



Sustainability exposed:

The Role of Ease of Retrieval in Pro-Environmental Behaviour

Psychology of Conflict, Risk and Safety

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Abstract

Considering the contemporary environmental crises, reducing the negative impact of human activity on the environment is crucial. (Past) Pro-environmental behaviour (PEB) serves as an effective approach for promoting and determining future sustainability, hinging on factors like environmental self-identity (ESI), biospheric values, and personal norms. This study explores the influence of the Ease of Retrieval (EoR) manipulation, a subconscious method altering perceptions of past behaviour, on PEB. Hypotheses postulated (1) a relationship between EoR and PEB, moderated by environmental self-identity, (2) a moderation effect of diagnosticity, and (3) a mediation of personal norms in the link between ESI and pro-environmental behaviour. Energy-saving self-identity and energy-saving behaviour were employed alongside global ESI and global PEB to increase the level of specificity. The convenience sample (n = 71) was randomly distributed to four groups resulting from the 2 (EoR: easy vs difficult) x 2 (Diagnosticity: low vs high) between-participants design with the independent variables perceived EoR, ESI, energy-saving self-identity, personal norms, pro-environmental behaviour intention and energy-saving behaviour intention and biospheric values as a covariate. The researcher conducted a MANCOVA, moderated mediation analyses, mediation analyses and Sobel tests. Despite non-significant outcomes regarding H1 and H2, support was found for the mediation effect of personal norms. High environmental/energy-saving self-identities are connected to high personal norms which predict high pro-environmental/energy-saving behaviour intentions. Biospheric values emerged as a significant covariate. The study's outcomes emphasise the need for future research to address limitations, revise the retrieval task, and integrate environmental psychology with climate inequality research for comprehensive insights.

Keywords: Pro-Environmental Behaviour Intention, Ease of Retrieval, Diagnosticity, Environmental Self-Identity, Personal Norms, Biospheric Values

Sustainability exposed:

The Role of Ease of Retrieval in Pro-Environmental Behaviour

The impact of human behaviour on Earth has become so immense that a distinct geographical epoch has been devoted to it. The Anthropocene is defined by the unprecedented alteration of our planet's ecosystems through the activity of our species (Myers, 2016). Climate change (York et al., 2003; Mishra & Mishra, 2018; Summerhayes & Zalasiewicz, 2018; Cendrero et al., 2020) and the sixth mass extinction (Pievani, 2013; Kolbert, 2014; Ceballos et al., 2020; Wagner et al., 2021) are both effects of the Anthropocene's human-induced changes of our planet's ecosystems.

There is overwhelming consensus in the scientific community that climate change currently is the largest threat to planetary health and human well-being (Oreskes, 2004; Shivanna, 2020; OHCHR, 2022). Due to climate change, around the globe, environmental disasters, and weather extremes such as floods and severe heatwaves get more frequent, famines become more likely, and predictions indicate that 200 million climate refugees until 2040 are probable (Jakobeit & Methmann, 2007; IPCC, 2023). In addition, humans are also causing the sixth mass extinction through various activities such as pollution and overexploitation of resources, which is seriously compromising biodiversity and thus ecosystems essential for human welfare (Pievani, 2013; Ceballos & Ehrlich, 2018).

Considering the short time frame that remains in which a liveable future for all can be ensured, every effort to reduce the impact of human activity on our environment is crucial. Among other measures, changing human behaviour is a necessity for saving our environment and reducing the consequences of climate change and the sixth mass extinction (Tian & Liu, 2022; IPCC, 2023). For this purpose, pro-environmental behaviour (PEB) is effective in addressing environmental problems and protecting environmental sustainability since it is a way to stimulate sustainability and reduce the negative impact contemporary human activity implies (Tian & Liu, 2022).

Previous research suggests that differences in future pro-environmental behaviour in individuals are linked to differing degrees of environmental self-identity (Van Der Werff et al., 2013; Balundė & Perlaviciute, 2019), biospheric values (Balundė & Perlaviciute, 2019; Ates, 2020), sustainable behaviour in the past (Cornelissen et al., 2008; Fanghella et al., 2019; van den Hazel, 2023) and personal norms (van der Werff & Steg, 2016, Ates, 2020). So far, the well-established literature on promoting pro-environmental behaviour via overt means found that influencing pro-environmental behaviour in this manner encounters various challenges, for instance, people denying any urgency to change behaviour, dismissing responsibility for the status quo, or the debilitating effect of habits for behaviour change (Gifford, 2011; White et al., 2019; van den Hazel, 2023). Given that, studying whether subconscious methods might be effective for facilitating pro-environmental behaviour bridges a promising gap in research. For this, the ease of retrieval manipulation has been identified to provide a convenient approach (Schwarz et al., 1991; Haddock et al., 1999; Tybout et al., 2005). Including the manipulation of the diagnosticity of the retrieval experience via a misattribution manipulation (Schwarz et al., 1991; Haddock et al., 1999) possibly further increases the relevance of the retrieval ease manipulation for the promotion of green behaviour since future interventions must acknowledge this effect to be successful. Thus, as this study seeks to contribute to the limited body of research on promoting pro-environmental behaviour through the manipulation of ease of retrieval and diagnosticity, the research question consequentially emerges as:

How does the interaction between ease of retrieval and diagnosticity influence individual environmental self-identity and subsequently pro-environmental behaviour?

Theoretical Framework

Pro-Environmental Behaviour

Pro-environmental behaviour, often instead referred to as sustainable-, eco-friendly, green-, or environmentally friendly behaviour includes all actions aimed at avoiding or minimising any kind of negative impact on the environment and protecting up to improving environmental sustainability (Steg and Vlek, 2009; Krajhanzl, 2010; Ates, 2020; Tian & Liu, 2022). This can range from targeting one's own behaviour up to promoting societal sustainability (Tian & Liu, 2022).

