Descriptive Norms mediate the relationship between commitment and engagement in pro-environmental behaviors when contrasting the private and public commitment condition.

H3c: Injunctive Norms mediate the relationship between commitment and engagement in pro-environmental behaviors when contrasting the private and public commitment condition.

Figure 1

Conceptual Diagram of Parallel Mediation Model



3 Method

3.1 Power Analysis

An a priori power analysis using G*Power (Faul et al., 2007) with parameters set to an alpha of 0.05, and power of 0.80 indicated that the required sample size for an analysis of variance with three groups is 159 to detect a Cohen's d medium effect size (Cohen, 1988).

3.2 Participants and Procedure

The study adopted a convenience sample. Participants were recruited online through the newsletter and the social media platforms (Instagram and Facebook) of the Discovery Museum. Additional data was collected using a snowball sampling method by sharing the study with friends, family, and several Facebook groups. The data used for the purpose of this Master's thesis and the following analysis were collected from the 6th to the 20th of June 2022.

The study consisted of two questionnaires which were both created in Qualtrics (see Figure 2 for Procedure). In the first questionnaire (see Appendix A), the participant was introduced to the problem of climate change and the different pro-environmental behaviors as well as their impact. Next, participants were randomly assigned to one of the different commitment groups (public commitment, private commitment, or control group). More details on the experimental groups can be found below. At the end of the questionnaire, participants were asked for their e-mail address through which I could approach them for

filling in the second questionnaire. The second questionnaire (see Appendix B) was sent to the participants a week later. In the second part, I measured the engagement in the pro-environmental behaviors, personal norms as well as social norms¹. Participants who completed both questionnaires received a discount code to enter the Discovery Museum. The study was approved by the ethical review board of the University of Groningen (PSY-2122-S-0350).

In total 214 participants completed the first questionnaire of which 86 completed the second questionnaire. Participants who did not provide full consent (participation and data processing), did not provide their e-mail address for the follow-up, did not fully watch the video (time spent on page below 135 seconds), and did clearly not read the full list provided (time spent on page below 10 seconds) were excluded from the data set. Thus, a total of 130 participants remained for the first questionnaire. From the 86 participants who filled in the second questionnaire, 71 participants could be matched with the first questionnaire. This was dependent on whether participants provided an e-mail address in the second questionnaire and whether it was identical to the first questionnaire. Of the 71 participants, 22 were in the public commitment condition, 27 in the private commitment condition, and 22 in the control condition. In the public commitment condition, 14 participants were willing to share their commitment on their social media platform of choice.

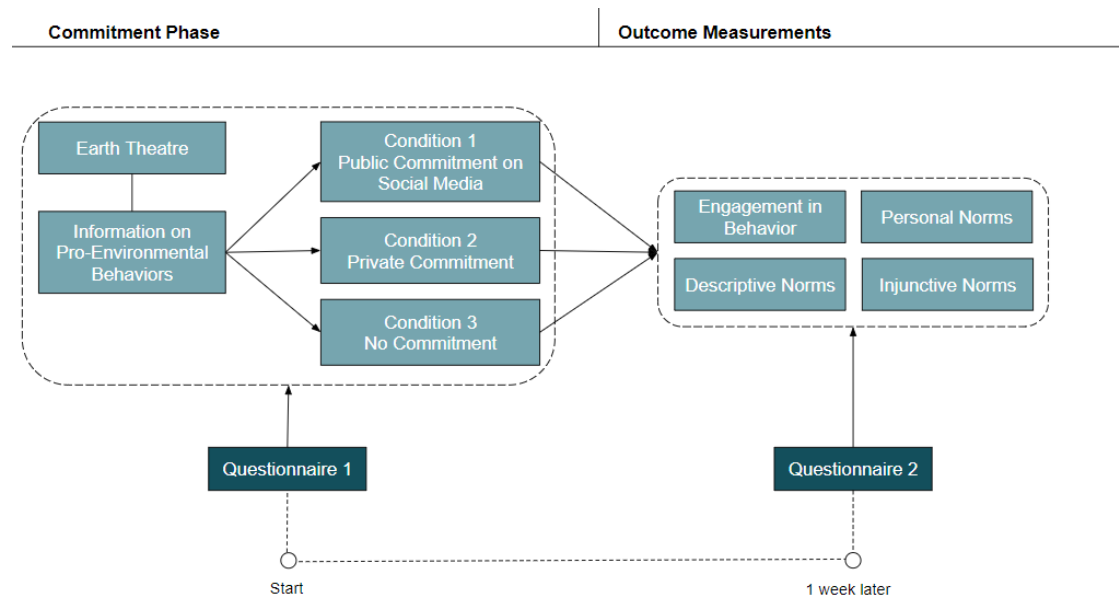
Of the participants who completed both questionnaires (71 participants), 39 were female, 28 were male, three were non-binary and one did not indicate the gender they're identifying with. Sixty-four participants were between the age of 18 to 24 years old, six participants were between 25 and 34 years, and one participant was between the age of 45 to 54 years. About 61% of participants completed primary school, secondary school, or

¹ Additional measures were included but not used for the main analysis. These include perceived ease of engaging in pro-environmental behaviors as well as the engagement or interest of shown by other individuals in the commitment. Perceived Ease is included in the explorational analyses and practical relevance.

vocational education and 39% completed a university bachelor's degree or a graduate degree. Compared to the general Dutch population, the sample is younger, more female, and slightly more educated (Statistics Netherlands).

Figure 2

Procedure of Study



3.2.1 First Questionnaire: Commitment Phase

In order to include the museum context within the study, participants first viewed a short video on our planet earth. The video began with a view of the earth from space. This was followed by a poem communicating hope for the future and a call for taking action for sustainability (GoodLeap; 2022). The video was a simplified version of what visitors view in the Discovery Museum on location.

Next, participants were informed about the threats of climate change and the consequences of human activities. Information was provided on what impact specific pro-environmental behaviors can have on mitigating climate change based on the study by Ivanova and colleagues (2020). The impact of the behaviors was indicated by stars which made it easy for participants to understand the differences between the behaviors. The list of behaviors was subsequently used for participants to make the commitments. According to

studies, it is important to make the behaviors very specific rather than general and broad (Gollwitzer, 1999). It was found that the more specific a goal intention or in this case a commitment is, the more likely the desired behavior is performed (Gollwitzer & Sheeran, 2006).

In the next step, all of the participants were randomly assigned to one of the three experimental conditions: Public commitment condition, private commitment condition, or control condition. The first experimental condition was the public (social media) commitment condition. In the public commitment condition, participants were first asked whether they are willing to make a commitment and share it on the social media platform of their choice (e.g. Facebook, Instagram, Twitter, etc.). If a participant was not willing to make a commitment or share the commitment online they were asked for their reasoning. The qualitative data will be used to get more insights. After an agreement, they could choose from the list of pro-environmental behaviors which behaviors they want to commit to for the duration of one week. Furthermore, participants could add their own ideas of pro-environmental behaviors they want to commit to.

Next, they were guided on how to share their commitment on their social media platform. The social media post they were instructed to create included a commitment badge (which could be downloaded through a link), a standardized text statement ('For the next week, I am committed to reducing my personal climate impact by engaging in the following actions.') as well as an automatically-generated list of all the behaviors they have committed to in the previous step. The commitment badge was added to make the post more colorful and entertaining which might increase the willingness of participants to make a post on their personal accounts. To avoid confusion, an example of how the social media post should look like was shown.

The second experimental condition was the private commitment condition. In the private commitment condition, participants were first asked whether they are willing to make a private commitment. If the participant was not willing to commit, they were asked for their reasoning. After an agreement, they could choose from the list of pro-environmental behaviors which behaviors they want to commit to for the duration of one week. Furthermore, participants could add their own ideas of pro-environmental behaviors they want to commit to.

Next, participants were presented with the same commitment badge as in the public commitment condition, however, instead of being asked to share it on their social media platforms they were simply presented with an overview of the selected behaviors and instructed to screenshot or note down the behaviors they have committed to for themselves.

Lastly, the third experimental condition was the control condition. Participants in the control condition were only thanked for reading the information on pro-environmental behaviors before completing the questionnaire.

3.2.2 Second Questionnaire: Outcome Measurements

In the second questionnaire, I measured the engagement in the pro-environmental behaviors, whether people committed if they shared their commitment, personal norms as well as social norms.

