Transition to a Sustainable Society: The Effect of Ease of Retrieval and Perceived Behavioural Control on Environmental Self-Identity and Pro-environmental Behaviour

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Abstract

Due to ever-increasing consumption, CO_2 emissions are increasing rapidly and the climate is changing, thus expanding the need for research on pro-environmental behaviour (PEB). Environmental self-identity (ESI) and self-efficacy (SE) were identified by research as key antecedents of pro-environmental behaviour. Moreover, literature suggests that by altering an individual's perception of their behaviour using the ease of retrieval (EoR) technique environmental self-identity and self-efficacy should be enhanced. This study explored the effects of ease of retrieval on environmental self-identity and self-efficacy, as well as the effects of environmental self-identity and self-efficacy on pro-environmental behaviour. Additionally, this study examined the moderating effect of perceived behavioural control (PBC) on the relationship between the variables.

During an online survey study 82 participants were randomly assigned to the conditions of the 2 (Ease of Retrieval: few versus many) x 2 (Behavioural Control: low versus high) between-participants design of the study. Additionally, manipulation checks and measures of environmental self-identity, self-efficacy, pro-environmental behaviour and belief in climate change were included.

The manipulation checks showed that both manipulations were successful. However, the effect of ease of retrieval on both environmental self-identity and self-efficacy was not significant. Furthermore, belief in climate change was not significantly related to any other variable. The main effect of environmental self-identity on pro-environmental behaviour was significant as well as the effect of self-efficacy on pro-environmental behaviour. No moderating effect of perceived behavioural control on the relationships between ease of retrieval and self-efficacy or environmental self-identity and pro-environmental behaviour was found.

The findings are mostly not in line with previous research. For some variables such as belief in climate change, the lack of findings could be explained by limitations of the study. In this case specifically, issues with the sample. However, some results were expected and contributed to the research in the field, namely that environmental self-identity influences pro-environmental behaviour and that self-efficacy is a potentially important antecedent of pro-environmental behaviour.

Keywords: climate change, ease of retrieval, environmental self-identity, self-efficacy, perceived behavioural control, pro-environmental behaviour.

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The climate is changing. Over the past century, the rate at which the climate is changing has drastically increased. One of the main reasons for climate change to occur in the first place and to increase so rapidly over the last decades is CO_2 emissions and other greenhouse gases (United Nations, n.d.). Climate change presents the global world with numerous challenges, as the number of consequences caused by climate change is large. The European Union lists various consequences that will affect the world if rapid climate change is ever increasing (European Commission, n.d.). These consequences include flooding, which is a prominent reason for concern in the Netherlands (PBL Netherlands Environmental Assessment Agency, n.d.), and also includes wildfires, which are a great concern across the globe (NASA Earth Observatory, n.d.). However, the consequences are not limited to natural ones, social issues are also becoming more pressing due to climate change, such as an increase in mental health problems (Hayes & Poland, 2018; Hayes et al., 2019; Berry et al., 2010) and an increase in health problems in general (Haines et al., 2006; Astone & Vaalavuo, 2023; Ebi & Hess, 2020). With all these consequences looming, a transition into a sustainable future is necessary.

As individuals are a driving factor in climate change research is orienting itself towards the consumer. Climate change is becoming a topic of great research interest, and that is not limited to interest in geography and other domains but is also spreading to the field of psychology. After all, consumer consumption of a variety of goods is one of the main origins of greenhouse emissions. Research has shown that energy consumption, as well as food consumption, are the primary sources of the emissions (Matasci et al., 2021). Consequently, if the aim is to reduce CO_2 emissions, the consumers themselves have to make an effort to reduce their carbon footprint, changing their behaviour in eco-friendly ways (Goodall, 2010). Therefore, research on pro-environmental behaviour and how psychology can help individuals towards behaving more pro-environmentally is a big and growing field nowadays.

Accordingly, in this field of research one of the main concepts that is used to predict pro-environmental behaviour and intention is environmental self-identity (Whitmarsh & O'Neill, 2010). Van der Werff et al. (2013a; 2013b; 2013c) describe that environmental self-identity is mainly based on biospheric values and past behaviour. While past behaviour is impossible to manipulate or change as it already happened, the way one looks at their past behaviour so the perception of past behaviour can change the way one acts in the future (Van der Werff et al., 2013b). One way of influencing the impression of an individual's past behaviour is by using a method called ease of retrieval, in which individuals are asked to either

recall many or few (or alternatively positive or negative) examples of past behaviour (Schwarz et al., 1991). Individuals that are to remember few or positive past behaviours are expected to gain an increase in environmental self-identity, whereas the recall of many or negative behaviours should lead to a decrease in environmental self-identity (Schwarz et al., 1991).

However, the effect of environmental self-identity on pro-environmental behaviour could also be moderated by perceived behavioural control (PBC). Perceived behavioural control, being one of the three main determinants of behaviour in the Theory of Planned Behaviour (Ajzen, 1991), describes the control individuals feel they have over their own behaviour. Once the behaviour is motivated through ESI, PBC facilitates the action, thus PBC acts as a moderator between ESI and PEB (Afridi et al., 2021).

Consequently, the considerations of the literature on ease of retrieval, perceived behavioural control, environmental self-identity and how they influence an individual's intention for pro-environmental behaviour leads to the research question that this thesis aims at answering: What is the influence of ease of retrieval on environmental self-identity and what is the influence of environmental self-identity and perceived behavioural control on pro-environmental behaviour?

Theoretical Framework

Pro-environmental behaviour

Pro-environmental behaviour (PEB) can be defined as any behaviour that is done in favour of the environment, such behaviour can take any form and is not bound to the individual (Van der Werff et al., 2013b; Mikuła et al., 2021; Steg & Gifford, 2008). Examples of PEB on the individual level can include but are not limited to, recycling, taking public transit or the bike (instead of taking one's own car), avoiding littering and turning off the heating. Although there are many forms of PEB this paper will focus specifically on energy-saving (sometimes referred to as energy conservation) behaviour. This is due to energy consumption being one of the leading contributors to CO_2 emissions (Matasci et al., 2021). Specific examples of energy conservation behaviour are using eco programs on a washing machine, turning off electronic devices while they are not needed, and can also be as simple as just turning off the lights after leaving a room. However, the specific energy-saving behaviour explored in this thesis was heating behaviour.

Research on pro-environmental behaviour and more specifically on energy-saving behaviour showed that there are many antecedents of PEB (e.g. beliefs in climate change, Carrus et al., 2021), however, the most direct influence on pro-environmental behaviour is

environmental self-identity (Carrus et al., 2021; Van der Werff et al., 2013b; Carfora et al., 2017).

Environmental self-identity

Environmental self-identity (ESI) is defined as, "the extent to which you see yourself as a type of person who acts environmentally friendly" (Van der Werff et al., 2013b, p.56). Environmentally friendly can be understood as any type of behaviour that is done to positively contribute to the environment. According to the theory, a person is thus more likely to act environmentally friendly if they see their identity pro-environmentally (Van der Werff et al., 2013b). To direct an individual in a more pro-environmental direction, it is essential to change that individual's view of themselves, to be more environmentally oriented (Van der Werff et al., 2013b).

According to Van der Werff et al. (2013b; 2013c) there are two antecedents of ESI, biospheric values and past behaviour. On the one hand, there are biospheric values which can be defined as goals that individuals strive towards, such as being pro-environmental (Wang et al., 2021). However, an individual might not be able to act upon their goals due to external reasons, thus their self-identity might not change. Therefore, even if individuals strive towards and work towards their goals they might not reach the goal and the effect of biospheric values on the environmental self-identity of those individuals would be diminished. Additionally, values are intrinsic to the individual and do not change easily over time (Feather, 1995). Therefore, the remainder of this research will focus on the second antecedent.

On the other hand, there is past behaviour, which can influence ESI (Van der Werff, et al., 2013b). Past behaviour is any behaviour that was done by an individual in the past that leads the individual to think more strongly of themselves in a certain way. Meaning that an individual who acts environmentally friendly regularly has an increased chance to view their own identity as being more environmentally friendly. By changing a person's perception of their past behaviour, it is possible to influence their view of their actual self (Van der Werff et al., 2013b). This change in perception can be achieved by utilizing an availability heuristic technique called ease of retrieval.

Alternatively, to ESI, self-efficacy (SE) could also mediate the relationship between ease of retrieval and pro-environmental behaviour. Studies have shown that besides past behaviour self-efficacy can also influence behavioural intentions in individuals (e.g. Hagger et al., 2001). Additionally, ease of retrieval can also influence self-efficacy, as Chang (2010) has shown the easier the retrieval of information about a topic is the more self-efficacy can be observed in individuals for that topic.

Ease of Retrieval

The concept of ease of retrieval (EoR) originates from the availability heuristic (Tversky & Kahneman, 1973; Schwarz et al., 1991). The availability heuristic postulates that the ease with which information can be remembered determines the perception of the likelihood with which a given event occurs (Tversky & Kahneman, 1973).

Taking a closer look at ease of retrieval, the technique builds on the basic assumption of the availability heuristic, however, the technique adds that the "subjective experience" (Schwarz et al., 1991) while recalling information might additionally influence the individual's perception of themselves. Therefore, if people find it either easy or difficult to recall examples of past behaviour the feeling connected to the recall of examples might influence the individual's self-image (Schwarz et al., 1991).