To provide a classification, Stern (2000) differentiated between three main categories. Private-sphere environmentalism consists of green consumerism, employing environmental household waste disposal, purchasing environmentally significant major household goods and services and the maintenance of these. Next, nonactivist behaviours in the public sphere encompass acceptance and support of pro-environmental public policies as well as proactive kinds of green citizenship. Lastly, environmental activism covers active involvement in environmental organisations and demonstrations (Stern, 2000). Consequentially, concrete examples such as decreasing waste of natural resources, reducing emissions and environmental damage (Tian & Liu, 2022) can unfold in changing behaviour in the private sphere, supporting corresponding policies, and engaging in activism, simultaneously but independently from one another.

Furthermore, pro-environmental behaviours frequently involve personal costs such as being more time-consuming, inconvenient, expensive, effortful, and uncomfortable (Steg et al, 2014), while benefits only become tangible on the societal level (Harland et al., 1999; Balundė & Perlaviciute, 2019). As a result, sustainable behaviour is often not the most plausible option.

Environmental Self-Identity

Alternatively, to promote pro-environmental behaviour, environmental self-identity (ESI) is advantageous as it is a central antecedent of pro-environmental behaviour across cultures (Van Der Werff et al., 2013a; Balundė & Perlaviciute, 2019; Ates, 2020).

Environmental self-identity is one aspect of an individual's overall identity as identities are made up of several specific identities (Simons, 2021). Experiencing a high environmental self-identity has been conceptualised as seeing oneself as an eco-friendly person who acts pro-environmentally (Van Der Werff et al., 2013a; van den Hazel, 2023).

As identity and behaviour reciprocally influence each other (Simons, 2021; van den Hazel, 2023), former pro-environmental behaviour increases environmental self-identity and in turn environmental self-identity raises future pro-environmental behaviour (Lacasse, 2016; Van der Werff et al., 2013a; van den Hazel, 2023). Pro-environmental behaviours such as recycling, intended reduction of meat consumption, fuel-efficient driving, sustainable transportation usage, environmental activism, and preferring eco-friendly products have been linked to strong environmental self-identity (Balundė & Perlaviciute, 2019).

Biospheric Values

Preceding, biospheric values is a central antecedent to environmental self-identity (Van Der Werff et al., 2013a; Ates, 2020) and strongly, positively related to pro-environmental behaviour across cultures (Balundė & Perlaviciute, 2019). In general, values are abstract, transsituational goals which are stable over time and serve as guiding principles for life (Schwartz, 1992 and Feather, 1995 as cited in Van Der Werff et al., 2013a). Strong biospheric values intrinsically motivate to care about nature and environment protection, even despite of personal costs (Balundė & Perlaviciute, 2019; Ateş, 2020). Similar to environmental self-identity, biospheric values have been related to pro-environmental preferences, intentions, and behaviours such as recycling, taking shorter showers, less meat consumption, energy-efficient

driving, reduced car usage, environmental activism, and adaptation of renewable energy systems at home (Van Der Werff et al., 2013a; Balundé & Perlaviciute, 2019).

However, especially pertaining to the resemblances between biospheric values and environmental self-identity, these concepts have been distinguished conceptually and empirically. Conceptually speaking, (biospheric) values are abstract principles while (environmental) self-identity reflects how one perceives oneself (Van Der Werff et al., 2013a). Empirically speaking, there is correlational and experimental evidence that environmental self-identity mediates the relationship between biospheric values and pro-environmental behaviour (Van Der Werff et al., 2013a; Balundé & Perlaviciute, 2019). This means that biospheric values must be linked to the self-identity to impact actual behaviour.

Past Behaviour

Another relevant distinction between the two antecedents of pro-environmental behaviour is the respective susceptibility to alteration and manipulation (Van Der Werff et al., 2013a). As shown above, self-identity is influenced by past behaviour, while values are more stable over time (Feather, 1995). Along with this, researchers established that reminding people of their past sustainable behaviour increases their perceived environmental self-identity which in turn reinforces future pro-environmental behaviour (Cornelissen et al., 2008; Fanghella et al., 2019; van den Hazel, 2023).

Ease of Retrieval

Unfortunately, past pro-environmental behaviour cannot be enhanced ex-post. Alternatively, research suggests that the hindsight perception of pro-environmental behaviour and thus environmental self-identity could be altered by utilising the subconscious ease of retrieval manipulation (van den Hazel, 2023).

Ease of retrieval (EoR) was first studied by Schwarz et al. (1991). They observed that self-evaluations can depend on the perceived difficulty of retrieving a requested number of items. Comprehensively, recalling few items is considered to be rather easy and thus leads to heightened self-evaluations, while recalling many items is considered more difficult and hence induces weakened self-evaluations (Schwarz et al., 1991).

In this regard, the insight that the individual's subjective experiences during the recall process affect the outcome is fundamental. Remarkably, individuals (under certain conditions) even base their self-evaluation solely on the ease of retrieval. When individuals are asked to recall a small number of items (easy), content-based assessments would acknowledge that few items are not as expressive as many items meaning that self-assessments would turn out low (e.g., Bern, 1972; Wyer & Srull, 1989 as cited in Schwarz et al., 1991). Accordingly, many recalled items (difficult) would result in higher self-assessments (of environmental self-identity) with the ease of retrieval theory, individuals who based their self-evaluation on the subjective experience during the recall process assessed themselves significantly higher in self-related judgments after recalling few instead of many items (Schwarz et al., 1991; Haddock et al., 1999; Tybout et al., 2005). Simplified, retrieval tasks can (under certain conditions) defer the foundation of self-evaluations from the recalled content to the experience during recalling instead.

In addition to this, Haddock et al. (1999) utilised the ease of retrieval manipulation in the context of attitude research. They found that the ease of retrieval manipulation only influences subjective judgments of attitude certainty, intensity, and importance in individuals with moderate attitude strength, and extremity. On the other hand, attitudes of high strength are in general more resistant to change, stable over time, more likely to affect reasoning and information processing and more likely to determine behaviour (Haddock et al., 1999). Attitude extremity has been linked to the degree of involvement a certain topic evokes resulting in extreme attitudes being connected to high involvement. High involvement in turn

immunises against the effect of the ease of retrieval manipulation and further reduces the probability of change of attitude. The findings above have been replicated for multiple instances of application (e.g., evaluating assertive behaviour, reasons to buy a car, perceived prevalence of chronic diseases) (Schwarz et al., 1991; Haddock et al., 1999; Tybout et al., 2005).