Engagement in Pro-Environmental Behaviors. Participants were asked how often they engaged in the pro-environmental behaviors from the list ('Please indicate to which extent you engaged in the following behaviors in the past week.'). Participants could answer the items on a scale from 1 (*never*) to 5 (*always*).

Commitment Behavior. Participants were asked whether they committed to the pro-environmental behaviors which were listed in the first questionnaire (Did you make a

commitment to the pro-environmental behaviors which were listed in the first questionnaire?). The item was answered with either yes or no.

Sharing Behavior. Participants who indicated that they committed to the behaviors were asked whether they shared their commitment with anyone (Did you share your commitment?). The item had three possible answers: Yes, with family/friends/colleagues; Yes, on Social Media; No, I kept it to myself.

Personal Norms. Personal norms to engage in pro-environmental behaviors were measured with three items (Van der Werff et al., 2019; De Groot & Steg, 2009; I feel morally obliged to engage in pro-environmental behaviors; It goes against my principles to not engage in pro-environmental behaviors; I feel good engaging in pro-environmental behaviors). The items were rated on a scale from 1 (*totally disagree*) to 7 (*totally agree*).

Descriptive Norms. Three items measured descriptive norms (Pedersen et al., 2015; People who are important to me engage in pro-environmental behaviors; My friends and family engage in pro-environmental behaviors; People in my social circle engage in pro-environmental behaviors). The items were rated on a scale from 1 (*totally disagree*) to 7 (*totally agree*).

Injunctive Norms. Three items measured injunctive norms (Van der Werff et al., 2019; Staunton et al., 2014; People who are important to me expect me to engage in pro-environmental behaviors; My friends and family expect me to engage in pro-environmental behaviors; People in my social circle expect me to engage in pro-environmental behaviors). The items were rated on a scale from 1 (*totally disagree*) to 7 (*totally agree*).

Perceived Ease. In order to provide further information to the Museum, perceived ease of behavior was also measured. However, the data was only used for exploratory analyses. Six items were used, partially adapted from the study by Van der Werff and colleagues (2019; It costs me little effort to engage in the pro-environmental behaviors; I

automatically engage in the pro-environmental behaviors; I easily forget to engage in the pro-environmental behaviors (recoded); It is feasible for me to engage in the pro-environmental behaviors; I am able to engage in the pro-environmental behaviors; I enjoy engaging in the pro-environmental behaviors). The items were rated on a scale from 1 (*totally disagree*) to 7 (*totally agree*). The items formed a reliable scale ($\alpha = .79$, $M = 5.35$, $SD = .90$).

4 Results

4.1 Confirmatory Analyses

4.1.1 Descriptive Statistics

To begin the reporting of the results, I will present the descriptive statistics of the outcome measurements from the second questionnaire.

Engagement in Pro-Environmental Behaviors. In total there were 71 participants which answered the items on their engagement in pro-environmental behaviors ($M = 3.77$, $SD = .87$). For participants who were in the control condition the average for all behaviors was taken ($n = 22$, $M = 3.07$, $SD = .84$). For participants who made a private commitment, the average of those behaviors for which a participant made a commitment was computed ($n = 27$, $M = 4.09$, $SD = .66$). The same calculation was made for participants in the public commitment condition who shared their commitment on their social media platform ($n = 14$, $M = 4.08$, $SD = .62$).

Commitment Behavior. In the public and private commitment conditions, all participants indicated that they did commit to the behaviors of their choice. Interestingly, 13 participants in the control condition also indicated that they committed to the behaviors.

Sharing Behavior. In the public commitment condition ($n = 22$), 14 participants indicated that they shared the commitment on their social media platform, and four participants that they shared it with family, friends, or colleagues. In the private commitment condition ($n = 27$), eight participants shared it with friends, family, or colleagues, 18

participants kept it to themselves and one participant indicated that they shared it on their social media platform. In the control condition ($n = 13$), eight participants kept the commitment to themselves and five participants shared it with family, friends, or colleagues.

Norm Variables. The items for the personal norm scale formed a reliable scale ($\alpha = .83$, $M = 5.52$, $SD = 1.25$). The items for descriptive norms formed a reliable scale ($\alpha = .92$, $M = 4.89$, $SD = 1.26$). The items for injunctive norms formed a reliable scale ($\alpha = .94$, $M = 4.29$, $SD = 1.48$).

4.1.2 Hypothesis 1 and Hypothesis 2

To test hypothesis 1 and hypothesis 2, a single one-way ANOVA with three conditions plus planned contrasts was conducted. Using R, the assumptions for an ANOVA were examined. All the assumptions seemed reasonable: no outliers were detected within the three groups; a Shapiro-Wilk test showed no evidence for non-normality in residuals ($W = 0.97$, $p = .19$); and a Levene's test indicated that there is no evidence that variance across groups is statistically significantly different ($F = 1.23$, $p = .30$).

A one-way ANOVA revealed that there was a statistically significant difference in engagement in pro-environmental behaviors between at least two groups ($F(2, 60) = 14.63$, $p < .001$, $\eta^2 = .33$). Further investigation of the impact of the allocated conditions on engagement in pro-environmental behaviors using planned contrasts showed that being in the commitment group was associated with a significant increase in engagement compared to being in the control group ($t(60) = 5.30$, $p < .001$ (two-tailed)). However, being in the public commitment group compared to being in the private commitment group did not significantly increase engagement ($t(60) = -.02$, $p = .24$).

Concluding, hypothesis 1 was supported. There was evidence that individuals in the commitment strategies showed increased engagement in the behaviors compared to the control group. However, hypothesis 2 was not supported by the data. There was not sufficient

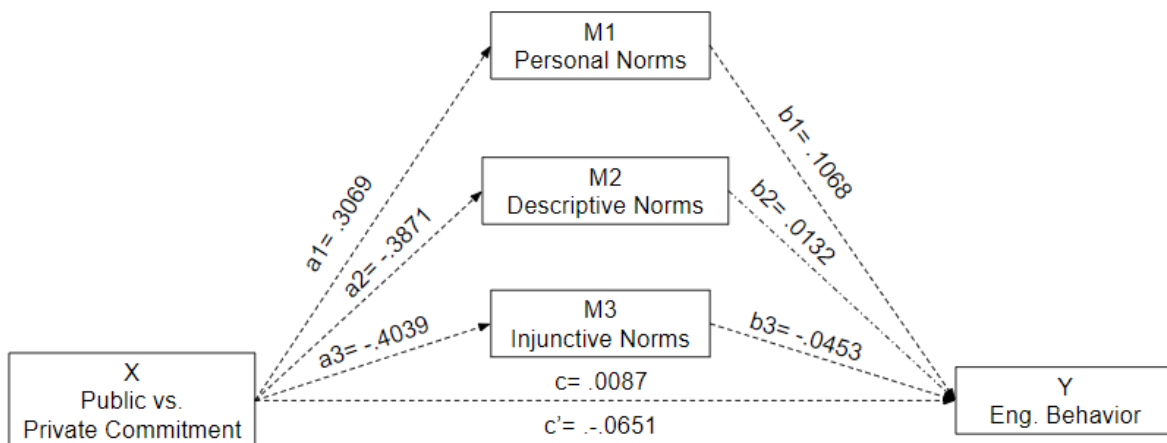
evidence showing that the public commitment strategy is more effective than the private commitment strategy.

4.1.3 Hypotheses 3

Next, to test hypotheses 3, whether descriptive, injunctive norms, and personal norms mediate the relationship between the commitment conditions and engagement in the behavior, a mediation analysis was used. The mediation analysis was conducted in SPSS by using the regression analysis model 4 of Hayes' PROCESS macro. The statistical tool is ideal to estimate the direct and indirect effects in single and parallel mediator models. In addition, the analysis uses bootstrapping confidence intervals which will be beneficial considering the small sample size available (Bootstrapping samples $N = 1000$). The data set which will be analyzed includes the allocated commitment conditions ($N = 41$). I conducted a parallel mediation analysis including personal norms, descriptive norms, and injunctive norms (see Figure 3). Public commitment was coded as 0 and private commitment as 1.

Figure 3

Results of Parallel Mediation Analysis



Note. The mediating effect of three norm dimensions in the relationship between the commitment groups (public and private) and engagement in pro-environmental behaviors. None of the effects had a significant p-value ($p < .05$); All presented effects are unstandardized; a_n is effect of commitment on norm dimensions, public commitment is coded as 0 and private commitment as 1; b_n is effect of norm dimensions on

engagement in behavior; c' is direct effect of commitment on engagement in behavior; c is total effect of commitment on engagement in behavior.