In Schwarz et al.'s (1991) study about ease of retrieval, they asked participants to either recall six or twelve (which they also called few or many) past examples of assertive or unassertive behaviour. The results of the study showed that individuals were more likely to self-assess as assertive if they had to report six assertive examples compared to twelve, as six examples were experienced as easy and twelve examples were experienced as difficult to recall. Additionally, they were less likely to self-assess as assertive if they had to report six unassertive examples compared to twelve (Schwarz et al., 1991). This and other studies on ease of retrieval (e.g. Aarts & Dijksterhuis, 1999; Dijksterhuis et al.,1999), as well as a meta-analysis on the ease of retrieval effect (Weingarten & Hutchinson, 2018), indicate that ease of retrieval can be used to change an individual's perception of their past behaviour, which as aforementioned should enhance their environmental self-identity. Thus, according to the theory the easier it feels to think of examples of past pro-environmental behaviour the more likely an individual is to view themselves as more environmentally friendly.

Additionally, there are studies which employed different designs, such as recalling positive and negative (instead of few and many) examples (e.g. Raghubir & Menon, 2005). However, the amount of research on alternative ease of retrieval designs is rather limited compared to the amount of research on the few versus many design. Moreover, the majority of studies on the few versus many design, including the aforementioned meta-analysis (Weingarten & Hutchinson, 2018) on the ease of retrieval approach show that the design is well functioning and robust to all kinds of research. Thus, the most promising results can be expected when participants are required to give few or many examples of past behaviour.

Furthermore, it should be noted that the effectiveness of the ease of retrieval manipulation on an individual's self-identity is increased if an individual has no strong beliefs

towards the topic (in this case no strong belief about climate change) (Dijksterhuis et al., 1999). Thus, belief in climate change could be a moderator of the ease of retrieval and environmental self-identity relationship and will be taken along as such.

Perceived Behavioural Control

Perceived behavioural control (PBC) is one of the key determinants in the Theory of Planned Behaviour (Ajzen, 1991). The Theory of Planned Behaviour (TPB) is a construct that is regularly used to describe the formation of behaviour in individuals. Perceived Behavioural Control describes the control an individual feels they have in order to perform behaviour.

Perceived behavioural control will be employed as a moderator in this study for two reasons. Firstly, PBC could moderate the relationship between ESI and PEB. For behaviour to take root there needs to be a motivator, in the case of this study ESI. However, the motivating effect of ESI on PEB could potentially be moderated by a facilitator, PBC, since the control an individual perceives about the behaviour they perform influences how strong the effect of the motivator is. This moderating effect between motivator (ESI) and behaviour (PEB) has been shown by previous research (Afridi et al., 2021), additionally, research has already shown that there is a connection between self-identity and PBC and an interplay between the two influences PEB (Carfora et al., 2017).

Secondly, there could be an alternative explanation of the effect of PBC in the model. This alternative theorized moderation effect could work through self-efficacy (which as aforementioned could be an alternative mediator opposed to ESI). For individuals with high levels of PBC, the effect of ease of retrieval on self-efficacy could also be increased. An example would be an individual that is tasked with remembering one past energy-saving behaviour, if the recalling is experienced as easy by the individual their self-efficacy should increase, however, the amount by which their self-efficacy increases due to the recall could be influenced by the information they have about their control over that behaviour. Nonetheless, the moderating effects of PBC, in this case, are only theorized and will thus only be explored as no clear hypothesis can be created at this point.

However, to achieve clarity in the theoretical model of this study, PBC will be manipulated during research. PBC does not only moderate the relationships between ESI and pro-environmental behaviour it also has an effect on any other form of behaviour that is relevant to the model. One of those being past behaviour, the antecedent of ESI that this study targets with the ease of retrieval manipulation. Thus, PBC will be manipulated to avoid accounting for the possible effects it could have on past behaviour. The manipulation can be

done by using feedback about the energy-saving behaviour of individuals, based on Kidwell & Jewell's (2010) study.

The present study

Based on the beforehand mentioned theoretical overview, the present study aims at examining the model presented in Figure 1, starting with examining the effect of an ease of retrieval manipulation on environmental self-identity and self-efficacy and further on pro-environmental behaviour. Additionally, the moderator behavioural control between environmental self-identity and pro-environmental behaviour is explored. The first five hypotheses are derived from the model and represent the main pathways shown in the model. The sixth hypothesis will be explored outside of the model as the moderation effect of belief in climate change is more isolated from the rest of the model.

H1: Participants in the "few" Ease of Retrieval condition compared to "many" have a higher Environmental Self-Identity.

H2: Participants with a higher Environmental Self-Identity have higher intention for Pro-environmental Behaviour.

H3: The effect of Environmental Self-Identity on Pro-environmental Behaviour is moderated by Perceived Behavioural Control; The positive effect of Environmental Self-Identity on Pro-environmental Behaviour will be stronger when Perceived Behavioural Control is higher.

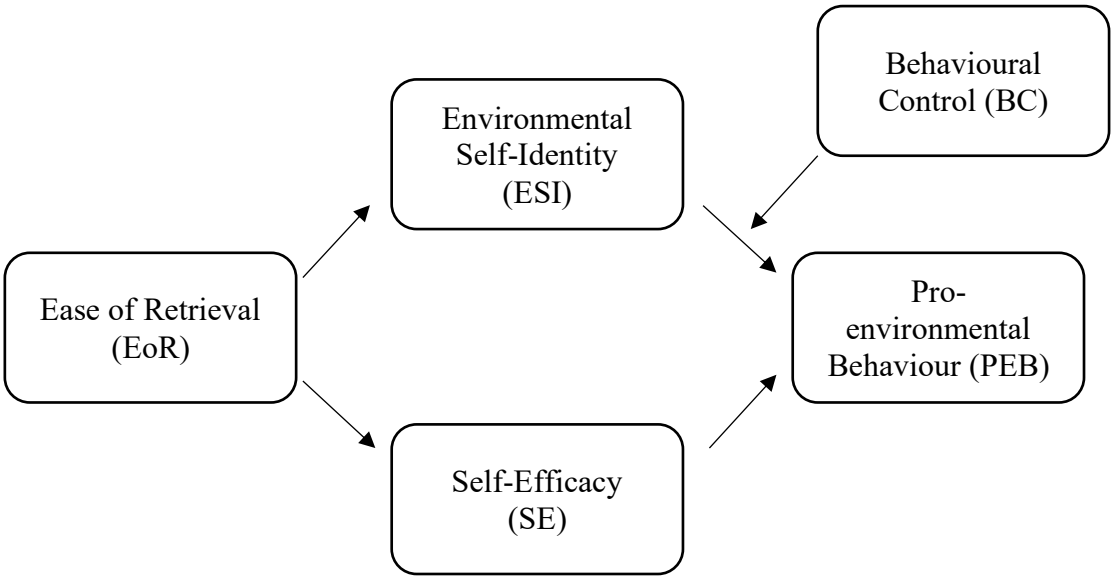
H4: Participants in the "few" Ease of Retrieval condition compared to "many" have a higher Self-Efficacy.

H5: Participants with a higher Self-Efficacy have a higher intention for Pro-environmental Behaviour.

H6: The effect of Ease of Retrieval on Environmental Self-Identity is moderated by Belief in Climate Change; The effect of Ease of Retrieval on Environmental Self-Identity will be stronger for individuals with a low Belief in Climate Change.

Figure 1

Theoretical model of this study.



Methods

Participants and Design

The design of the study was a 2 (Ease of Retrieval: few versus many) x 2 (Behavioural Control: low versus high) between participants design (random allocation) with Environmental Self-Identity and Pro-environmental Behaviour as the dependent variables.

The participants were recruited through voluntary response sampling using the participant database "Sona-Systems" which is used by the University Twente, furthermore, the questionnaire was publicly accessible and spread through other social media platforms to gather as much data as possible. The sample thus included everyone who voluntarily participated and was not targeted at a specific group of people. Participants that took part in the experiment through "Sona-Systems" were awarded 0.25 "Sona credits", which the participants were aware of before signing up for the study.

Initially, 121 participants took part in the study, after filtering out individuals who were unsuccessful in filling out the questionnaire completely (n = 39; full exclusion criteria are presented later), 82 participants were left (32 Female, 49 Male, 1 Other, M_{age} = 25.49, SD = 10.8, range = 16 – 70 years). The participants were randomly allocated to one of the four cells in the 2x2 design. Participant's nationality was mainly German (76%), other nationalities included Dutch (7%), and French (6%), and other nationalities made up the remaining 11%.

Pilot Study

A small pilot study was conducted to test the number of items for the Ease of Retrieval manipulation as well as test the Behavioural Control manipulation. In the pilot study, 5 participants (3 Female, 2 Male, M_{age} = 27 years) were asked to name examples of energy-saving behaviour concerning their heating. Participants were then asked how many examples of behaviour they were able to access easily and after how many examples of behaviour it was near impossible to come up with any more examples. Naming two behaviours seemed easy for most participants whereas naming more than three behaviours was seen as very hard. Thus, to make sure that coming up with the behaviours was easy and hard the main study used one behaviour for the few condition and seven for the many condition. Furthermore, the pilot study was used to test the manipulation of Behavioural Control. Participants were given either positive or negative feedback about their Behavioural Control, afterwards their Perceived Behavioural Control was assessed (through a manipulation check). The results of the manipulation check indicated that providing feedback was a suitable option to manipulate the participants' Perceived Behavioural Control and was thus used in the main study.