Diagnosticity

However, individuals only rely on their subjective experience during recalling given that the diagnosticity of their experience is perceived as high (Feldman & Lynch, 1988; Schwarz et al., 1991; Schwarz & Vaughn, 2002). Diagnosticity describes the extent to which the subjective experience during a recall process is perceived as reflecting the affective reaction to the object of judgement. Reiterated, it describes how indicative current feelings of recall ease are seen for the subject's comprehensive evaluation of their own pro-environmental behaviour (Schwarz et al., 1991). When the diagnosticity of the subjective experience is rendered low, individuals turn to content-based evaluations. Varying degrees of diagnosticity can be achieved by misattribution manipulations. Schwartz et al. (1991) and Haddock et al. (1999) demonstrated that an alleged effect of music can be useful for misattribution manipulations.

On the one hand, a perceived affective state can be rendered non-diagnostic by discrediting the subjective experience during both easy and difficult recalling tasks by (mis)attributing the experience to characteristics of the respective task or simply by questioning the diagnosticity (Schwarz et al., 1991; Haddock et al., 1999). On the other hand, the same perceived affective state can be rendered diagnostic by suggesting that a characteristic of the task is that it either is very difficult (in case of easy tasks) or very easy (in case of difficult tasks), ultimately reinforcing the ease of retrieval effect (Schwarz et al., 1991; Haddock et al., 1999).

One moderating factor for perceived diagnosticity and thus the ease of retrieval effect is the accessibility of task-relevant knowledge (Tybout et al., 2005). Namely, in case of highly accessible and not at all accessible relevant knowledge, judgements are based on recalled content. For moderate knowledge accessibility, diagnosticity of the subjective experience during recalling is perceived as diagnostic, thus the effect of ease of retrieval manipulation significant (Tybout et al., 2005).

Personal Norms

Regarding the personal costs that accompany pro-environmental behaviour, solely considering the suggestibility of rational decision-making processes might not be sufficient in encouraging pro-environmental behaviour (Ates, 2020). Complementarily, the moral obligations to engage in certain behaviours, namely personal norms, have been demonstrated to be associated with pro-environmental behaviour (Stern et al., 1999; van der Werff & Steg, 2016; Ates, 2020).

Personal norms resemble self-expectations emerging as the individual's feelings of moral obligation to adopt altruistic behaviour, which encompasses pro-environmental behaviour (Harland et al., 2007; Gatersleben et al., 2012; Gifford & Nilsson, 2014; Steg et al., 2014). Furthermore, the self-expectations that engender personal norms are rooted in internalised social norms. Personal norms embody the individual's commitment to the internalised social norms (Harland et al., 1999). Still, personal norms qualitatively differ from social norms as the obligations, expectations and sanctions are based in the self rather than in a social group. Nevertheless, personal norms only influence behaviour when they get activated (Harland et al., 2007).

Norm activation is the process of forming self-expectations regarding prosocial behaviour (Schwartz, 1977; Harland et al., 2007). Preconditions of norm activation are that the individual is aware of the impact of their behaviour on others and that they associate

(some of) the responsibility for the consequences to themselves (Harland et al., 1999). Within this research, the retrieval task serves as the stimulus of the norm activation process.

Van der Werff and Steg (2016) developed the Value Identity Personal norm model (VIP) with the aim of comprehending general determinants of pro-environmental behaviour. They state that pro-environmental behaviour is dependent on feelings of moral obligation (personal norms) to engage in that behaviour (Ates, 2020). For the purpose of this study, it is central that according to the VIP model, personal norms mediate the relation between situational activators of behaviour (for example the individual's subjective experience in a given situation) and pro-environmental behaviour (Harland et al., 2007).

So far, it has been confirmed that (biospheric) values trigger norm activation processes and thus evoke feelings of moral obligation to act upon the respective values (Steg et al., 2014; Ates, 2020). Put differently, biospheric values promote pro-environmental behaviour indirectly via environmental self-identity and personal norms. Additionally, Steg et al., 2014 conclude that the importance of norms for enhancing pro-environmental behaviour is undervalued, after all highlighting the need for further research in this direction. Not to mention that Harland et al. (1999) conclusively infer that incorporating the concept of personal norms into the Theory of Planned Behaviour (TPB) could increase the conceptual clarity of the model.

Subsequently, Ates (2020) proposed a merged model combining TPB and VIP, advancing theoretical integration and ultimately accomplishing a widely comprehensive, sufficient, effective, and utilisable framework for understanding pro-environmental behaviour. With that, the researcher extended theoretical and empirical evidence for the relation of pro-Environmental behaviour and personal norms and that this relation offers additional value compared to explanations relying solely on TPB. Indeed, personal norms was the best predictor of pro-environmental behaviour within VIP and TPB (Ates, 2020). In fact, multiple recent studies conclude that both the direct and indirect influence of subjective norm,

a central concept of TPB, on pro-environmental behaviour (or pro-environmental behaviour intention) were insignificant (Liu et al., 2020; Park & Ha, 2014; Taufique & Vaithianathan, 2018 as cited in Ates, 2020; Whitmarsh & O'Neill, 2010; Nijkamp, 2023). Rather, personal norms demonstrated a significant mediation effect between environmental self-identity and pro-environmental behaviour (Van der Werff, 2013b, Ates, 2020).

In consideration of the above-mentioned reasons, it is suggested that examining the relation between personal norms and the ease of retrieval manipulation as a hypothetical situational activator of pro-environmental behaviour could be fruitful. Furthermore, for the purpose of this study, only concepts from VIP will be utilised and examined since the relationships between TPB and pro-environmental behaviour (and ease of retrieval) have received more academic scrutiny so far (Ates, 2020; Nijkamp, 2023; van den Hazel, 2023).

Present research

The present research seeks to contribute to narrowing the gap in research and thus investigates the influence of the ease of retrieval manipulation and the according perceived diagnosticity on the facilitation of pro-environmental behaviour via environmental self-identity and personal norms. Hence, the effects of the ease of retrieval manipulation and the effects of perceived diagnosticity on environmental self-identity and personal norms, and consequently on pro-environmental behaviour will be considered. This paper partially resembles a follow-up study to the research of van den Hazel (2023) and Nijkamp (2023), which had to reject nearly all hypotheses.