Mediation analyses based on 1000 bootstrapped samples using bias-corrected 95% confidence intervals (Preacher & Hayes, 2004) showed that the IV had a non-significant total effect on the DV [TE= .0054, se= .2078, $p = .99$], a non-significant residual direct effect [DE= -.0406, se= .2231, $p = .85$], and a non-significant indirect effect via personal norms [IE= .0328, se= .0680, LL= -.09, UL= .19], descriptive norms [IE= -.0051, se= .0616, LL= -.11, UL= .15] and injunctive norms [IE= .0183, se= .0616, LL= -.09, UL= .16].

The results suggest that there was no significant direct effect between commitment form and engagement in behavior ($c' = -.0651$, $t = -.1818$, $p = .98$) with a 95 % confidence interval between -.49 and .41. While some researchers support the notion that a direct effect of X and Y does not need to be present to find a mediation (Bollen 1989, p. 52; Hayes 2018, p. 80), a direct effect of the independent variable on the mediator could also not be detected (see Figure 3 for the effects associated with these pathways). Thus, no evidence was found which would support the hypothesis of mediation.

4.2 Exploratory Analyses

4.2.1 Hypothesis 2: Further Analyses

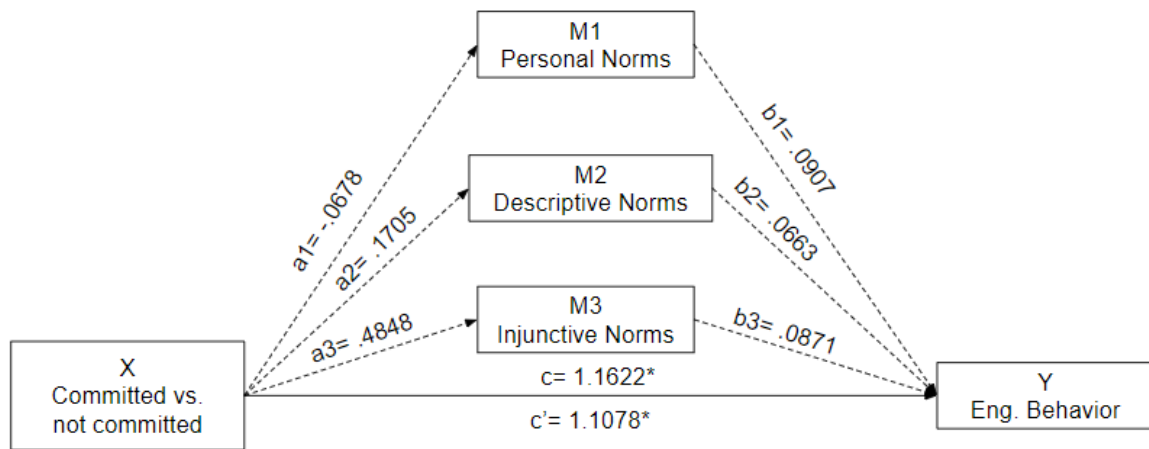
During the analysis of the results to test the main hypotheses, I recognized that the manipulation (allocation to conditions) was not as decisive for the sharing behavior. For example, some participants who were in the private condition indicated that they despite not being asked told their friends, family, or colleagues about their commitment. Subsequently, it is worth discussing whether this situation also counts as a public commitment. To get a better understanding of the data and potentially more insights into the sharing behavior, I created new groups which can be analyzed. This further analysis compares the group of individuals who committed and shared their commitment with an external party (Friends, family, colleagues, or on social media) with the group who did commit but kept it to themselves.

Before the analysis, assumptions were explored. All assumptions seemed reasonable to conduct a standard student t-test: no outliers were detected; the Shapiro-Wilk test showed no evidence for non-normality in the distributions of the modified public commitment group ($W = 0.95$, $p = .23$) and the modified private commitment group ($W = 0.96$, $p = .42$); the Levene's test indicated that there is no evidence that population variances differ ($F = 1.50$, $p = .23$).

A student t-test was conducted comparing individuals who shared their commitment with an external party (friends, family, colleagues, or social media; $N = 28$) with individuals who kept their commitment to themselves ($N = 27$). The mean engagement in pro-environmental behaviors in the modified public commitment group was 4.05 ($SD = 0.56$), whereas the mean in the modified private commitment group was 3.83 ($SD = 0.72$). The student t-test indicated that the difference was not statistically significant, $t(52) = 1.254$, $p = .30$.

4.2.2 Hypothesis 3: Further Analyses

Although there were no mediation effects detected when comparing the public and private conditions, I wanted to further explore potential mediation effects when comparing committed individuals with non-committed individuals. While the data set is inconclusive about the effectiveness of a public commitment, I might get further insights into the commitment strategy itself. In addition, I get the benefit of a bigger sample size and slightly increased statistical power. Thus, for the mediation analyses, I created a data set indicating solely whether a person made a commitment or not. In this modified data set the commitment groups are combined (committed (1) versus not committed (0), $N = 71$). I conducted a parallel mediation analysis in SPSS by using the regression analysis model 4 of Hayes' PROCESS macro. The analysis uses bootstrapping confidence intervals which will be beneficial considering the small sample size available (Bootstrapping samples $N = 1000$).

Figure 4*Results of Parallel Mediation Analysis*

Note. The mediating effect of three norm dimensions in the relationship between the commitment groups (public and private) and engagement in pro-environmental behaviors. *Significant p-value ($p < .05$); All presented effects are unstandardized; a_n is effect of commitment on norm dimensions, commitment is coded as 1 and no commitment as 0; b_n is effect of norm dimensions on engagement in behavior; c' is direct effect of commitment on engagement in behavior; c is total effect of commitment on engagement in behavior.

Mediation analyses based on 1000 bootstrapped samples using bias-corrected 95% confidence intervals (Preacher & Hayes, 2004) showed that the IV had a significant total effect on the DV [TE= 1.0115, se= .1718, $p < .001$], a significant residual direct effect [DE= .9641, se= .1652, $p < .001$], and a non-significant indirect effect via personal norms [IE= -.0061, se= .0383, LL= -.09, UL= .09], descriptive norms [IE= .0113, se= .0505, LL= -.03, UL= .16] and injunctive norms [IE= .0422, se= .0618, LL= -.05, UL= .20].

The result suggests that there was a significant direct effect between commitment form and engagement in behavior ($c' = 1.1078$, $t = 5.8364$, $p < .001$) with a 95 % confidence interval between .63 and 1.29. However, the direct effects of personal norms, descriptive norms, and injunctive norms were not significant (see Figure 4 for the effects associated with

these pathways). Thus, no evidence was found which would support the hypothesis of mediation.

4.2.3 Moderation Analysis

Considering the results of the mediation analysis, I further explored the data by conducting a moderation analysis using model 1 of Hayes' PROCESS macro in SPSS. Since the independent variable was not correlated with the mediator, I considered a possible moderation instead. It could be a possibility that instead of mediating the relationship between commitment and behavior, norms could be a moderator and affect the strength of the relationship. This analysis was mainly explorative since I could not identify previous studies which examined a possible moderation effect. The independent variable in this model was committed versus not committed, the dependent variable was engagement in pro-environmental behaviors, and the moderators personal-, descriptive- and injunctive norms.

Indeed, moderating effects were found for descriptive norms and injunctive norms on engagement in behavior for the data committed versus not committed. There is a significant interaction between commitment and descriptive norms on engagement in behavior ($b = -.2748$, $t = -2.20$, $p < .001$; see Figure 5). There is a significant interaction between commitment and injunctive norms on engagement in behavior ($b = -.3208$, $t = -3.05$, $p < .001$; see Figure 6). When norms are high, making a commitment only slightly increases engagement in the behavior. However, when norms are low, making a commitment significantly increases engagement in behavior.