Procedure

The study was created using the software Qualtrics and was conducted online. Participants took part in the study on either a computer or a mobile phone through the link that they were provided with. No additional hardware or software was needed. Firstly, after following the link to the Qualtrics website, participants were informed about the study itself and were then asked for their informed consent, which they could either agree or disagree to give (see Appendix A). Secondly, demographic data of the participants was collected (age, nationality, gender). Thirdly, participants answered questions about their Belief in Climate Change (see below).

Following that participants were evenly split into the two Ease of Retrieval conditions. They were presented with either an easy task, of naming one energy-saving behaviour concerning their heating, or a difficult task, asking them to name up to seven of those behaviours. Afterwards, a manipulation check was done on the Ease of Retrieval manipulation (see below).

Next, participants were asked to answer questions about their Environmental Self-Identity (see below).

Proceeding with the experiment, the manipulation of the participants' Behavioural Control was done by first asking participants questions about their heating behaviour and

secondly providing participants with feedback through a made-up score about how likely or unlikely they were to save energy with their heating behaviour. This technique was based on feedback techniques found in different research (e.g. Kidwell & Jewell, 2010) (see Appendix B for the specific questions and information that was provided to the participants alongside the score). Additionally, the time it took participants to go to the next page was measured, however, this measurement was not made visible to the participants.

Subsequently, participants were asked about their behavioural intention for Pro-environmental Behaviour in the future (see below).

Lastly, participants were asked about their Self-Efficacy and Perceived Behavioural Control (see below).

After all the study-related questions were answered a debrief form was presented which explained the manipulations (see Appendix A) and participants were once again asked to give their consent to still have their data collected.

Measures

Belief in Climate Change. The first measure that participants filled out was about their Belief in Climate Change. The questions for this measure were based on the Yale Climate Opinion survey in the US (Marlon et al., 2021). In total three questions regarding the Belief in Climate Change were asked, measured on a seven-point Likert scale (ranging from Strongly disagree - Strongly agree). These questions were 'I believe that climate change is real.', 'I believe that climate change is mostly caused by humans.' and 'I believe that the consequences of climate change are real.'. The scale had an acceptable but not necessarily good reliability at $\alpha = 0.65$, $\lambda 2 = 0.66$. However, as Cronbach's Alpha was acceptable, the items on the scale were averaged out into one variable, Belief in Climate Change.

Ease of Retrieval. A manipulation check on the Ease of Retrieval manipulation was done by asking the participants 'In the following please indicate how difficult it was to come up with this/these behaviour(s)?' (on a seven-point Likert scale ranging from Extremely easy - Extremely difficult).

Environmental Self-Identity. The next measure was about the Environmental Self-Identity. Participants were asked four questions about their Environmental Self-Identity related to their energy-saving behaviour. The questions were based on Van der Werff et al.'s (2013b) Energy-saving self-identity scale and were adapted for the context of heating behaviour. The four questions were 'Adjusting the heating to save energy is an important part of who I am.', 'I am the type of person to adjust the heating to save energy.', 'I see myself as a person that

adjusts the heating to save energy.' and 'I see myself as a person that dresses warmly instead of adjusting the heating to save energy.'. These questions had to be answered on a seven-point Likert scale (ranging from Strongly disagree - Strongly agree). The reliability of the scale was good at $\alpha = 0.89$, $\lambda 2 = 0.9$, therefore, the questions were averaged and combined into one Environmental Self-Identity variable.

Pro-environmental Behaviour. Next, participants were asked about their intention for energy-saving behaviour in the future. The participants had to answer three questions, 'Over the next week I plan on turning down the heating more regularly.', 'Over the next week I plan on only using the heating if necessary.' and 'Over the next week I plan on dressing warmly instead of turning up the heating.'. These questions had to be answered on a seven-point Likert scale (ranging from Strongly disagree - Strongly agree). The questions were combined into one Pro-environmental Behaviour scale, as the reliability was good at $\alpha = 0.84$, $\lambda 2 = 0.84$.

Self-Efficacy Next, participants were asked to answer three questions regarding their Self-Efficacy. The questions were based on the Risk Behaviour Diagnosis Scale (Witte et al., 1996) and adapted for energy-saving behaviours. The three questions were 'I am confident I can reduce my energy consumption by adjusting my heating behaviour.', 'I am able to reduce my energy consumption by adjusting my heating behaviour.' and 'It is easy to reduce my energy consumption by adjusting my heating behaviour.'. The questions were answered on a seven-point Likert scale (ranging from Strongly disagree - Strongly agree). The reliability of the scale was good at $\alpha = 0.9$, $\lambda 2 = 0.9$, thus the questions were averaged into one Self-Efficacy scale.

Perceived Behavioural Control. A manipulation check was done by asking the participants one question 'Lastly, please indicate how much control you think you have over your energy-saving behaviour in relation to your thermostat or heater behaviour.' on a seven-point Likert-scale (ranging from No Control - Complete Control).

Data Analysis

Firstly, the data was prepared for further analysis. The survey results of individuals that did not complete the entire questionnaire were excluded, as well as some survey results in which participants spend less than 10 seconds on the feedback information page that was used to manipulate Behavioural Control. Following that the different measures per variable were averaged out and combined into one scale per variable after checking the reliabilities. The data

was analysed using IBM's SPSS Statistics (Version 28.0). Firstly, Pearson correlations were produced as well as other descriptive statistics such as means and standard deviations.

Following that, univariate tests (t-tests) were used to check whether the manipulations of Ease of Retrieval, as well as Behavioural Control, were successful. If the t-test is significant (p <.05) it can be assumed that the manipulations worked. This is true for both manipulations.

After the manipulation checks, the data was further investigated checking the assumptions of linearity, homoscedasticity, independence and normality. The assumptions of linearity, homoscedasticity and independence have been met. However, the assumption of normality was violated for the main variables, Environmental Self-Identity ($W(82)$ = 0.92; p <.01), Pro-environmental Behaviour ($W(82)$ = 0.91; p <.01), Belief in Climate Change ($W(82)$ = 0.76; p <.01) and Self-Efficacy ($W(82)$ = 0.87; p <.01) (Appendix C). The proposed model was tested using the PROCESS macro in SPSS (Hayes, 2018; Version 4.3) which can handle the violations of normality (Hayes, 2018). Additional analyses that were promoted by either the literature discussed or by the other analyses (e.g. the correlations) were also conducted in SPSS. It should be noted that a confidence interval of 95% (with $\alpha = 0.05$) was used for all analyses.

Results

General Findings

Taking a closer look at the normality assumption checks revealed that the data for all four variables was negatively skewed at scores ranging from -0.76 to -1.38 (Environmental Self-Identity (-0.76), Pro-environmental Behaviour (-0.80), Belief in Climate Change (-1.38) and Self-Efficacy (-1.11)), meaning that the average score for all variables was rather high. Furthermore, there was a clear and strong ceiling effect in the Belief in Climate Change variable, with 41 people (50% of all participants) reaching the highest score. This indicated that most participants had a very strong Belief in Climate Change.

Table 1 shows the correlations, means and standard deviations between the variables, including the main variables (Environmental Self-Identity, Pro-environmental Behaviour, Ease of Retrieval Manipulation Check, Behavioural Control Manipulation Check, Self-Efficacy, Belief in Climate Change) as well as the demographic variables (Age, Gender). Some variables did not significantly correlate with any other variable, namely, Gender and Belief in Climate Change. Pro-environmental Behaviour significantly correlated with both manipulation checks as well as Environmental Self-Identity and Self-Efficacy. Self-Efficacy additionally significantly correlated with the Behavioural Control Manipulation Check and Environmental

Self-Identity. Next to that, Environmental Self-Identity also significantly correlated with both manipulation checks as well as age, suggesting that older individuals were more likely to have a higher Environmental Self-Identity.

Table 1

Correlation Matrix for all Variables

Variables	*M*	*SD*	1	2	3	4	5	6	7	8
1. Age	25.49	10.81	1							
2. Gender	-	-	-.006	1						
3. Behavioural Control Manipulation Check	4.62	1.36	.187	-.020	1					
4. Ease of Retrieval Manipulation Check	4.82	2.06	.032	.083	.170	1				
5. Environmental Self-Identity	4.66	1.49	.273*	-.049	.245*	.311**	1			
6. Self-Efficacy	5.07	1.48	.135	-.029	.543**	.148	.435**	1		
7. Belief in Climate Change	6.58	0.56	-.160	-.075	-.125	-.032	.179	.134	1	
8. Pro-environmental Behaviour	5.12	1.49	.110	-.002	.291**	.336**	.699**	.572**	.198	1

Note. *$p < .05$. **$p < .01$.

Manipulation Checks

Firstly, for the Ease of Retrieval manipulation, a t-test (with the conditions (few versus many) as IV and the manipulation check as DV) showed that there was a significant difference between the two groups, $t(70) = 4.187$, $p < 0.01$. Participants in the "few" group scored significantly higher on the manipulation check, meaning that the task was easier ($M = 5.65$; $SD = 1.60$) than participants in the "many" group, meaning that the task was more difficult ($M = 3.90$; $SD = 2.13$).