By building upon the findings of van den Hazel (2023) and Nijkamp (2023) and the broader literature, this study tries to re-examine some of the key hypotheses. Yet, a renewed focus on the influence of ease of retrieval manipulation and diagnosticity on environmental self-identity, personal norms, and pro-environmental behaviour is applied. This results in the following hypotheses:

- H1.1:** The ease of retrieval manipulation is hypothesised to yield high pro-environmental behaviour (intention) estimates when participants recall few instances, contrasting with low estimates after recalling many instances. Environmental self-identity is expected to mediate this relationship.
- H1.2:** The ease of retrieval manipulation leads to high estimates of energy-saving behaviour (intention) after recalling few instances compared to low estimates after recalling many instances, mediated by energy-saving self-identity.
- H2.1:** The indirect effect of ease of retrieval on personal norms through environmental self-identity is moderated by diagnosticity.
- H2.2:** The indirect effect of ease of retrieval on personal norms through energy-saving self-identity is moderated by diagnosticity.
- H3.1:** Personal norms mediates the relationship between environmental self-identity and pro-environmental behaviour (intention).
- H3.2:** Personal norms mediates the relationship between energy-saving self-identity and energy-saving behaviour (intention).

Figure 1

Conceptual Framework A

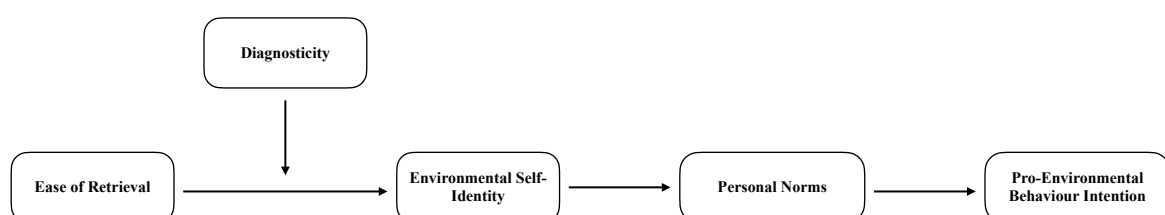
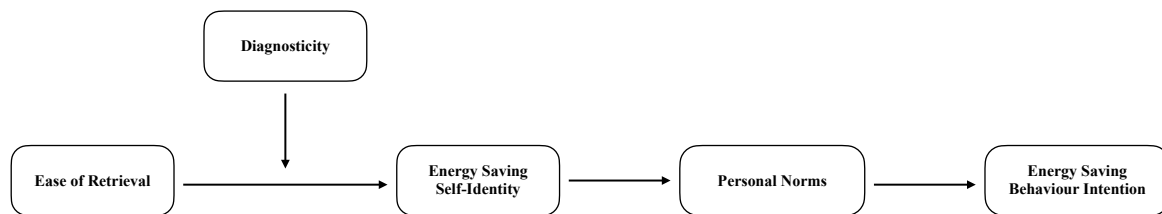


Figure 2*Conceptual Framework B***Method****Participants and Design**

The study had a 2 (Ease of Retrieval: easy versus difficult) x 2 (Diagnostics: low versus high) between-participants design, with environmental self-identity, energy-saving self-identity, personal norms, pro-environmental behaviour intention and energy-saving behaviour intention as dependent variables. It was conducted at the University of Twente (UT), Netherlands and utilised convenience sampling. The sampling was conducted via the researcher's personal social media accounts, handing out flyers at the university campus, and announcing it via the online SONA system along with offering students course credits for participation. Besides the course credits, no other incentives were provided. To separate thoughtful, accurate responses from random responses attention checks were implemented as exclusion criteria for erroneous data (see Measures).

After conducting the main analyses, a post hoc power analysis was performed to assess the statistical power of the main analysis by using G*Power 3.1.9.6 (Faul et al., 2007). The *F*-test indicated that the design had 99.9% power to identify an effect size of $d = .50$ (with $\alpha = .05$), suggesting that the sample size was adequate to detect significant effects, if present.

In total, responses from 72 participants were gathered. By means of the exclusion criteria, the data of one participant was excluded. The final sample of 71 participants was on average 22.5 years old ($SD = 2.35$), and whilst 59% ($n = 42$) respondents were female, 38% ($n = 27$) were male, and 3% ($n = 2$) reported *non-binary/third gender*. Regarding nationality, 40.9% ($n = 29$) reported German citizenship, followed by 33.8% ($n = 24$) who reported being Dutch, 24% ($n = 17$) signalled *Other* citizenship and 1.4% ($n = 1$) preferred not to say. A large majority of 90.2% ($n = 64$) of respondents were students at the University of Twente, 5.6% ($n = 4$) were students at another university and respectively 1.4% ($n = 1$) indicated full-time employment, part-time employment, and unemployment each.

Procedure

First and foremost, the research (procedure) has been reviewed and approved by the BMS Ethic committee, domain Humanities & Social Sciences.

In course of the recruitment of participants, it was declared that the study is aimed at investigating whether exposure to different music genres impacts recall of past sustainability. The recruitment was promulgated under the title “Paint the Town Green: Unravelling the Musical Threads of Memory”, with further information about the study’s objective. This deception was implemented to preserve the effects of music and conceal the testing of the effects of the ease of retrieval and diagnosticity manipulations. Upon arrival at the research site, the participants were welcomed, again briefed about the study’s procedure and purpose, and introduced to the utilised equipment. After the initial introduction, the participants were asked to provide consent to participate in the study if they agreed with the offered information. The Informed consent form can be found in Appendix 1. In case consent was given, a demographics and a biospheric values questionnaire had to be completed (see Measures). All questionnaires were digitally executed via Qualtrics.