Figure 5

Interaction Effect Commitment and Descriptive Norms

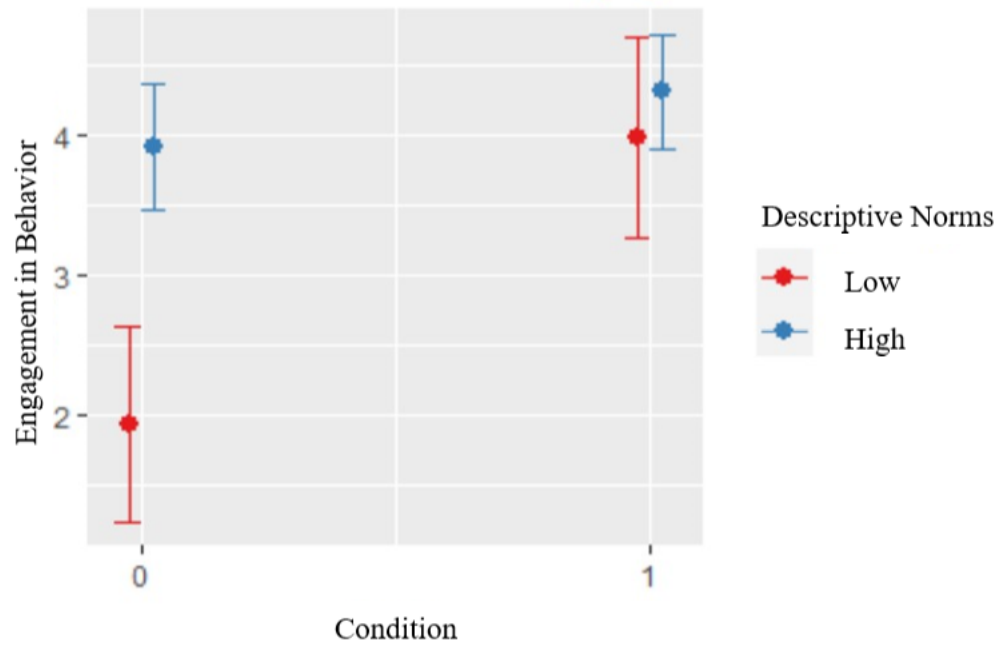
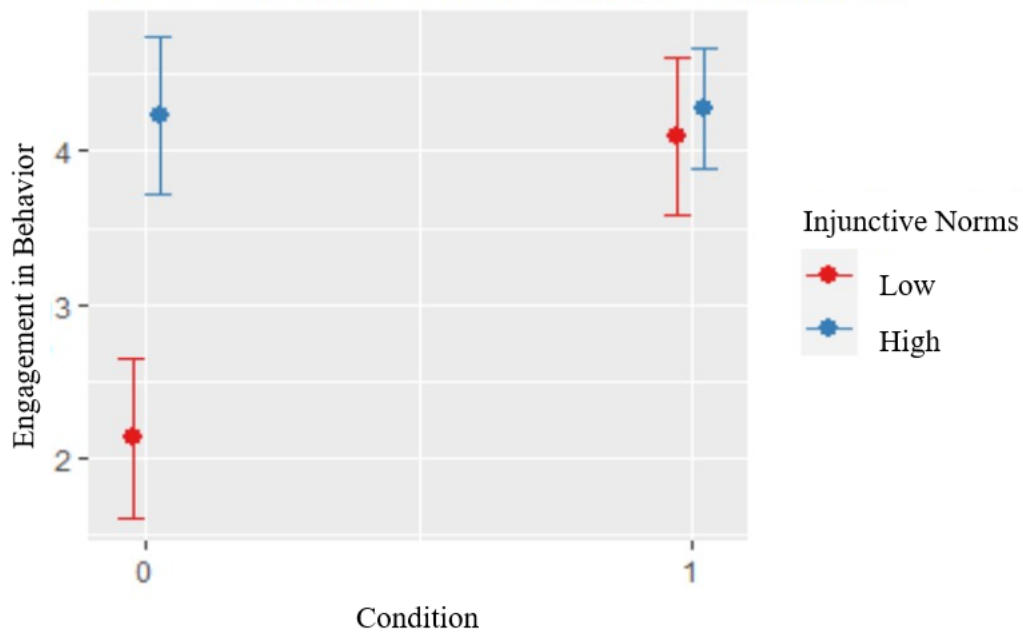


Figure 6

Interaction Effect Commitment and Injunctive Norms



4.2.4 Qualitative Data

In addition to the quantitative data analysis, it is interesting to consider the qualitative data for the context of this study. In the full data set of the first questionnaire (N = 130), 38 participants were randomly allocated to the public commitment condition. Forty-seven % of

participants indicated, that they do not want to share their commitment on their social media platforms and provided their reasoning. Twelve individuals indicated that they usually do not use their social media accounts to share aspects of their lives online. For example, participant 60 indicated: “I don't post on social media often - and this would be strange of me”. Two participants indicated that they feel social anxiety or even restrain from using social media to protect their mental health: “I am currently doing a social media detox for my own mental health”. In addition, four participants indicated that they do not have social media platforms.

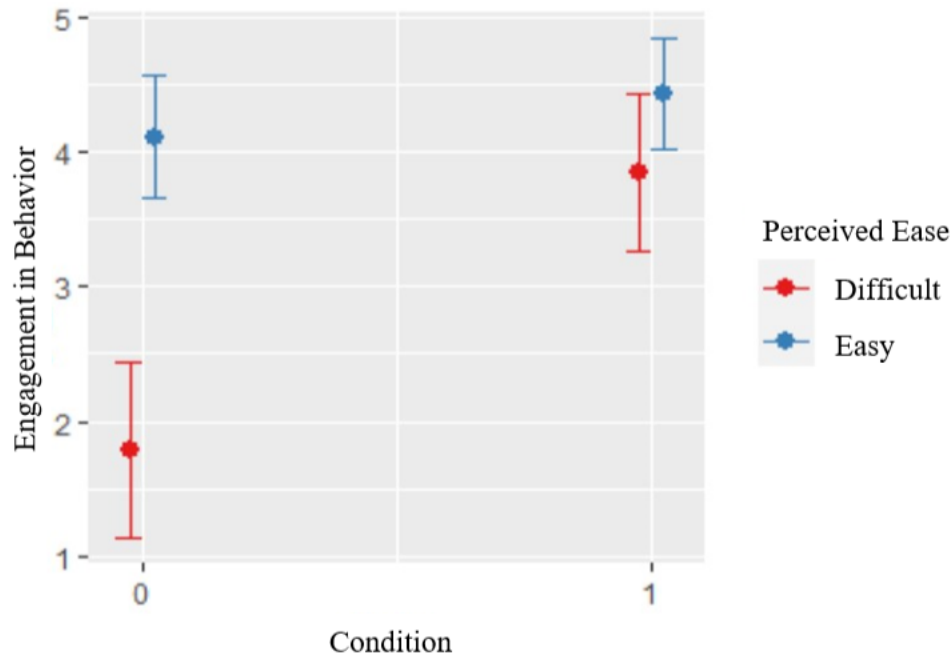
In contrast, among the participants which were allocated to the private commitment condition, only one person was not willing to commit. The participant indicated that they experience strict commitments as energy-consuming and lowering their motivation to engage in the behavior: “I believe that by becoming more conscious about my behavior and its effects, I will naturally shift to better behaviors. I've found that, at least personally, strict commitments and plans tend to quickly fail and consume much energy”.

4.2.5 Perceived Ease

Further, a moderation analysis for perceived ease was conducted to provide further information to the museum. There was a significant interaction between commitment and perceived ease on engagement in behavior ($b = -.4202$, $t = -2.49$, $p < .001$). Examination of the interaction plot shows that when the behaviors are perceived as easy, making a commitment only slightly increases engagement in the behavior. However, when the behaviors are perceived as difficult, making a commitment significantly increases engagement in behavior.

Figure 7

Interaction Effect Commitment and Perceived Ease



4.2.6 Missing Data

The study design which included two questionnaires made data collection challenging. As participants did not return for the second questionnaire, the available sample for analysis was small. To test whether the study design and the commitment part could have been a potential factor that influenced participants to not return for the second questionnaire, missing data was analyzed in R. It is important to look at the missingness due to the time between the first and the second questionnaire which included the commitment phase. It is possible, that participants did not return because they got discouraged, forgot about, or did not engage in the committed behaviors which would make the results of the following analyses more promising than their true value. Following, I looked at whether the condition and the decision made by the participant to commit or not to commit influenced whether the person returned for the second questionnaire. A chi-square test of independence was performed to examine the relationship between the randomly allocated conditions and the return of participants for the second questionnaire. The relation between the two was not significant ($X^2(2, N = 130) = 1.1368, p = .57$). A second chi-square test of independence

examines the relationship between participants' compliance with the request in the questionnaire, such as making the commitment when asked, and return for the second questionnaire was also not significant ($X^2(1, N = 130) = 1.8234, p = .17$). Subsequently, I assume that the study design, particularly the conditions did not cause the dropping-out. However, there are still various reasons that could have led the participants to not fill in the second questionnaire which based on solely the data cannot be explained (e.g., the e-mail regarding the follow-up went to the spam folder or was simply overlooked). In the questionnaires, participants were always reminded before continuing to the next page to provide a response for all the listed items. Subsequently, among the participants who completed both questionnaires, no missing data occurred.