Secondly, a t-test for the Behavioural Control manipulation (with the two conditions (low versus high) as IV and the manipulation check as DV) showed that there was a significant difference between the low Behavioural Control and high Behavioural Control group, $t(80) = 3.94$, $p < 0.01$. Participants in the "high" control condition scored significantly higher ($M = 5.14$; $SD = 0.94$) than participants in the "low" control condition ($M = 4.05$; $SD = 1.52$) at the manipulation check.

To conclude, both manipulation checks confirmed that the manipulation of the Ease of Retrieval, as well as the Perceived Behavioural Control variable, have been successful and that the manipulations worked as intended.

Regression Analysis

The proposed model and all pathways within the model were tested using a moderated mediation analysis with Ease of Retrieval (IV), Environmental Self-Identity (Mediator), Self-Efficacy (Mediator), Behavioural Control (Moderator) and Pro-environmental Behaviour (DV). Before the analyses, all the assumptions were checked that are relevant for testing the model. The assumptions of linearity, homoscedasticity and independence have been met for all relevant analyses (Appendix D; Appendix E; Appendix G). As mentioned before, the assumption of normality was violated which was not a concern. The model was tested using Model 15 from PROCESS (Hayes, 2018), as it allowed for the simultaneous testing of the entire model.

Firstly, the analysis portrayed the effect of Ease of Retrieval on Environmental Self-Identity. The results suggest that Ease of Retrieval did not significantly influence Environmental Self-Identity (B = 0.24, $t(80)$ = 0.73, p = 0.47, 95% CI [-0.42, 0.90]). Thus suggesting, that individuals with the easy Ease of Retrieval task did not have higher Environmental Self-Identity than individuals with the difficult Ease of Retrieval task, leading to the rejection of H1.

Secondly, the results indicated that the Ease of Retrieval condition was not able to significantly influence Self-Efficacy in individuals, meaning that individuals did not get higher Self-Efficacy after having done the easier Ease of Retrieval task (B = 0.27, $t(80)$ = 0.82, p = 0.41, 95% CI [-0.38, 0.92]), leading to the rejection of H4. Ease of Retrieval was not found to be a significant predictor of any of the mediators investigated, suggesting that it might not be a suitable option to enhance either Self-Efficacy or Environmental Self-Identity. Following that the entire model was calculated by PROCESS. The results of the calculation are shown in Table 2.

Table 2

Results Moderated Mediation Analysis

	B	*SE*	*t*	*p*	*LLCI*	*ULCI*
Intercept	0.50	0.55	0.90	0.37	-0.61	1.60
EoR	0.22	0.32	0.68	0.50	-0.42	0.86
ESI	0.63	0.12	5.37	<0.01	0.39	0.86
SE	0.31	0.11	2.75	<0.01	0.09	0.54
BC	0.70	0.98	0.71	0.48	-1.26	2.66
Interaction 1	0.25	0.45	0.56	0.57	-0.64	1.14

	B	*SE*	*t*	*p*	*LLCI*	*ULCI*
Interaction 2	-0.15	0.17	-0.92	0.36	-0.48	0.18
Interaction 3	-0.02	0.18	-0.09	0.93	-0.38	0.35

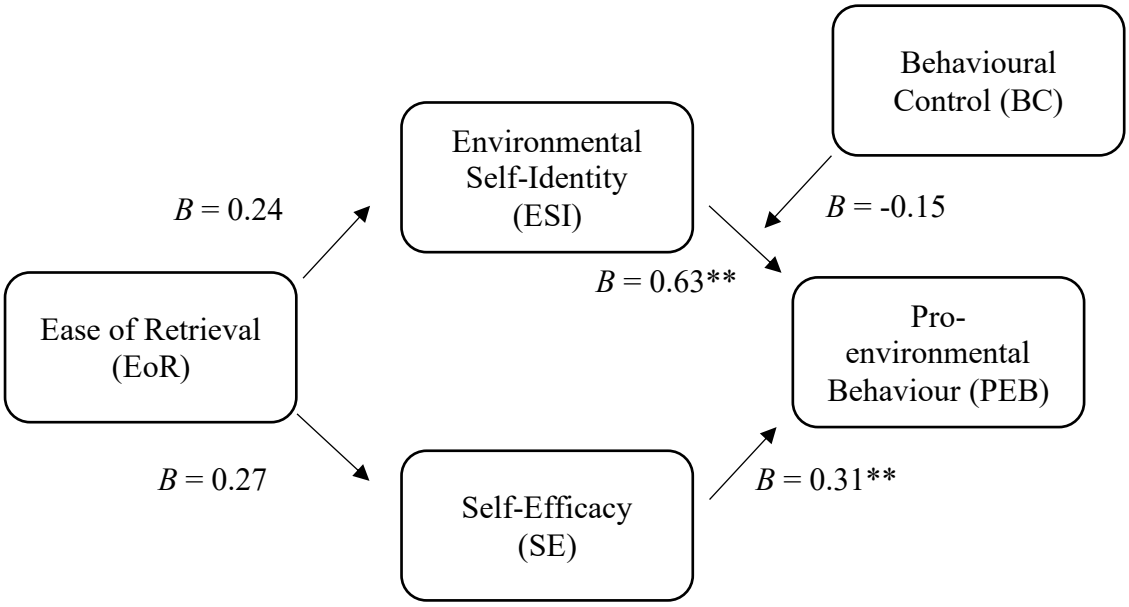
Note. Intercept = Pro-environmental Behaviour; EoR = Ease of Retrieval Manipulation; ESI = Environmental Self-Identity; BC = Behavioural Control Manipulation; Interaction 1 = Ease of Retrieval Manipulation x Behavioural Control Manipulation; Interaction 2 = Environmental Self-Identity x Behavioural Control Manipulation; Interaction 3 = Self-Efficacy x Behavioural Control Manipulation; 95% Confidence Interval used.

The indirect effect of the moderated mediation model was not significant (95% CI [-0.23, 0.22]), thus no moderated mediation was found in the model. Nonetheless, as Table 2 shows, the main effect of Environmental Self-Identity on Pro-environmental Behaviour was significant ($p < .01$), therefore the second hypothesis H2 was accepted. Thus, individuals with higher Environmental Self-Identity showed a higher intention for Pro-environmental Behaviour. Additionally, the second main effect of Self-Efficacy on Pro-environmental Behaviour was also significant ($p < .01$), suggesting that individuals with higher Self-Efficacy have higher intention for Pro-environmental Behaviour (thus H5 was accepted). Importantly, the results additionally suggest that Environmental Self-Identity was the stronger predictor of Pro-environmental Behaviour as the effect of Environmental Self-Identity on Pro-environmental Behaviour was stronger ($B = 0.63$) than the effect of Self-Efficacy on Pro-environmental Behaviour ($B = 0.31$).

However, the moderation effect of Behavioural Control on the relationship between Environmental Self-Identity and Pro-environmental Behaviour, so the interaction effect was not significant, leading to the rejection of H3. Therefore, the results suggest that Behavioural Control did not have an influence on the model. The results of the analysis that relate to the hypotheses are presented in Figure 2.

Figure 2

Full Model with all Pathways



* p<0.05 ** p<0.01

Due to the strong correlation between the Ease of Retrieval manipulation check and Environmental Self-Identity, the above analysis was redone using the Ease of Retrieval manipulation check, so the perceived difficulty of the task as the IV instead of Ease of Retrieval. The results suggest that the manipulation check was able to significantly predict Environmental Self-Identity (B = 0.23, t(80) = 2.93, p < .01, 95% CI [0.07, 0.38]). The analysis did not show any other results that differed in significance from the above analysis.

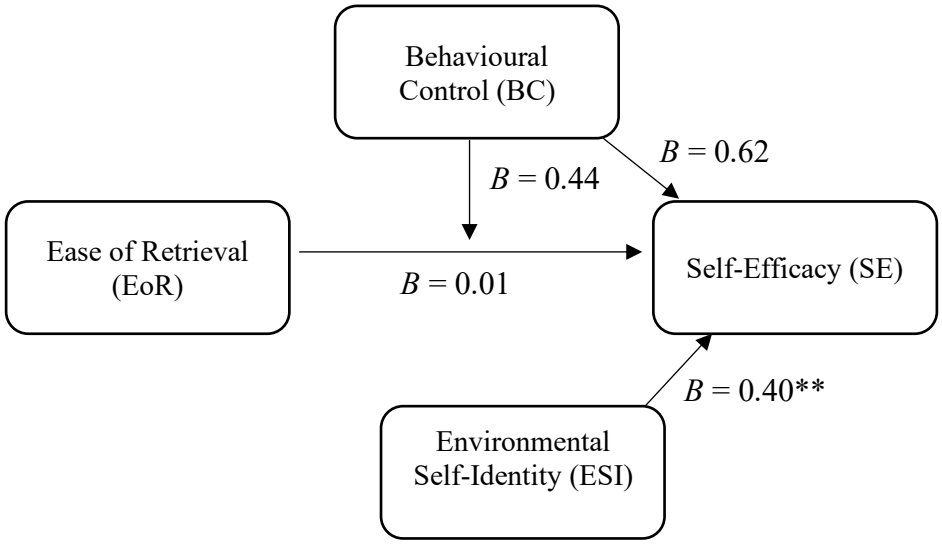
Additional Analyses

Theorized Alternative Moderation of Behavioural Control

An additional analysis was run to test the theorized moderation effect of Behavioural Control on the relationship between Ease of Retrieval and Self-Efficacy. To test the moderation effect, a smaller version of the original model was run. The results of the analysis can be seen in Figure 3.