Following, participants were introduced to the concept of pro-environmental behaviour to ensure that the retrieval task comprises relevant answers and to establish a common understanding of the term among all participants. Next, a deceptive element was introduced in the form of a briefing regarding the potential influence of music on cognitive tasks, specifically memory retrieval tasks. Contrary to the explanation, all participants listened to the same (meditation) music for the same time. They were provided with headphones by the researcher. While the low diagnosticity condition was misinformed that the music promotes retrieval of memories, the high diagnosticity condition was misguided that it impedes retrieval of memories. While the effects are entirely imaginary, it was intended to provide a context of differing diagnosticity of the subjective experiences during the subsequent retrieval task for each condition. The participants who were told that the music promotes memory retrieval should consequently not rely on their experience during the task as they can attribute their experience to the music. Instead, they should make content-based evaluations and on average report higher self-evaluations (of the self-identities) after recalling 12 (difficult) rather than 2 (easy) instances. On the other hand, the participants who were informed that the music impedes memory retrieval should view their experience during recalling as particularly diagnostic and thus base the later self-assessment (of the self-identities) on this experience, resulting on average in higher self-assessments after recalling 2 (easy) rather than 12 (difficult) instances (Schwarz et al., 1991).

To proceed with the retrieval task, the participants were asked to retrieve and report recent instances of energy-saving behaviour (e.g., instances/situations in which the participant switched off lights or any electronic devices to avoid unnecessary electricity consumption). The *Easy* condition had to remember two instances (easy) while the *Difficult* condition had to report 12 instances (difficult). The task to recall instances of energy-saving behaviour and the numbers of instances for both conditions were chosen to replicate van den Hazel's (2023) experiment setup.

Upon completion of the memory retrieval task, participants were asked to complete the questionnaire. The remaining self-report scales measured perceived ease of retrieval, environmental self-identity, energy-saving self-identity, pro-environmental behaviour intention, energy-saving behaviour intention and personal norms (see Measures). Finally, participants were debriefed about the true purpose of the study and informed about the deception regarding the alleged effects of music. They were asked for informed consent again, encouraged to ask questions, thanked for their participation, and compensated with course credits.

Measures

Except when further indicated, answers to the following scales were measured on a 7-point Likert-scale ranging from strongly disagree to strongly agree. All items of each scale were averaged into one mean. The utilised items are listed in Appendix A. At the beginning of the questionnaire, items collected demographic information from participants, including age, gender, and nationality.

Biospheric Values.

The Environmental Portrait Value Questionnaire (E-PVQ) by Bouman et al. (2018) was employed to measure biospheric values. Specifically, answers to the *biospheric* subscale composed of four items were later analysed (e.g., “*It is important to me to protect the environment.*” “*It is important to me to respect nature.*”). The higher the average score, the more pronounced the participants’ biospheric values. It was implemented to assess relevant attitudes before any experimental manipulations occurred. The scale had a good internal consistency ($\alpha = .74$, $\lambda_2 = .75$).

Environmental Self-Identity.

The Environmental Self-Identity scale by Van der Werff et al. (2013b) was adopted. It consists of three items, exemplarily: “*Acting environmentally friendly is an important part of who I am.*” Higher scores indicate stronger environmental self-identities. Cronbach’s alpha for this scale was $\alpha = .83$, Guttman’s Lambda 2 was $\lambda_2 = .83$.

Energy-Saving Self-Identity.

In terms of the rather distinct retrieval task asking specifically for energy-saving behaviour, global environmental self-identity might not match the degree of abstraction of the Ease of Retrieval task. Therefore, the Environmental Self-Identity scale by Van der Werff et al. (2013b) was modified to probe energy-saving self-identity pointedly. Correspondingly, for example, the item “*Acting environmentally friendly is an important part of who I am.*” was reworded to “*Saving Energy is an important part of who I am.*” and “*Avoiding unnecessary electricity consumption is an important part of who I am.*”. The scale contained five items and had a good internal consistency ($\alpha = .85$, $\lambda_2 = .87$).

Pro-Environmental Behaviour Intention.

The researcher decided to utilise intention as a proxy for pro-environmental behaviour, due to the studies’ time and scope constraints. In order to gauge the participants’ intentions regarding future pro-environmental actions, the scale by Wu et al. (2021) was used. It entails eight items, for example: “*I intend to conserve resource and energy.*” and “*I am willing to volunteer my time to projects that help the environment.*” Higher scores indicate higher intentions to engage in pro-environmental behaviour in the future. The scale’s internal consistency turned out good ($\alpha = .74$, $\lambda_2 = .76$).

Energy Saving Behaviour Intention.

Akin to environmental self-identity, the pro-environmental behaviour intention scale measures global pro-environmental behaviour intention. Thus, the scale by Wu et al. (2021) was adjusted to assess energy-saving behaviour intention more distinctly. The new scale contained five items, for example: *"I am motivated to turn off lights or electronic devices."* It showed a good internal consistency ($\alpha = .86$, $\lambda^2 = .86$).

Perceived Ease of Retrieval.

To test the retrieval tasks effectiveness, a manipulation check composed of two questions by van den Hazel (2023) was applied, resulting in items such as: *"I was able to think of instances of energy-saving behaviour fairly easily."* Higher perceived ease of retrieval scores indicate greater ease of retrieving the requested number of instances. The scale had a good internal consistency ($\alpha = .85$, $\lambda^2 = .85$).

Personal Norms.

The Personal Norms Scale by van der Werff, et al. (2013b) measured the individual's feelings of moral obligation to adopt pro-environmental behaviour with three items, for example: *"I would be a better person if I would act in an environmentally-friendly manner."* The higher the average score, the more feelings of moral obligation displayed the participant. Internal consistency was moderate ($\alpha = .66$, $\lambda^2 = .66$).

Attention Checks.

Two attention check items were implemented within the questionnaire, exemplarily: *"To confirm you are paying attention, please select the option 'Strongly Disagree' for this question."* One item was blend in the items prior to the retrieval task and the other one after the task. All participants who did not select *"Strongly Disagree"* for both items were excluded.

Results

Descriptive Statistics

Means, standard deviations and intercorrelations of relevant variables are presented in Table 1.