5 Discussion

The aim of this study was to provide a scientific basis for the usage of the commitment strategy in the new exhibition of the Discovery Museum. While several studies found, that making a private commitment is very beneficial in encouraging individual behavior change to more sustainable practices (Bryce et al., 1997; Matthies et al., 2006; Boudet et al., 2016), I proposed to take the commitment strategy a step further and ask individuals to make a public commitment by sharing their pledge on their social media platforms. Using an online experiment, I aimed to examine this proposal in a systematic way and in addition uncover the normative processes underlying the effectiveness of the commitment strategy and behavior change. Following, I will discuss the results and conclusion of the research.

5.1.1 Effectiveness of the Commitment Strategy

The first hypothesis in this study was that the private and public commitment strategies are effective in encouraging pro-environmental behaviors when compared to the control group, individuals who did not commit. The results are in line with previous research

on the topic (Abrahamse et al., 2005; 2013; Cialdini, 2001; 2003; Pallak & Cummings, 1976; Lokhorst et al., 2011) and indicate that making a commitment is indeed on average effective to encourage pro-environmental behaviors. Thus, hypothesis 1 was supported.

5.1.2 Effectiveness of the Public Commitment Strategy

The second hypothesis looked at whether making a public commitment via social media further increases the effectiveness of the commitment and in such engagement in the pro-environmental behaviors compared to the private commitment. The data indicated, that there was no significant difference between the public commitment group and the private commitment group. A public commitment seemed on average equally as effective as a private commitment. This is at odds with previous literature which often finds that public commitments are more effective than private commitments (see meta-analysis: Lokhorst et al., 2011). Two reasons come to mind. First of all, there could have been a flaw in the study design. In my study, there are no controls for whether the person actually made a social media post or not. Thus, some individuals might not have shared their commitments online which puts them on the same level as the private commitment group. Secondly, the literature suggests that a public commitment intervention benefits from being coupled with a second intervention (e.g. tailored information; Lokhorst et al., 2010) which my study lacks. Participants all received the same information which might have a different impact depending on the characteristics of the individual (e.g. environmental values; Bouman et al., 2018).

Subsequently, in addition to the first analysis, I further examined whether the self-reported sharing experience had an impact. Many individuals did not share their commitment on social media but instead reported that they shared it with family, friends, or colleagues. Arguably, this can also be viewed as a public commitment since social norms play a role. While the differences in the mean of the group which shared the commitment and the group

which did not share the commitment is greater than in the conditions, the statistical test indicated that there was no significant difference between the groups.

Based on the results I conclude, that the most important aspect which encouraged increased engagement in the behaviors for the duration of one week was the act of making a commitment. In my data set, whether the commitment was public or private did not make a significant difference. However, it is clear that many participants who were allocated to the public commitment condition were not willing to share their commitment. While these participants were excluded from the main analyses, it is important to further discuss.

Lack of public commitment. The qualitative data gave some insights into why participants were not willing to share their commitment on social media with the main reasons being: First, feelings that social media is not the right place to share a commitment, and second, mental health reasons. Sharing information about oneself on social media platforms is often risky. First of all, the audience which will view our information is uncertain (Litt & Hargittai, 2016). Once something is posted, we can often not influence whether it can be seen by a person we did not want to disclose the information to (e.g. supervisors, family members). Secondly, privacy and algorithms can take complex forms which are difficult to predict. Our private information is not always safe from misuse and posts might exist on the social network for longer than we anticipated. As a result, disclosing information about one's identity that could provide a risk of stigmatization is often not shared (Birnholtz et al., 2020). Similarly, a commitment might not be shared when the person does not necessarily feel passionate or excited about the pledge. In the case of non-compliance with a shared commitment, the person might risk violating social norms. Thus, instead of social norms potentially encouraging engagement in the behavior when a commitment is shared, social norms could prevent individuals to enter the risks in the first place and not sharing their commitment with a social network.

An additional study interesting for this context looked at the non-willingness of making a public commitment and described it in terms of the social dilemma literature (Lokhorst et al., 2009). A social dilemma occurs when the collective interest is contrasting to the individual interest. Pro-environmental behaviors are an example of such. For example, while behaviors such as taking shorter showers are not as comfortable for the individual, it does benefit water conservation and in such the collective. The study found that trust and situational expectations play major roles when it comes to the willingness to make a public commitment (Lokhorst et al., 2009). Individuals who have low dispositional trust do not trust others to make contributions to the public good. However, when they have situation-specific information about high voluntary contributions by others, this may motivate them to contribute as well. Individuals with high trust also expect high voluntary contributions to the public good by others. If they have situation-specific information that this is not the case, they might be more likely to make a commitment themselves and contribute. The study concludes that public commitment interventions are not always effective since they can be influenced by trust and situation- or context-specific information which varies. Meaning that when it comes to public commitment interventions there is no one-fit-all solution to increase effectiveness which might was mistakenly assumed in my study design. Thus, it is again important to consider further manipulations which can be combined with the public commitment strategy as demonstrated by Lokhorst and colleagues (2010; e.g. tailored information).

5.1.3 Impact of Process Variables

The third hypotheses were focused on the underlying processes which influenced engagement in behavior. More specifically, I predicted that personal norms, descriptive norms, and injunctive norms could be variables that mediate the relationship between the form of commitment and engagement in pro-environmental behaviors. The available data

indicated, that there was no significant relation between making a commitment and the process variables personal norms, descriptive norms, and injunctive norms. Thus, I did not find evidence that would support my hypothesis of a mediating effect.

To further explore the data, I conducted a moderation analysis. A moderating effect was found for descriptive norms and injunctive norms. This means that the more a person perceived or valued what other people commonly do or what other people think should be done the higher was the engagement in the pro-environmental behaviors. When norms were high, making a commitment only slightly increased engagement in the behaviors. Contrary, when norms were low, making a commitment significantly increased engagement in the behaviors. Resulting we can see that when someone makes a commitment social norms have a decreased impact and matter less. Thus, mainly the act of making a commitment is influential on engagement in pro-environmental behaviors.

This result differs from what I assumed at the beginning of the study. Based on the literature, I suggested that making a commitment would increase the importance of social norms. Thus, social norms would become more important and motivate the individual to engage in pro-environmental behaviors to avoid disapproval from others (Lokhorst et al., 2011). However, making a commitment seems to decrease the relevance of social norms. An explanation for this could be that the individual who makes a commitment could believe that they fulfilled their “obligations” of contributing to the environmental problem. Subsequently, the expectations of others or what others do or do not becomes less important. A similar concept underlies the self-completion theory (SCT; Gollwitzer & Kirchhof, 1998; Wicklund & Gollwitzer, 1982). The SCT suggests that individuals who are committed to a goal will perform various activities to claim goal attainment. Making a commitment to pro-environmental behaviors could be a symbol to an individual that they are an environmentally

conscious person. Subsequently, they will not feel pressured when others in their social environment expect them to be or are themselves environmentally friendly.

5.1.4 Limitations and future studies

First of all, a major limitation of this study is the small sample size which is why the results of the analyses need to be treated with caution. During data collection, it proved difficult to collect enough participants, especially for the public commitment condition. Many participants were not willing to make a public commitment. Thus, future studies which aim to use the public commitment strategy via social media platforms may have to implement some factors that could increase motivation to make a public commitment. A study might benefit if the commitment people make is connected to a preexisting online community. As such, making a commitment is not solely a solo act but grants access to a bigger social community. Alternatively, the call for making a commitment could originate from a popular actor which could further increase the willingness to commit due to heightened credibility.