Figure 3

Results of the Model with Behavioural Control as a Moderator of the Ease of Retrieval and Self-Efficacy Relationship



* p<0.05 ** p<0.01

After making sure that all assumptions were met (Appendix G, besides the normality assumption and the independence assumption for Ease of Retrieval on Self-Efficacy), a moderation analysis was conducted to test the model, with Ease of Retrieval (IV), Behavioural Control (Moderator), Environmental Self-Identity (Covariate) and Self-Efficacy (DV). The results as put forth in Table 3 show that the interaction effect was not significant. Thus, Behavioural Control did not influence the relationship between Ease of Retrieval and Self-Efficacy whilst controlling for Environmental Self-Identity.

Table 3

Results Mediated Moderation Analysis Alternative Model

	B	*SE*	*t*	*p*	*LLCI*	*ULCI*
Intercept	2.76	0.52	5.33	<0.01	1.73	3.79
EoR	0.01	0.42	0.01	0.99	-0.83	0.84
BC	0.62	0.42	1.49	0.14	-0.21	1.45
Interaction	0.44	0.57	0.77	0.44	-0.70	1.58
ESI	0.40	0.10	4.14	<0.01	0.21	0.59

Note. Intercept = Self-Efficacy; EoR = Ease of Retrieval Manipulation; BC = Behavioural Control Manipulation; ESI = Environmental Self-Identity; 95% Confidence Interval used.

Belief in Climate Change

While the correlation matrix reveals no correlations between Belief in Climate Change and any of the other variables, the literature discussed did suggest an effect of Belief in Climate Change. Therefore, in accordance with the literature, Belief in Climate Change was explored as a moderator of the relationship between Ease of Retrieval and Environmental Self-Identity. PROCESS (Model 1, Hayes, 2018), was again used to perform a moderator analysis with Ease of Retrieval (IV), Environmental Self-Identity (DV) and Belief in Climate Change (M). The assumptions of linearity, homoscedasticity and independence have been met (Appendix F), the assumption of normality was still violated however regression analysis was still possible. The results of the analysis indicate that Belief in Climate Change did not significantly moderate the relationship between Ease of Retrieval and Environmental Self-Identity ($B = 0.49$, $t(78) = 0.82$, $p = .41$, 95% CI [-0.70, 1.68]), thus, H6 had to be rejected. Furthermore, Belief in Climate Change as an independent variable alone did also not significantly influence Environmental Self-Identity ($B = 0.20$, $t(78) = 0.44$, $p = .66$, 95% CI [-0.70, 1.10]).

Discussion

Ease of Retrieval

The results were a combination of expected findings and surprising findings that do not align with current research. Firstly, the manipulation of ease of retrieval worked as intended. This research provides further evidence, as the literature suggested (e.g. Aarts & Dijksterhuis, 1999; Dijksterhuis et al.,1999; Weingarten & Hutchinson, 2018), that, even when employing a very specific behaviour, the number of examples that have to be recalled changes the perceived task difficulty experienced by individuals. However, while the manipulation worked as intended, the expected effect of ease of retrieval on environmental self-ident could not be confirmed by this research, as H1 had to be rejected.

One possible explanation for this surprising finding is that the recalled behaviour may have not been in alignment with the environmental self-identity that individuals were asked about. During the study, individuals were asked to recall past heating behaviour, but due to the wording of the task, it might have been understood to be more related to energy-saving behaviour in general. Support for this comes from the finding that some participants gave examples of energy-saving behaviour in general that were not related to heating behaviours. This could form an incongruence for those individuals between how the task was perceived (to be more about energy-saving behaviour in general), and how environmental self-identity and other measures were later perceived (to be specifically about heating behaviour). Further

evidence stems from feedback that was given by a few participants that it was confusing whether the research was about energy-saving behaviour or heating behaviour. Future research should therefore focus on creating a task that is directly linked to the specific type of environmental self-identity that is explored as well as make sure that the wording of the task does not leave room for possible misunderstandings.

Another possible explanation for the lack of confirmation of the initial theory might lie in the difficulty ratings of the task. Individuals in the 'many' condition were supposed to find the task very difficult, indeed they found the task to be more difficult than individuals in the 'few' condition, however, the mean score for the difficult condition was around 'neither easy nor difficult'. Thus, individuals that should have had a hard time with the task at hand did not (on average) perceive the task to be very challenging. This could explain why the effect of ease of retrieval was not as strong as expected, since there was no clear cut between a very difficult and very easy task. This is further supported by the finding that the ease of retrieval manipulation check did significantly influence environmental self-identity. Thus, the expected effect of ease of retrieval on environmental self-identity could be confirmed with the perceived task difficulty. This underlines the importance of future studies to make the difference in task difficulty more accentuated, especially with the aim to make the task very challenging for individuals in the 'many' condition while keeping the task easy for individuals in the 'few' condition.

Furthermore, ease of retrieval was tested as an influencer of self-efficacy. As with environmental self-identity, ease of retrieval did also not influence self-efficacy significantly, thus H4 also had to be rejected. This is not in line with research (e.g. Chang, 2010) and was not an expected result. However, it should be noted that the amount of research on the topic is very limited and to the knowledge of the researcher there is currently only one study that specifically tested this relationship (e.g. Chang, 2010). Furthermore, it should be noted that the context of the study was entirely different (healthcare related) than the context of this study. However, contextual differences cannot explain the lack of results, a more plausible explanation for the lack of expected findings lies in the explanations above. There might still be some incongruence between the task and the self-efficacy questions that might lead to a reduced effect. Additionally, and more importantly, the lack of individuals that found the task to be very difficult again leads to problems in drawing conclusions about the findings of this study. In Chang's (2010) study, the main finding (concerning ease of retrieval and self-efficacy) was after all, that "retrieval difficulty resulted in lower self-efficacy" (Chang, 2010).

Thus, future research should as before mentioned make sure that the task is perceived as very difficult by some individuals.

Environmental Self-Identity and Pro-environmental Behaviour

Environmental self-identity influenced pro-environmental behaviour significantly. The second hypothesis of this study could be confirmed by the finding that a higher environmental self-identity in individuals did lead to higher intention for pro-environmental behaviour. This finding is in accordance with the research that was already done on the topic (e.g. Van der Werff et al., 2013a; 2013b; 2013c) and further suggests that environmental self-identity is one of the key antecedents of pro-environmental behaviour. Additionally, this study supports the theory that enhancing people's environmental self-identity is a suitable way of enhancing their pro-environmental behaviour. Considering those findings and the findings that the perceived task difficulty significantly influenced environmental self-identity literature on spillover effects should be shortly discussed. As positive spillover effects especially after enhancing an individual's self-identity can be expected this connection is of high importance in future research (Truelove et al., 2014; Maki et al., 2019; Truelove et al., 2021). If environmental self-identity could be reliably enhanced by an ease of retrieval manipulation that could open new doors for psychology to utilize spillover effects effectively to increase pro-environmental behaviour in individuals even more drastically. To further test for spillover effects future studies should employ more longitudinal study designs.

Self-Efficacy

This study additionally explored the effects of self-efficacy and was successful in finding an effect of self-efficacy on pro-environmental behaviour, as H5 was confirmed. The results are in line with research on the topic of self-efficacy. As predicted by other research, self-efficacy, in general, influences behavioural intentions in individuals (Hagger et al., 2001). Additionally, research predicted the effects of self-efficacy on pro-environmental behaviour, although it was mostly used as an indirect or moderator variable in other research (e.g. Faraz et al., 2021; Sawitri et al., 2015). This research builds on that and suggests that there is a direct effect of self-efficacy on pro-environmental behaviour, proposing that self-efficacy can be used as a suitable way of enhancing pro-environmental behaviour in individuals in the future. This enables future studies to research the effects of self-efficacy further and provides a reason to study alternative ways of enhancing self-efficacy in individuals with the aim of ultimately enhancing pro-environmental behaviour. However, the effect size of self-efficacy on pro-

environmental behaviour was slightly less strong than that of environmental self-identity. Thus, if the aim is to enhance pro-environmental behaviour, the focus of future research should remain on environmental self-identity, but self-efficacy can be seen as an additional pathway.

(Perceived) Behavioural Control

The manipulation of behavioural control by using feedback was successful. In line with research on the topic (e.g. Kidwell & Jewell, 2010), this study successfully recreated the usage of feedback to manipulate the perception of behavioural control that individuals feel. This provides further support for future research to use feedback to manipulate (perceived) behavioural control of individuals. However, as will be discussed further at a later stage, on average participants in the low control condition did still perceive control over their behaviour.

Nevertheless, this study suggests that behavioural control did not influence any of the other variables, namely environmental self-identity, self-efficacy and pro-environmental behaviour. Additionally, behavioural control did not moderate the relationship between ease of retrieval and self-efficacy, nor did it moderate the relationship between environmental self-identity and pro-environmental behaviour, as H3 had to be rejected.

Firstly, looking at the effects of behavioural control on the relationship between environmental self-identity and pro-environmental behaviour, unexpectedly behavioural control did not moderate the relationship as predicted by previous research (Carfora et al., 2017; Afridi et al., 2021). Additionally, there was no direct effect of behavioural control on pro-environmental behaviour which previous research suggested (e.g. Abrahamse & Steg, 2011; Sheau-Ting et al., 2016; Mansor & Sheau-Ting, 2019). The lack of findings suggests that there were further underlying issues with the behavioural control variable.