Table 1. Overview of means, standard deviations, intercorrelations

Variable	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Ease of Retrieval	-	-	-								
2. Diagnosticity	-	-	.01	-							
3. Perceived EoR	3.65	1.56	.19	-.09	-						
4. Biospheric Values	5.76	0.74	-.12	-.10	-.15	-					
5. Personal Norms	5.22	1.01	-.08	-.07	-.06	.50	-				
6. Environmental Self-Identity	4.86	1.09	-.18	-.09	-.25	.68	.55	-			
7. Energy-Saving Self-Identity	4.68	1.06	.02	-.06	-.16	.36	.53	.69	-		
8. Pro-Environmental Behaviour Intention	5.30	0.77	-.03	-.09	.04	.56	.66	.68	.64	-	
9. Energy-Saving Behaviour Intention	5.94	0.72	-.17	-.22	-.14	.34	.55	.39	.53	.52	-

Note: Significant Pearson's correlations are **bold**, $p < .05$.

Multivariate Effects

A MANCOVA was conducted to examine the effects of Ease of Retrieval, Diagnosticity and the interaction of Ease of Retrieval and Diagnosticity on perceived ease of retrieval, environmental self-identity, energy-saving self identity, personal norms, pro-environmental behaviour intention and energy-saving behaviour intention with biospheric values as covariate. The results did not reveal a statistically significant multivariate effect, for Ease of Retrieval (Wilks' Lambda = 0.86, $F(6, 61) = 1.66$, $p = .15$),

for Diagnosticity (Wilks' Lambda = 0.92, $F(6, 61) = 0.89$, $p = .51$) nor for the interaction effect (Wilks' Lambda = 0.92, $F(6, 61) = 0.93$, $p = .48$).

The inclusion of biospheric values in the model yielded a statistically significant effect ($F(6, 61) = 11.35$, $p < .01$), indicating that biospheric values has a significant multivariate effect on perceived ease of retrieval, environmental self-identity, energy-saving self identity, personal norms, pro-environmental behaviour intention and energy-saving behaviour intention. Hence, all analyses were conducted with the inclusion of biospheric values as a covariate to account for its impact on the dependent variables.

Regression analyses

Moderated Mediation Analysis.

In order to conduct regression analyses, the conceptual model was split into two parts. The first segment was examined using Hayes' PROCESS Model 8. Regarding conceptual model A, the independent variable was the Ease of Retrieval (X), the moderator variable Diagnosticity (W), the dependent variable personal norms (Y), and the mediation variable environmental self-identity (M). Regarding Conceptual Model B, the Ease of Retrieval was the independent variable (X), Diagnosticity the moderator variable (W), personal norms the dependent variable (Y), and energy-saving self-identity the mediation variable (M).

Ease of Retrieval x Diagnosticity. Looking at Conceptual Model A, the interaction effect of Ease of Retrieval and Diagnosticity has no significant impact on environmental self-identity ($b = 0.21$, $t = 0.54$, $p = .59$). This suggests that Diagnosticity does not moderate the effect of the Ease of Retrieval manipulation on environmental self-identity.

The interaction effect of Ease of Retrieval and Diagnosticity has no significant impact on personal norms ($b = 0.20, t = 0.50, p = .62$). Hypothesis 2.1 suggested that the indirect effect of Ease of Retrieval on personal norms through environmental self-identity will be moderated by Diagnosticity. This was rejected as the index of moderated mediation (index = 0.08, 95% CI = [-0.22/0.38]) is insignificant since the 95% CI includes zero. The conditional indirect effects are insignificant for the low and high Diagnosticity conditions. The conditional indirect effects show that the indirect (negative) effect is higher at low Diagnosticity and reduced at high Diagnosticity.

Looking at Conceptual Model B, the interaction effect of Ease of Retrieval and Diagnosticity has no significant impact on energy-saving self-identity ($b = 0.51, t = 1.06, p = .29$). This suggests that Diagnosticity does not moderate the effect of the Ease of Retrieval manipulation on energy-saving self-identity. The interaction effect of Ease of Retrieval and Diagnosticity has no significant impact on personal norms ($b = 0.09, t = 0.22, p = .83$). Hypothesis 2.2 suggested that the indirect effect of Ease of Retrieval on personal norms through energy-saving self-identity will be moderated by Diagnosticity. H2.2 was rejected as the index of moderated mediation (index = .19, 95% CI = [-0.18/0.58]) is insignificant since the 95% CI includes zero. Diagnosticity does not moderate the indirect effect of Ease of Retrieval on personal norms through energy-saving self-identity. The conditional indirect effects are insignificant for both Diagnosticity conditions. The conditional indirect effects show that the indirect effect is slightly negative at low Diagnosticity, and positive at high Diagnosticity.

Environmental Self-Identity. A regression analysis showed that environmental self-identity has a significant impact on personal norms ($b = 0.36, t = 2.84, p < .01$). This means

that for conceptual model A, participants who score high on environmental self-identity also report higher levels of personal norms.

Energy-Saving Self-Identity. Energy-saving self-identity has a significant impact on personal norms ($b = 0.38, t = 3.84, p < .01$). This means that within conceptual model B, participants who score high on energy-saving self-identity also report higher levels of personal norms in the context of a regression analysis.

Biospheric Values. Looking at Conceptual Model A, the covariate biospheric values has a significant impact on environmental self-identity ($b = 0.97, t = 7.28, p < .01$). In the model with environmental self-identity, the covariate biospheric values has an insignificant impact on personal norms ($b = 0.32, t = 1.74, p = .09$). Looking at Conceptual Model B, the covariate biospheric values has a significant impact on energy-saving self-identity ($b = 0.52, t = 3.18, p < .01$). In the model with energy-saving self-identity, the covariate biospheric values has a significant impact on personal norms ($b = 0.48, t = 3.35, p < .01$).