Secondly, I suspect that the study design is highly vulnerable to bias. On the one hand, it is important to note that the results are only based on individuals who were willing to commit (both in the public and private condition) and thus, might already be interested in pro-environmental behaviors. On the other hand, individuals who committed to certain behaviors might provide a more favorable answer in the second questionnaire than the actual true value. Thus, future studies might benefit from using more tangible measures of examining public commitment such as the actual energy consumption of a household as well as qualitative measurements to examine process variables. A study design adopted by Pallak and Cummings (1976) which combined interviews and energy meter measurements is an older example of such that could be adopted for a revision of the study and to examine the social media aspect further. In addition, it is worth considering adding pre- and post-measures of norms in order to get a better understanding of the pre-existing sensitivity to social norms.

Third, due to time limitations, the time gap between the first and the second questionnaire was only one week. This limits the potential to make long-term inferences. Additionally, the small time frame might have encouraged participants to make more behavior commitments than they can sustain. Thus, future studies are advised to include more measurement points in order to improve understanding of the long-term impact of commitment strategies.

Lastly, the variable which indicated the engagement in the pro-environmental behaviors consisted of the commitment groups of the average of the committed behaviors. However, for the control group, it consisted of the average of all behaviors. Due to the small sample size, it was not possible to systematically test each behavior separately as for some behaviors only a few participants committed to them. Thus, it could be that in the commitment conditions participants mostly committed to a certain type of behavior. For example, participants in the commitment condition might choose behaviors that are relatively new and effortful for them. However, only these behaviors were then compared to the control group which includes the complete list. Therefore, for future research, it might be beneficial to use separate behaviors rather than listing several options as it becomes challenging to analyze.

5.1.5 *Practical Relevance*

As indicated, the aim of this study was to support the Discovery Museum in the development of the exhibition and provide a scientific basis for the proposed commitment strategy at the end of the planned exhibition. Due to the small sample size, the results are not very conclusive, however, I am able to provide some suggestions in this regard.

First of all, the results of the analysis were in favor of the commitment strategy as a means of motivating engagement in pro-environmental behaviors. In the examined sample, the act of making a commitment encouraged individuals to engage in the behaviors they have

chosen. While the results were inconclusive about the public commitment strategy it might, nevertheless, be advisable to provide the elective option for visitors to share their commitment online. On the one hand, the literature suggests that making a commitment public can improve its effectiveness (Cialdini, 2001). On the other hand, comparing the means of the public and private commitment groups indicates that making a public commitment does not decrease engagement in pro-environmental behaviors. Thus, most likely there will be no adverse effect from adding the option to the exhibition.

Secondly, for practical relevance perceived ease to engage in the behaviors was analyzed separately. I found that while the act of making the commitment showed the greatest impact on engagement in the behavior, perceived ease strengthened this relation. The more participants felt that their commitment is practical and easy to engage in, the more they actually engaged in the behavior. Thus, it could be important that in the exhibition visitors are made aware of the simplicity of a specific behavior. This could be achieved by making the steps to reach the ultimate sustainability goal simple and straightforward (Gollwitzer, 1999). It was found that the more specific a goal intention or in this case a commitment is, the more likely the desired behavior is performed (Gollwitzer & Sheeran, 2006). However, simplicity does not equal not effortful. Each step and each goal should be somewhat difficult in order to promote the behavior and increase motivation (Van der Werff et al., 2019).

6 Conclusion

While the study did not provide conclusive results in regards to an increased effectiveness of the public commitment via social media when compared to a private commitment, I did find supporting results that the act of making a commitment is an effective tool to encourage engagement in pro-environmental behaviors compared to making no commitment. In addition, the results suggested that descriptive and injunctive norms are influential moderators. When someone has not made a commitment, social norms played a

greater role in whether the person would engage in pro-environmental behaviors. Contrary, when someone made a commitment, norms seemed to matter less. I suggest, that making a commitment to pro-environmental behaviors could be a symbol to an individual that they are an environmentally conscious person. Subsequently, they will not feel pressured when others in their social environment expect them to be or are themselves environmentally friendly.

Lastly, for the exhibition of the Discovery Museum, I suggest providing the voluntary option to the visitors to make a public commitment. On average, a public commitment was equally as effective as a private commitment. Thus, considering the promotional effects of social media platforms, it is advisable to integrate the public commitment strategy.

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Appendix A

7/15/22, 3:16 PM

Qualtrics Survey Software

Consent

Museum Research on Sustainable Behaviors

Dear Participant,

Welcome to our study!

The aim of this research is to inform the development of the upcoming sustainability exhibition at the Discovery Museum in Kerkrade, Netherlands. Your participation is highly appreciated and will help us to create an inspiring exhibition for future visitors of the museum.

Before we start, some important information:

This study is run by Desiree Schmid (d.f.schmid@student.rug.nl), dr. Maddie Judge and prof. dr. Linda Steg from the University of Groningen in collaboration with the Discovery Museum Kerkrade. The research started in April 2022 and will end in June 2022. The research plan was evaluated by the Ethics Committee of Psychology (ECP) of the University of Groningen.

What will be asked from you as a participant?

Before taking this survey, you will be asked to consent to participate. Following, the research comprises two questionnaires. The first questionnaire begins shortly after you consent to participate and includes information on pro-environmental behaviors. Participation in this survey study will take about 15 minutes. After you completed this questionnaire, we will ask you to complete a short follow-up questionnaire 1 week from now. This will help us to understand the long-term impact of the information. To be able to invite you for the follow-up, we will ask you to provide your email or Prolific ID (this will not be used for any other purposes). The follow-up questionnaire will not take longer than 10 minutes and will be sent to 1 week after the original study.

Do you have to participate in this research?

Participation in the research is voluntary. However, your consent is needed. Therefore, please read this information carefully. Ask all the questions you might have, for

example, because you do not understand something. Only afterward you decide if you want to participate. If you decide not to participate, you do not need to explain why, and there will be no negative consequences for you. You have this right at all times, including after you have consented to participate in the research.

What are the consequences of participation?

With your participation, you are contributing to research on factors promoting sustainable behaviors. There are no known risks of participation. Participants who complete both questionnaires will get a 20 % discount code for entry to the Discovery Museum in Kerkrade.

How will we treat your data?

You are able to withdraw from this study at any point, without negative consequences. Within 3 weeks of sending out the follow-up surveys, all email addresses will be deleted from the datasets. You will be able to request a summary of the overall findings of the study; however, we cannot provide your individual responses after this point, since we do not collect other identifying information. Anonymized survey data may be stored on the Open Science Framework by the principal researcher after any publications of journal articles if requested. The principal investigator is responsible for processing and correctly storing the data. It will be stored on a password-protected drive for at least five years following any publications.

What else do you need to know?

You may always ask questions about the research: now, during the research, and after the end of the research. You can do so by emailing d.f.schmid@student.rug.nl.

If you have questions/concerns about your rights as a research participant or about the conduct of the research, you may also contact the Ethics Committee of the Faculty of Behavioural and Social Sciences of the University of Groningen: ec-bss@rug.nl. If you have questions or concerns regarding the handling of your personal data, you may also contact the University of Groningen Data Protection Officer: privacy@rug.nl.

INFORMED CONSENT

MUSEUM RESEARCH ON SUSTAINABLE BEHAVIORS.

7/15/22, 3:16 PM

Qualtrics Survey Software

EC code PSY-2122-S-0350

- I have read the information about the research. I have had enough opportunity to ask questions about it.
- I understand what the research is about, what is being asked of me, which consequences participation can have, how my data will be handled, and what my rights as a participant are.
- I understand that participation in the research is voluntary. I myself choose to participate. I can stop participating at any moment. If I stop, I do not need to explain why. Stopping will have no negative consequences for me.
- Below I indicate what I am consenting to.

You have the right to a copy of this consent form.

Consent to participate in the research:

- ☐ Yes, I consent to participate; this consent is valid until 27-06-2022
- ☐ No, I do not consent to participate

Consent to processing my personal data:

- ☐ Yes, I consent to the processing of my personal data as mentioned in the research information. I know that until 27-06-2022 I can ask to have my data withdrawn and erased. I can also ask for this if I decide to stop participating in the research.
- ☐ No, I do not consent to the processing of my personal data.