One possible explanation could be that the difference between the manipulation conditions was not strong enough. There were on average no individuals that perceived that they had no control over their behaviour. Thus, while the manipulation worked to some extent, it failed in making participants feel as if they have no control over their behaviour. While this may not directly be a flaw of the manipulation that was used, it certainly could have had an impact on the results, hiding some of the effects that were expected as the difference between the two conditions was not strong enough. Future research should pay special attention to the manipulation and the effects of the manipulation to make sure that individuals in a low control condition perceive their behavioural control as minimal.

Secondly, the moderation effect of behavioural control on the relationship between ease of retrieval and self-efficacy was not found. The lack of findings could again be due to a weak

difference between the low and high control conditions, thus no conclusions can be drawn. Nonetheless, to the knowledge of the author, this study was the first to test the moderation effect that was theorized, thus suggesting for future research that perceived behavioural control is not of great interest when investigating the effects of ease of retrieval on self-efficacy further.

Belief in Climate Change

The effects of belief in climate change on the other variables could not be confirmed in this study. Based on Dijksterhuis et al. (1999) an effect of belief in climate change on the relationship between ease of retrieval and environmental self-identity was expected, however, no such effect was found, as H6 was rejected. Additionally, it was expected that belief in climate change would correlate with other variables of the study as all variables in the study were related to climate change, however, belief in climate change did not significantly correlate with any of the other variables.

Nonetheless, future research should be careful with the interpretations of these results. Based on the results it may be easy to assume that belief in climate change is not of relevance when researching areas such as environmental self-identity or pro-environmental behaviour. Yet, there might be underlying shortcomings of this study that explain the lack of findings in regard to belief in climate change. The sample of the study might have the largest impact on the results, as the participants almost unanimously believed in climate change (as well as its origin and consequences), creating a ceiling effect for the variable. This makes drawing conclusions about the nature of the belief in climate change variable nearly impossible. Therefore, future research should still be invested in researching the effects of belief in climate change on the other variables further. But future research at the same time should make sure to get a more representative sample that also includes individuals that do not believe in climate change.

Strengths and Limitations

The current study did have some shortcomings and limitations as well as strengths that should be highlighted to enrich future endeavours. Firstly, starting with a clear limitation of the study, the sample should be addressed. The sample of the study was flawed in two main ways, on the one hand, the sample was too homogenous, and on the other hand, the sample size was on the lower end. The sample consists mainly of Germans making it harder to draw conclusions for a more general public even in the European Union and especially for other parts of the world. While homogeneity in a sample is often a problem in modern research, it seems that it

is especially a problem for this study, as many of the results are dependent on a division between low and high-scoring individuals. However, since the sample is so homogenous, most individuals are on the higher end of the scale for all variables, making it harder to draw conclusions based on the data collected. An explanation for that might be the young average age of participants as well as the overall very strong belief in climate change of the individuals, explaining the high scores in perception of control of energy-saving behaviours, the overall strong intention for energy-saving behaviours as well as the strong self-efficacy and environmental self-identity in the sample. Future research could address these issues by using a more proactive sampling style, drawing in older and more climate-inactive individuals.

Additionally, these limitations in the sample are important as the pro-environmental behaviour that was explored is also a big cost factor for many consumers, thus, it may be that the high intention for such behaviour (to reduce heating) could be related to the wish to save money and not just to save the environment. This is particularly interesting in this study as the participants in the sample were mainly German and during the duration of the study heating prices in Germany were still high due to geopolitical issues in the region (e.g. the Ukrainian war, Cooban, 2023; Amelang et al., 2023). This might have provided more incentive, especially in the explored sample to reduce heating not only in favour of the environment but also to save money.

The sample size is another concern, making it harder to draw conclusions from the sample. The study should have more than 200 and certainly not less than 100 participants, for correct interpretation of the results (Brysbaert, 2019), yet even with limited participants the results do reflect reality, the possibility for errors is just higher (Brysbaert, 2019). Using a larger (and as mentioned less homogenous) sample, would solve the issues arising in this research for future studies.

Furthermore, pro-environmental behaviour is often researched in more specific ways, such as heating behaviour but using such a specific behaviour might lead to other shortcomings of the study. As aforementioned, participants of the study had some trouble understanding that the specific behaviour they were asked about was heating behaviour. The questions in the survey could have thus been worded more directly related to heating behaviour and could have been presented less ambiguously. However, simultaneously it is one of the strengths of the study, as long as future studies use precise wording, this study shows that heating behaviour can be a suitable alternative when investigating energy-saving behaviour in general.

Conclusion

To conclude, this study enhances the understanding of environmental psychology and more specifically, the antecedents of pro-environmental behaviour. The study shows that, as the literature suggested, individuals who score higher on environmental self-identity than others show higher intentions for pro-environmental behaviour. Additionally, as one of the first studies on the relation between self-efficacy and pro-environmental behaviour, the study suggests that self-efficacy is an antecedent of pro-environmental behaviour.

Furthermore, contrary to contemporary research the study suggests that perceived behavioural control does not have a direct or moderating effect on self-efficacy, environmental self-identity and pro-environmental behaviour. However, lending future researchers additional tools, the study supports previous findings that feedback can successfully be used to manipulate the perceived behavioural control of individuals.

Likewise, following other research papers, this study indicates that the difficulty of the task perceived by individuals can be manipulated by prompting individuals to recall either few or many examples of past behaviour. Nonetheless, as the study was not without its shortcomings, the study demonstrates the effects of an ease of retrieval manipulation can be limited if the manipulation is not strong enough, as the expected effect of ease of retrieval on environmental self-identity could not be confirmed by this research.

As the climate is changing continuously, still more research is needed to find ways of enhancing pro-environmental behaviour in the future. Environmental self-identity and self-efficacy were both shown to be suitable pathways through which change can happen. Future research should build on these findings to reinforce the opportunities humanity has to improve the climate through individual action.