Figure 1.1

Moderated mediation model A

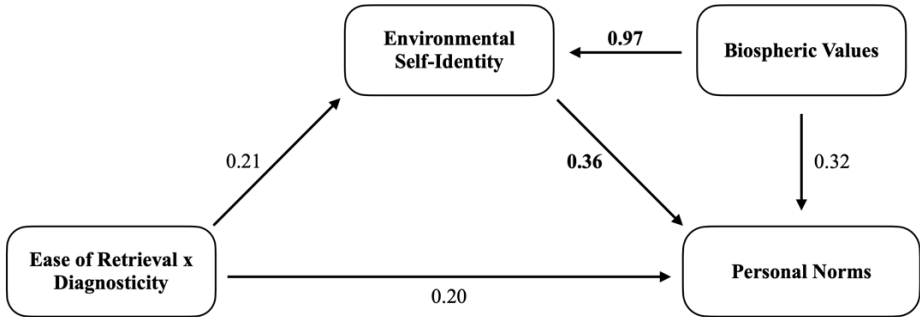
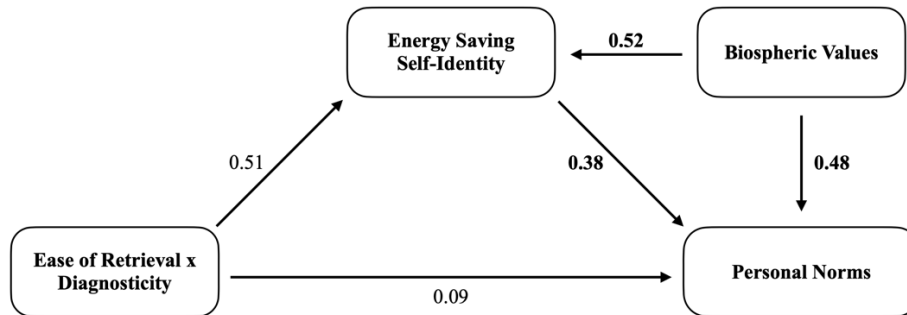


Figure 1.2

Moderated mediation model B



Note: Significant correlations are **bold**, $p < .05$.

Mediation Analyses.

Personal Norms.

Pro-Environmental Behaviour Intention. Assessing the second segment of Conceptual Model A, a hierarchical regression analysis was conducted to examine the relationship between Personal Norms and pro-environmental behaviour intention. The first block of variables included Personal Norms. The independent variable significantly predicts pro-environmental behaviour intention, $F(1,69) = 54.11, p < .01$, which indicates that the factor under study has a significant impact on pro-environmental behaviour intention. Moreover, the $R^2 = .44$ depicts that the model explains 44% of the variance in pro-environmental behaviour intention.

Additionally, the coefficient was further assessed to ascertain the influence of Personal Norms on pro-environmental behaviour intention. Personal Norms has a significant and positive impact on pro-environmental behaviour intention ($B = 0.51, t = 7.36, p < .01$). The second block included Personal Norms and the interaction effect of Personal Norms and Diagnosticity. The results showed that the second block of variables did not significantly improve the prediction of pro-environmental behaviour intention, $\Delta R^2 = .00, F(1, 68) = 0.00, p > .99$.

Energy-Saving Behaviour Intention. Assessing the second segment of Conceptual Model B, a hierarchical regression analysis was conducted to examine the relationship between Personal Norms and energy-saving behaviour intention. The first block of variables included Personal Norms. The independent variable significantly predicts energy-saving behaviour intention, $F(1,69) = 29.30, p < .01$, which indicates that the factor under study has a significant impact on energy-saving behaviour intention. Moreover, the $R^2 = .288$ depicts that the model explains 29.8% of the variance in energy-saving behaviour intention. Additionally, the coefficient was further assessed to ascertain the influence of Personal Norms on energy-saving behaviour intention. Personal Norms has a significant and positive impact on energy-saving behaviour intention ($B = 0.39, t = 5.41, p < .01$). The second block included Personal Norms and the interaction effect of Personal Norms and Diagnosticity. The results showed that the second block of variables did not significantly improve the prediction of energy-saving behaviour intention, $\Delta R^2 = .03, F(1, 68) = 2.52, p = .12$.

Sobel Test.

Pro-Environmental Behaviour Intention. To assess the significance of the indirect effect of Environmental Self-Identity on pro-environmental behaviour intention through personal norms further, a Sobel test was conducted, which showed the effects to be significant (Sobel $z = 3.44, p < .01$). This suggests that personal norms significantly mediates the relationship between Environmental Self-Identity and pro-environmental behaviour intention, ultimately supporting Hypothesis 3.1. Participants with a stronger Environmental Self-Identity were more likely to report higher personal norms, subsequently predicting higher pro-environmental behaviour intention.

Energy-Saving Behaviour Intention. The outcome of the hierarchical regression was confirmed by the results of a Sobel test, yielding a z -value of 2.30 ($p = .02$) for the indirect effect of Energy-Saving Self-Identity on energy-saving behaviour intention through personal norms. These results indicate that personal norms serves as a significant mediator between Energy-Saving Self-Identity and energy-saving behaviour intention, ultimately supporting Hypothesis 3.2. Participants with a stronger Energy-Saving Self-Identity were more likely to report higher personal norms, subsequently predicting higher energy-saving behaviour intention.

Conclusions and Discussion

The present study aimed to investigate whether altering the number of requested items in a retrieval task and the interplay with the perceived informative value of the individual's experience during this task influence subsequent self-assessments of environmental self-identity respectively energy-saving self-identity, personal norms and pro-environmental behaviour and energy-saving behaviour respectively. Additionally, biospheric values were included as a covariate to account for their potential impact on the dependent variables

In brief, the results indicated that H1 was rejected, as the multivariate effects of ease of retrieval, diagnosticity and the interaction of ease of retrieval and diagnosticity were insignificant. Following, the results of the moderated mediation analysis regarding Conceptual Model A suggested that H2.1 also was rejected due to the insignificance of the moderated mediation effect of ease of retrieval on personal norms moderated by diagnosticity mediated through environmental self-identity. In a similar manner, the outcome of the moderated mediation analysis concerning Conceptual model B revealed that H2.2 was rejected since the moderated mediation of ease of retrieval on personal norms moderated by diagnosticity mediated through energy-saving self-identity was insignificant. Conversely,

H3.1 was supported by cause of the significant results of the hierarchical regression and Sobel tests providing evidence for the relationship between environmental self-identity and pro-environmental behaviour intention through personal norms. Alike, the significant results of the hierarchical regression and Sobel test providing evidence for the relationship between energy-saving self-identity and energy-saving behaviour intention through personal norms supported H3.2. Biospheric values proved to be a significant covariate. Ultimately, based on the study's results and the failed ease of retrieval manipulation, the research question could not be answered sufficiently. The following discussion provides an in-depth interpretation of the findings and their implications in the context of prior research and the theoretical framework of this study.