Introduction

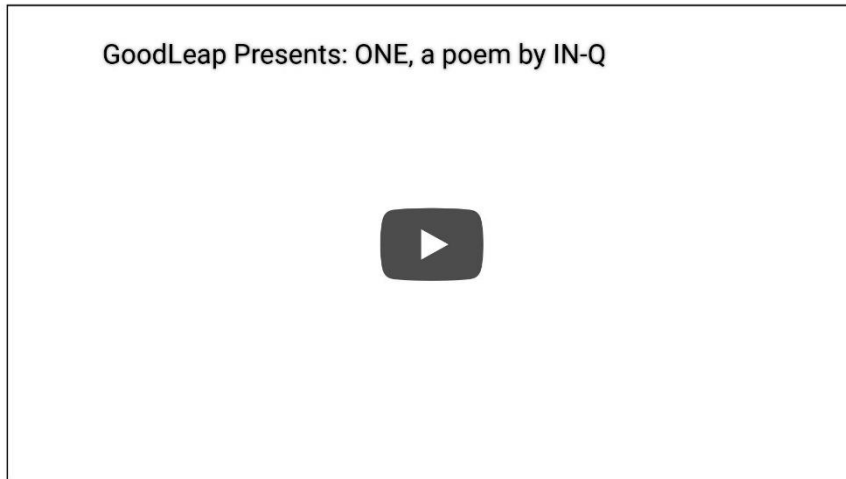
Thank you for your consent to participate in this questionnaire.

To start, you will view a video on our earth. Followed by information on different pro-environmental behaviors.

Earth Theater

Welcome to the Earth theatre!

Please watch the following video:



Pro-Environmental Behaviors

Climate change is one of the most urgent threats we face today. We are experiencing increased temperatures, more extreme weather events, and loss of biodiversity. This threatens the health and well-being of people across the world.

We can all contribute to limiting climate change. A recent study identified the extent to which different behaviors would reduce CO₂ emissions and limit climate change.

On the next page, you can find an overview of the extent to which different things you can do would help limit climate change. Please read the list carefully before continuing.

Behaviors	Impact
Reducing car use	★ ★ ★
Steps:	
Walk or take the bicycle for short distances rather than using the car	★ ★ ★
Use public transportation rather than the car	★ ★

7/15/22, 3:16 PM

Qualtrics Survey Software

Car pool rather than drive your own car	★
---	---

Eating more plant-based foods rather than animal-based food	★★★
<u>Steps:</u>	
Replace meat with plant protein	★★★
Replace cow milk with plant milk	★★★

Reducing food waste	★★
<u>Steps:</u>	
Pick ugly fruit and vegetables in the grocery store	★
Re-use left overs	★
Avoid purchasing too much, buy only what you need	★
Learn how to storage different foods correctly	★

Conserving energy	★★
<u>Steps:</u>	
Lower thermostat setting	★★
Turn off heating before leaving the house	★★
Avoid using air conditioner	★★
Wash your laundry at lower temperature	★
Turn off all electrical devices completely rather than on standby	★
Turn off lights in rooms where no one is present	★

Conserving water	★
<u>Steps:</u>	
Take shorter showers	★★
Fill up dishwasher and washing machine completely	★
Shut off tap water when not in use	★
Collect rainwater for your plants	★

Minimizing waste	★
<u>Steps:</u>	
Avoid plastic bags	★
Avoid unnecessary packaging	★
Instead of single-use products buy reusable items	★
Buy from bulk bins or farmer markets and bring your own containers	★
Separate your waste and dispose at designated locations	★

P-S Condition

Let's take action!

7/15/22, 3:16 PM

Qualtrics Survey Software

For the next week, we would like to ask you to commit to one or more behaviors from the list to decrease your personal environmental impact. In addition, we would like to ask you to share your commitment with your family, friends, and followers on your social media platform (Instagram, Facebook, or Twitter).

Are you ready to make a commitment?

☐ Yes, I will make a commitment

☐ No, I will not commit. This is why:

Are you willing to share your commitment on your social media platform (Instagram, Facebook, Twitter, etc.)?

☐ Yes, I will share it on my social media platform

☐ No, I will not share it on my social media platform This is why:

Please indicate one or several behaviors to which you want to commit to for the next week in order to reduce your current environmental impact.

To have the greatest impact and limit climate change, please pick behaviors that are new to you.

At the bottom, you can also add your own ideas of behaviors you want to commit to limit your personal impact on climate change.

For the next week, I am committed to:

Reducing car use ★★★

Walk or take the bicycle for short distances rather than using the car

☐

Use public transportation rather than the car

☐

Car pool rather than drive own car

☐

Eating more plant-based foods rather than animal-based food ★★★

Reduce meat consumption

☐

Replace dairy consumption

☐

Reducing food waste ★★

Pick ugly fruit and vegetables in the grocery store	<input type="checkbox"/>
Re-use left overs	<input type="checkbox"/>
Avoid purchasing too much buy only what is needed	<input type="checkbox"/>
Learn how to storage different foods correctly	<input type="checkbox"/>
Conserving energy ★★	
Lower thermostat setting	<input type="checkbox"/>
Turn off heating before leaving the house	<input type="checkbox"/>
Avoid using air conditioner	<input type="checkbox"/>
Wash laundry at lower temperature	<input type="checkbox"/>
Turn off all electrical devices completely rather than on standby	<input type="checkbox"/>
Conserving water ★	
Take shorter showers	<input type="checkbox"/>
Fill up dishwasher and washing machine completely	<input type="checkbox"/>
Shut off tap water when not in use	<input type="checkbox"/>
Collect rainwater for plants	<input type="checkbox"/>
Minimizing waste ★	
Avoid plastic bags	<input type="checkbox"/>
Avoid unnecessary packaging	<input type="checkbox"/>
Instead of single use products buy reusable items	<input type="checkbox"/>
Buy from bulk bins or farmer markets and bring own containers	<input type="checkbox"/>
Separate waste and dispose at designated locations	<input type="checkbox"/>
Your own idea <input type="text"/>	<input type="checkbox"/>
Your own idea <input type="text"/>	<input type="checkbox"/>
Your own idea <input type="text"/>	<input type="checkbox"/>

Thanks for making a commitment!

Now let's create a post for the social media platform of your choice (Instagram, Facebook, or Twitter). Please include the **picture of the badge** as well as the **displayed text** that includes all your commitments.

Badge:

To download the badge, simply click on the image and it will automatically be downloaded to your computer.

7/15/22, 3:16 PM

Qualtrics Survey Software



Text:

For the next week, I am committed to reducing my personal climate impact by engaging in the following actions:

`#{q://QID67/ChoiceGroup/SelectedChoicesTextEntry}`

Here is an example of how your post could look like:



P Condition

Let's take action!

7/15/22, 3:16 PM

Qualtrics Survey Software

For the next week, we would like to ask you to commit to one or more of the described behaviors to decrease your personal environmental impact.

Are you ready to make a commitment?

☐ Yes

☐ No. This is why:

Please indicate one or several behaviors to which you want to commit to for the next week in order to reduce your current environmental impact.

To have the greatest impact and limit climate change, please pick behaviors that are new to you.

At the bottom, you can also add your own ideas of behaviors you want to commit to limit your personal impact on climate change.

For the next week, I am committed to:

Reducing car use ★★★

Walk or take the bicycle for short distances rather than using the car

☐

Use public transportation rather than the car

☐

Car pool rather than drive own car

☐

Eating more plant-based foods rather than animal-based food ★★★

Reduce meat consumption

☐

Replace dairy consumption

☐

Reducing food waste ★★

Pick ugly fruit and vegetables in the grocery store

☐

Re-use left overs

☐

Avoid purchasing too much buy only what is needed

☐

Learn how to storage different foods correctly

☐

Conserving energy ★★

Lower thermostat setting

☐

Turn off heating before leaving the house

☐

Avoid using air conditioner

☐

7/15/22, 3:16 PM

Qualtrics Survey Software

Wash laundry at lower temperature	<input type="checkbox"/>
Turn off all electrical devices completely rather than on standby	<input type="checkbox"/>
Conserving water ★	
Take shorter showers	<input type="checkbox"/>
Fill up dishwasher and washing machine completely	<input type="checkbox"/>
Shut off tap water when not in use	<input type="checkbox"/>
Collect rainwater for plants	<input type="checkbox"/>
Minimizing waste ★	
Avoid plastic bags	<input type="checkbox"/>
Avoid unnecessary packaging	<input type="checkbox"/>
Instead of single use products buy reusable items	<input type="checkbox"/>
Buy from bulk bins or farmer markets and bring own containers	<input type="checkbox"/>
Separate waste and dispose at designated locations	<input type="checkbox"/>
Your own idea <input type="text"/>	<input type="checkbox"/>
Your own idea <input type="text"/>	<input type="checkbox"/>
Your own idea <input type="text"/>	<input type="checkbox"/>

Thanks for making a commitment!