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Appendix A

Figure 1

Informed Consent on the First Page

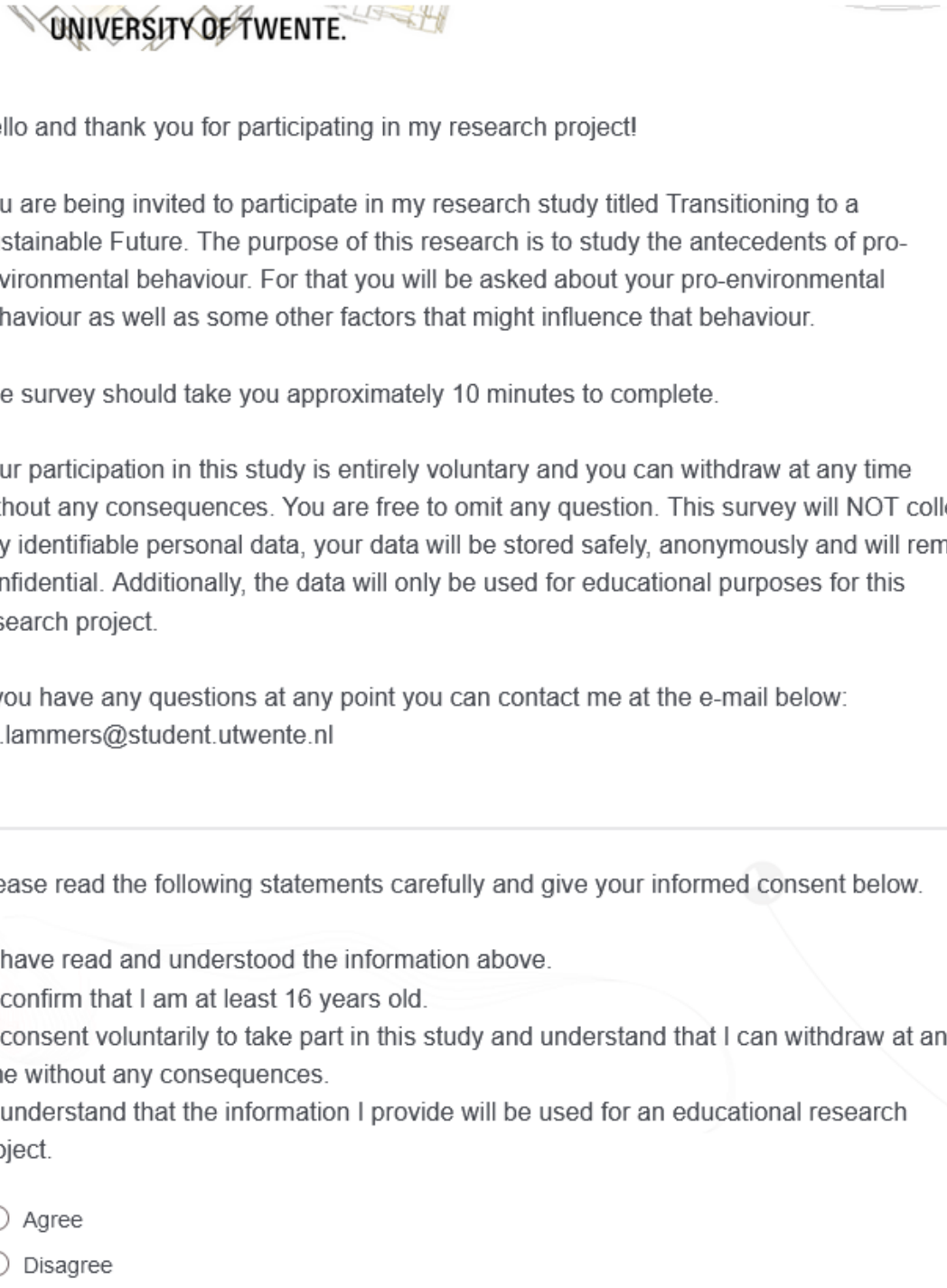
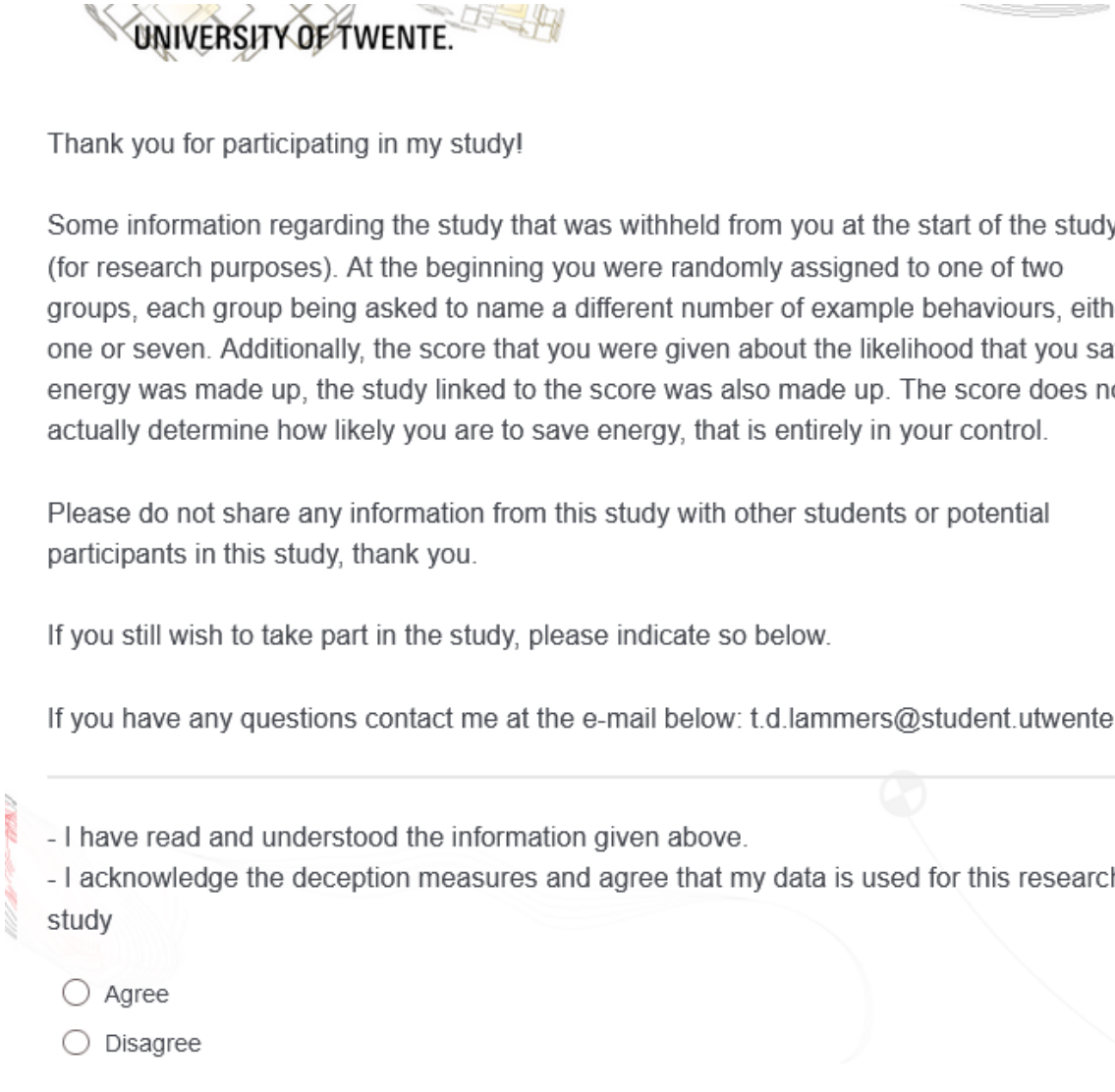


Figure 2

Debrief Form and Second Informed Consent on the Last Page


UNIVERSITY OF TWENTE.

Thank you for participating in my study!

Some information regarding the study that was withheld from you at the start of the study (for research purposes). At the beginning you were randomly assigned to one of two groups, each group being asked to name a different number of example behaviours, either one or seven. Additionally, the score that you were given about the likelihood that you save energy was made up, the study linked to the score was also made up. The score does not actually determine how likely you are to save energy, that is entirely in your control.

Please do not share any information from this study with other students or potential participants in this study, thank you.

If you still wish to take part in the study, please indicate so below.

If you have any questions contact me at the e-mail below: t.d.lammers@student.utwente.nl

- I have read and understood the information given above.
- I acknowledge the deception measures and agree that my data is used for this research study

○ Agree
○ Disagree

Appendix B

Figure 1

Information about the feedback

In the following some information regarding the questions you just answered will be given. It is important that you read the explanations carefully.

Research on room temperature and energy saving behaviour, by Krueger et al. (2021), has given us the ability to calculate a score based on the answers to the questions on the last page. This score is dependent on the preferred temperature you provided as well as your handling of the thermostat or heater. Based on your answers on the last page, you are now given your very own score. This score will tell you something about how likely you are to conserve energy with your temperature behaviour in mind. A score of 0-50 means that you are extremely unlikely to conserve energy, a score of 50-70 means you are rather unlikely to conserve any energy. A score of 70-90 would imply that you are somewhat likely to conserve energy and lastly a score above 90 would imply that you are very likely going to conserve energy.

Figure 2

Low score feedback

Your score is 56, that means with your handling of temperature in your room and the way you engage with the thermostat or heater makes it rather unlikely that you are going to save energy in the process.

Figure 3

High score feedback

Your score is 93, that means with your handling of temperature in your room and the way you engage with the thermostat or heater makes it very likely that you are going to save energy in the process.

Appendix C

Figure 1

Tests of Normality for the Variables (SPSS Output)

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
BiCC	,286	82	<,001	,758	82	<,001
ESI	,165	82	<,001	,917	82	<,001
PEB	,185	82	<,001	,908	82	<,001
SE	,216	82	<,001	,871	82	<,001

a. Lilliefors Significance Correction

Note. BiCC = Belief in Climate Change; ESI = Environmental Self-Identity; PEB = Pro-environmental Behaviour; SE = Self-Efficacy.

Appendix D

Figure 1

Assumption of Independence EoR on ESI (SPSS Output)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,081[a]	,007	-,006	1,49360	1,998

a. Predictors: (Constant), EoRMan

b. Dependent Variable: ESI

Figure 2

Assumption of Homoscedasticity EoR on ESI (SPSS Output)

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
ESI	Based on Mean	,069	1	80	,793
	Based on Median	,066	1	80	,799
	Based on Median and with adjusted df	,066	1	78,589	,799
	Based on trimmed mean	,102	1	80	,751

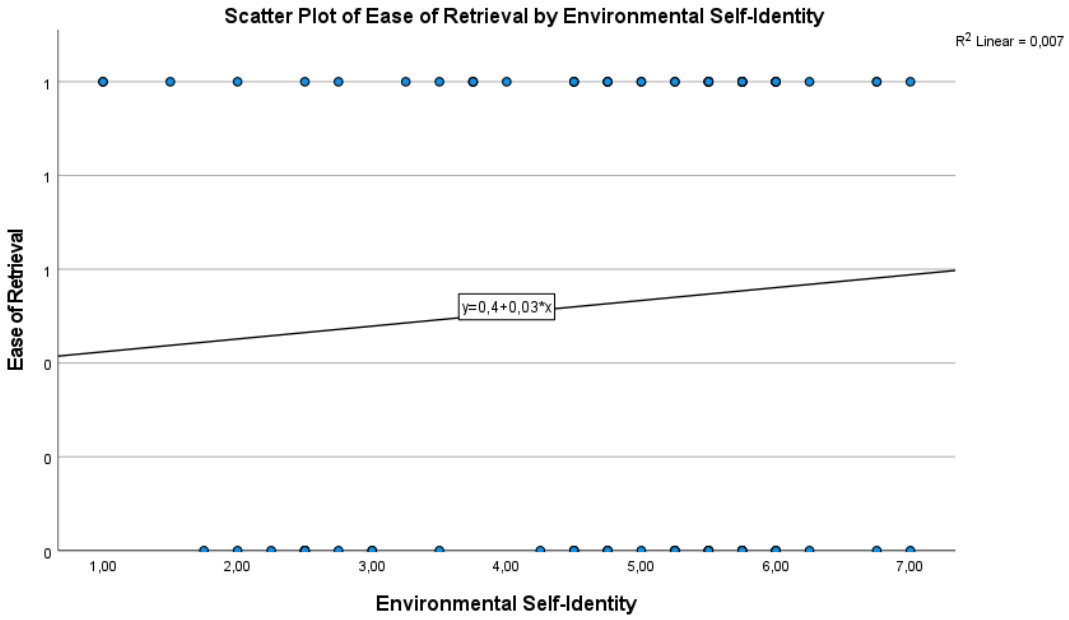
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: ESI

b. Design: Intercept + EoRMan

Figure 3

Assumption of Linearity EoR on ESI (SPSS Output)



Appendix E

Figure 1

Assumption of Independence ESI on PEB (SPSS Output)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,699[a]	,489	,483	1,07399	1,519

a. Predictors: (Constant), ESI

b. Dependent Variable: PEB

Figure 2

Assumption of Homoscedasticity ESI on PEB (SPSS Output)

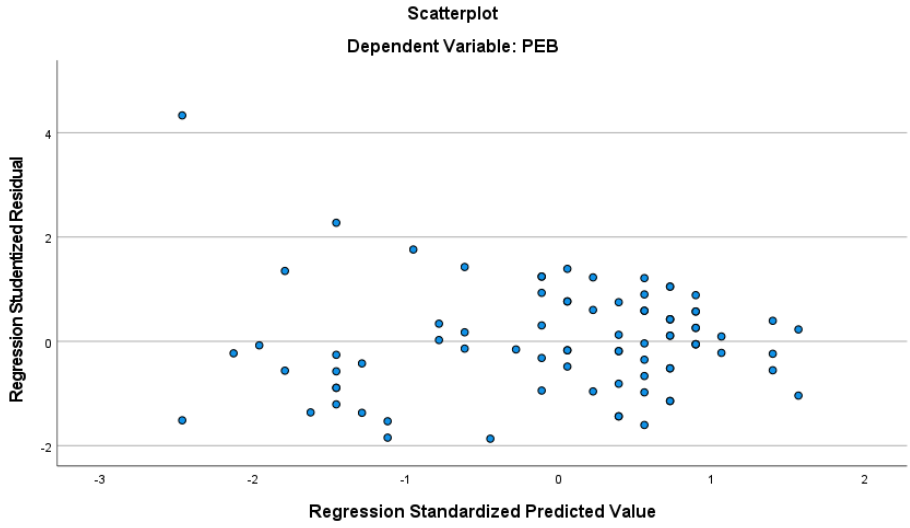
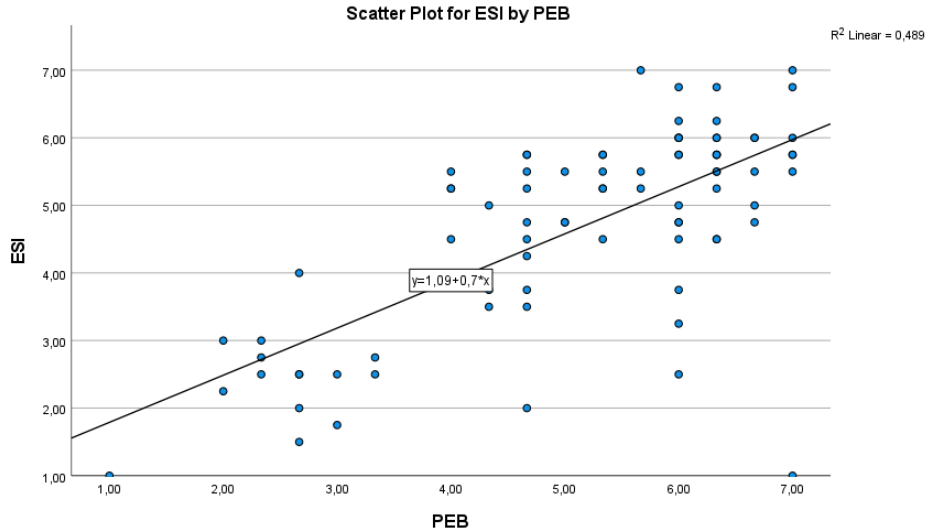


Figure 3

Assumption of Linearity ESI on PEB (SPSS Output)



Appendix F

Figure 1

Assumption of Independence BiCC on ESI (SPSS Output)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,179[a]	,032	,020	1,47446	1,977

a. Predictors: (Constant), BiCC

b. Dependent Variable: ESI

Figure 2

Assumption of Homoscedasticity BiCC on ESI (SPSS Output)

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
ESI	Based on Mean	,680	5	76	,640
	Based on Median	,353	5	76	,879
	Based on Median and with adjusted df	,353	5	71,904	,879
	Based on trimmed mean	,635	5	76	,673

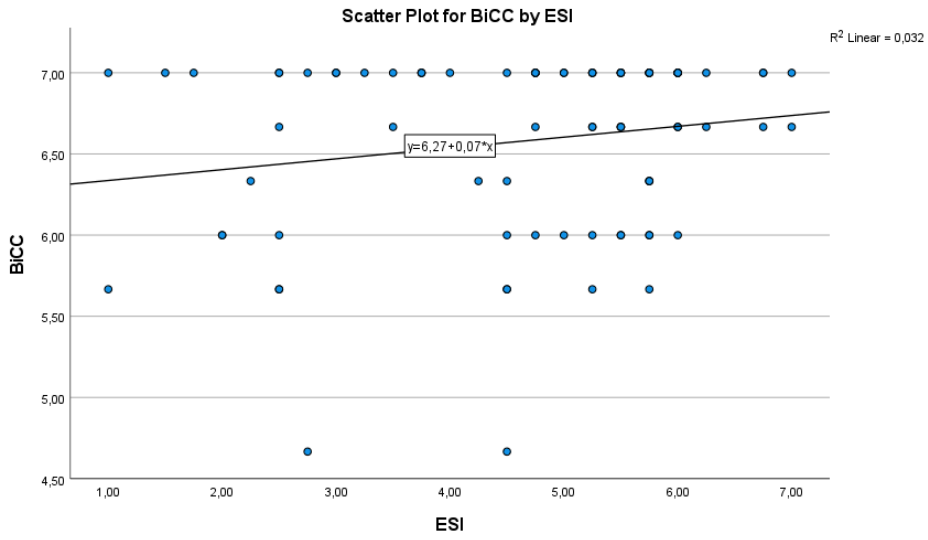
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: ESI

b. Design: Intercept + BiCC

Figure 3

Assumption of Linearity BiCC on ESI (SPSS Output)



Appendix G

Figure 1

Assumption of Independence EoR on SE (SPSS Output)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,092[a]	,008	-,004	1,48166	,927

a. Predictors: (Constant), EoRMan

b. Dependent Variable: SE

Figure 2

Assumption of Homoscedasticity EoR on SE (SPSS Output)

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
SE	Based on Mean	2,716	1	80	,103
	Based on Median	1,399	1	80	,240
	Based on Median and with adjusted df	1,399	1	79,642	,240
	Based on trimmed mean	2,549	1	80	,114

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: SE

b. Design: Intercept + EoRMan

Figure 3

Assumption of Linearity EoR on SE (SPSS Output)

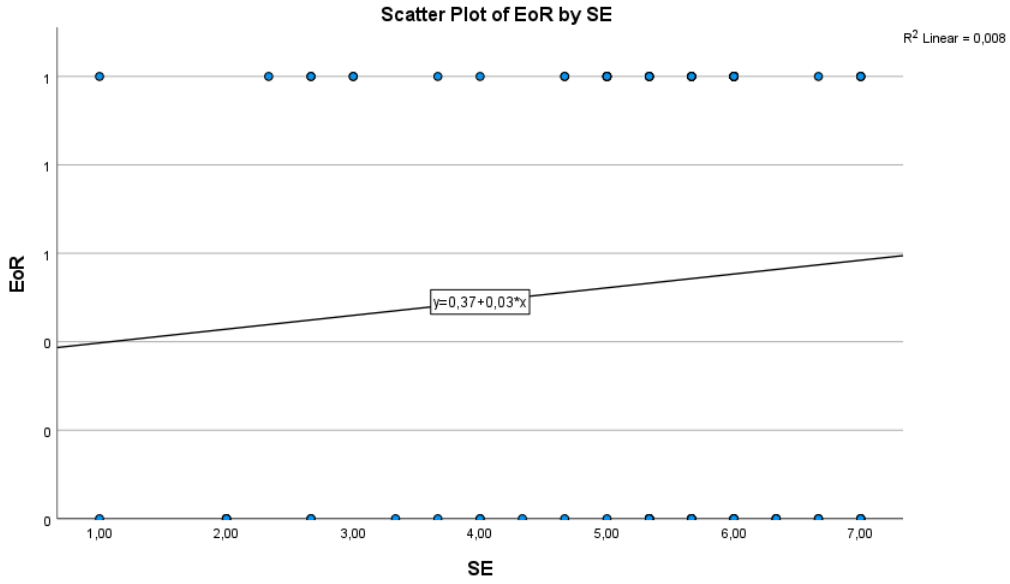


Figure 4

Assumption of Independence SE on PEB (SPSS Output)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,572[a]	,328	,319	1,23176	1,993

a. Predictors: (Constant), SE

b. Dependent Variable: PEB

Figure 5

Assumption of Homoscedasticity SE on PEB (SPSS Output)

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
PEB	Based on Mean	2,974	13	65	,002
	Based on Median	1,293	13	65	,240
	Based on Median and with adjusted df	1,293	13	37,155	,260
	Based on trimmed mean	2,766	13	65	,003

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: PEB

b. Design: Intercept + SE

Figure 6

Assumption of Linearity SE on PEB (SPSS Output)