Here is an overview of the commitments you have selected. It might be a good idea to write down or screenshot this list so you will not forget.

Commitments:

`#{q://QID129/ChoiceGroup/SelectedChoicesTextEntry}`

C Condition

7/15/22, 3:16 PM

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Thank you for taking the time and read about the most impactful behaviors to reduce our impact on climate change.

Please click on next to continue the questionnaire.

Demographics

You are close to the end!

Please provide some information about yourself so we can check whether participants are representative for the general population.

How old are you?

- ☐ Under 18
- ☐ 18-24 years old
- ☐ 25-34 years old
- ☐ 35-44 years old
- ☐ 45-54 years old
- ☐ 55-64 years old
- ☐ 65+ years old

How do you describe yourself?

- ☐ Male
- ☐ Female
- ☐ Non-binary / third gender
- ☐ Prefer to self-describe
- ☐ Prefer not to say

What is the highest level of education you have completed or are currently in?

- ☐ Primary school
- ☐ Secondary school
- ☐ Vocational or similar

7/15/22, 3:16 PM

Qualtrics Survey Software

- ☐ University Bachelor degree
- ☐ Graduate or professional degree (MA, MS, MBA, PhD, JD, MD, DDS, etc.)
- ☐ Prefer not to say

Final

Thank you for participating in this research!

This study includes a second short questionnaire (10 min.) to examine your experiences with pro-environmental behaviors. We will send you the second questionnaire 1 week from now.

If you complete this questionnaire and the second questionnaire, you support the Discovery Museum in developing their new exhibition. As a thank you for your help, you will receive a **discount code for visiting the Discovery Museum in Kerkrade, Netherlands.**

Disclaimer: Your e-mail address will solely be used to send you the second survey and will be deleted after 3 weeks.

☐ My E-Mail address:

Powered by Qualtrics

Appendix B

7/15/22, 3:17 PM

Qualtrics Survey Software

Introduction

Museum Research on Sustainable Behaviors

Dear Participant,

Welcome back to our study!

Before we start, some important information:

This study is run by Desiree Schmid (d.f.schmid@student.rug.nl), dr. Maddie Judge and prof. dr. Linda Steg from the University of Groningen in collaboration with the Discovery Museum Kerkrade. The research started in April 2022 and will end in June 2022. The research plan was evaluated by the Ethics Committee of Psychology (ECP) of the University of Groningen.

Do you have to participate in this research?

Participation in the research is voluntary. However, your consent is needed. Therefore, please read this information carefully. Ask all the questions you might have, for example, because you do not understand something. Only afterward you decide if you want to participate. If you decide not to participate, you do not need to explain why, and there will be no negative consequences for you. You have this right at all times, including after you have consented to participate in the research.

What are the consequences of participation?

With your participation, you are contributing to research on factors promoting sustainable behaviors. There are no known risks of participation. Participants who complete both questionnaires will get a 20 % discount code for entry to the Discovery Museum in Kerkrade.

How will we treat your data?

You are able to withdraw from this study at any point, without negative consequences. Within 3 weeks of sending out the follow-up surveys, all email addresses will be deleted from the datasets. You will be able to request a summary of the overall

7/15/22, 3:17 PM

Qualtrics Survey Software

findings of the study; however, we cannot provide your individual responses after this point, since we do not collect other identifying information. Anonymized survey data may be stored on the Open Science Framework by the principal researcher after any publications of journal articles if requested. The principal investigator is responsible for processing and correctly storing the data. It will be stored on a password-protected drive for at least five years following any publications.

What else do you need to know?

You may always ask questions about the research: now, during the research, and after the end of the research. You can do so by emailing d.f.schmid@student.rug.nl.

If you have questions/concerns about your rights as a research participant or about the conduct of the research, you may also contact the Ethics Committee of the Faculty of Behavioural and Social Sciences of the University of Groningen: ec-bss@rug.nl. If you have questions or concerns regarding the handling of your personal data, you may also contact the University of Groningen Data Protection Officer: privacy@rug.nl.

INFORMED CONSENT

MUSEUM RESEARCH ON SUSTAINABLE BEHAVIORS.

EC code PSY-2122-S-0350

- I have read the information about the research. I have had enough opportunity to ask questions about it.
- I understand what the research is about, what is being asked of me, which consequences participation can have, how my data will be handled, and what my rights as a participant are.
- I understand that participation in the research is voluntary. I myself choose to participate. I can stop participating at any moment. If I stop, I do not need to explain why. Stopping will have no negative consequences for me.
- Below I indicate what I am consenting to.

You have the right to a copy of this consent form.

Consent to participate in the research:

☐ Yes, I consent to participate; this consent is valid until 27-06-2022

7/15/22, 3:17 PM

Qualtrics Survey Software

- ☐ No, I do not consent to participate

Consent to processing my personal data:

- ☐ Yes, I consent to the processing of my personal data as mentioned in the research information. I know that until 27-06-2022 I can ask to have my data withdrawn and erased. I can also ask for this if I decide to stop participating in the research.
- ☐ No, I do not consent to the processing of my personal data.

E-Mail

So that we can connect both your first and second questionnaire, please add your e-mail address here.

Disclaimer: Your e-mail address will solely be used to connect the two questionnaires and will be deleted after 3 weeks.

- ☐ E-Mail Address:

Commitment

Did you make a commitment to the pro-environmental behaviors which were listed in the first questionnaire?

- ☐ No, I did not commit
- ☐ Yes, I did commit

Shared

Did you share your commitment?

- ☐ Yes, with family / friends / colleagues
- ☐ Yes, on Social Media
- ☐ No, I kept it to myself

7/15/22, 3:17 PM

Qualtrics Survey Software

Interest

How much engagement / interest did people show in your commitment?

None at all	A little	A moderate amount	A lot	A great deal
0	1	2	3	4

Engagement in Behavior

Please indicate to which extent you engaged in the following behaviors **in the past week.**

	Never	Sometimes	About half the time	Most of the time	Always
Walk or take the bicycle for short distances rather than using the car	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use public transportation rather than the car	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Car pool rather than drive own car	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduce meat consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Replace dairy consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pick ugly fruit and vegetables in the grocery store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Re-use left overs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid purchasing too much buy only what is needed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learn how to storage different foods correctly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lower thermostat setting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Turn off heating before leaving the house	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid using air conditioner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wash laundry at lower temperature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Turn off all electrical devices completely rather than on standby	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Take shorter showers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fill up dishwasher and washing machine completely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shut off tap water when not in use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7/15/22, 3:17 PM

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	Never	Sometimes	About half the time	Most of the time	Always
Collect rainwater for plants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid plastic bags	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid unnecessary packaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instead of single use products buy reusable items	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Buy from bulk bins or farmer markets and bring own containers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Separate waste and dispose at designated locations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Perceived ease and enjoyment

To what extent do you agree or disagree with the following statements about the pro-environmental behaviors?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
It costs me little effort to engage in the pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I automatically engage in the pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I easily forget to engage in the pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is feasible for me to engage in the pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am able to engage in the pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7/15/22, 3:17 PM

Qualtrics Survey Software

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I enjoy engaging in the pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Personal Norms

To what extent do you agree or disagree with the following statements about the pro-environmental behaviors?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I feel morally obliged to engage in pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It goes against my principles to not engage in pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel good engaging in pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Social Norms

To what extent do you agree or disagree with the following statements about how other people engage in pro-environmental behaviors?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7/15/22, 3:17 PM

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	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
People who are important to me engage in pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My friends and family engage in pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People in my social circle engage in pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To what extent do you agree or disagree with the following statements about what other people expect from you in regards of pro-environmental behaviors?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
People who are important to me expect me to engage in pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My friends and family expect me to engage in pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People in my social circle expect me to engage in pro-environmental behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Discount Code

Thank you for participating in this research. If you have any further questions please contact Desiree Schmid (d.f.schmid@student.rug.nl).

https://rug.eu.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV_3w8cqVRbdAKJp8q&ContextLibraryID=UR... 7/8

Last but not least, here is your 20 % discount code for Museum tickets!

Code here

You can use the discount code in the online ticket shop and get a maximum of 5 tickets. The code is valid until the end of the year (31.12.2022).

Here is the link to the online ticket shop:

<https://www.discoverymuseum.nl/en/plan-your-visit/tickets/>

Enjoy a unique experience at the Discovery Museum!