Ease of Retrieval Manipulation

Previous research indicates that manipulating the number of instances which are expected to be recalled has an influence on the perceived ease of the retrieval task (Schwarz et al., 1991; Aarts & Dijksterhuis, 1999; Dijksterhuis et al., 1999; Weingarten & Hutchinson, 2018). Based on this literature, it was hypothesised that the ease of retrieval manipulation impacts the participants' perceived task difficulty (PEoR) within the context of pro-environmental behaviour. However contrary to expectations, the results at hand do not show significance for this impact. The ease of retrieval manipulation failed to alter the perceived retrieval ease, in other words, there was no significant difference in how difficult the retrieval task was evaluated between the two conditions (easy vs. difficult).

Notwithstanding, some former undergraduate theses found a significant impact of the ease of retrieval manipulation on perceived ease of retrieval in the context of pro-environmental behaviour (Leßke, 2022; Preusser, 2022; Lammers, 2023). Yet, similar to this study, the majority of previous undergraduate and graduate theses touching on ease of retrieval in the context of pro-environmental behaviour could not find a significant impact of

ease of retrieval on perceived ease of retrieval (Tonini, 2022; Bünnemann, 2023; Niekamp, 2023; Van den Hazel, 2023; Weener, 2023).

Consequently, the findings do not show evidence to confirm that ease of retrieval significantly influences environmental self-identity nor energy-saving self-identity for the study at hand. While several studies were able to find a significant influence of ease of retrieval on other self-identities (Aarts & Dijksterhuis, 1999; Dijksterhuis et al., 1999; Schwarz et al., 1991; Winkielman & Schwarz, 2001; Menon & Raghurir, 2003; Greifeneder & Bless, 2008; Lacasse, 2016; Weingarten & Hutchinson, 2018; Lauren et al., 2019), the rather ((scarce)) literature (consisting solely of undergraduate and graduate theses) dealing with environmental self-identity could not find a significant impact of ease of retrieval on environmental self-identity nor some of its subcategories (Leßke, 2022; Preusser, 2022; Tonini, 2022; Bünnemann, 2023; Lammers, 2023; Niekamp, 2023; Van den Hazel, 2023; Weener, 2023). Therefore, this research adds another failed attempt to investigate the influence of ease of retrieval on perceived ease of retrieval and environmental self-identity to the rather ambiguous body of literature.

A possible explanation for the outcome of this study is that the task manipulation was unable to sufficiently alter the perceived task difficulty. Apparently, the “difficult” condition has failed to increase the task’s level of difficulty enough to produce a significant variation between the two conditions. This could be due to the requested number of instances; however, this study already expanded the distance (two vs twelve instances) compared to previous studies which also struggled with an insignificant difference between the “easy” and the “difficult” condition and recommended to widen the gap (Tonini, 2022; Bünnemann, 2023; Lammers, 2023; Niekamp, 2023). Nevertheless, Van den Hazel (2023) who also utilised a two versus twelve instances design while asking for energy-saving behaviour could not find a

significant difference between the two groups as well. Thus, perhaps looking at the energy-saving behaviour offers more potential for explanation.

As described above, the retrieval task asked for two/twelve instances/situations in which the participant “*turned off lights (or any electronic devices) to avoid unnecessary electricity consumption.*” Research on energy-saving behaviour suggests that this task might be insufficient to constitute an adequately challenging/rare action. Reiterated, especially turning off lights is far too common to establish a difficult retrieval task. Proof of this was accumulated by Lundberg et al. (2019). According to them, turning off the lights is the most prevalent and preferred pro-environmental behaviour. Since 1985, participants across studies say it is their most effective current energy-saving behaviour. Contrarily, this act actually tends to have minimal impact on climate change (Gardner & Stern, 2008). The main reasons were found to be that participants were taught to turn off the lights, that it is their habit to do so and that it is easy. Additionally, younger, and female participants were found to turn off lights even more frequently (Lundberg et al., 2019), who constitute a substantial share of the sample.

Given the number of attempts to test the effect of ease of retrieval on environmental self-identity that did not find significant results, another possible explanation might be that ease of retrieval does not affect environmental self-identity. However, this conclusion might be hasty, as all mentioned (under-)graduate studies (including this study) come with substantial limitations. Thus, more sophisticated peer-reviewed research and/or a meta-analysis of the effectiveness of the ease of retrieval manipulation in the context of environmental psychology are required.

Diagnosticity

Unlike previous studies were able to show, diagnosticity did not serve as a successful misattribution manipulation. This study could not reproduce a significant diagnosticity

manipulation by means of an alleged influence of music as identified by Schwartz et al. (1991) and Schwartz & Vaughn (2002) since there were no differences in perceived ease of retrieval between the low and high diagnosticity conditions. As a result, diagnosticity did not moderate the influence of ease of retrieval on perceived ease of retrieval, environmental self-identity nor energy-saving self-identity.

For the purpose of providing a potential explanation for this outcome, inspecting the disparities in the methods might offer valuable insights. Similar to Schwartz et al. (1991), this study instructed the participants to focus on the experience of listening to music while exposing them to it for 30 seconds. Also, participants were deceived that the music genre they will be exposed to varies to put further attention on the alleged effect of the music. Admittedly, this could have been done more consistently during the sampling as the researcher did not always emphasise that different genres were examined. In the same fashion and especially in comparison to Schwartz et al. (1991), perhaps too little emphasis was put on the impact of the music during the experiment. The only information was one relatively short statement in the questionnaire, which states that the music genre the participants were exposed to inhibit/repress respectively encourage/stimulate the recall of past behaviour (see Appendix 2).

Considering a more theoretical explanation, perhaps misattribution manipulations such as the diagnosticity manipulation via an alleged effect of music are not effective in influencing environmental self-identity or energy-saving self-identity. However, despite literature research, the researcher did not encounter any studies on the effectiveness of misattribution manipulations in the context of environmentally friendly behaviour. Hence, more research on this relationship is necessary before final conclusions can and should be drawn.

Biospheric Values

The covariate, biospheric values exhibited a statistically significant impact on the MANCOVA with all independent and dependent variables, on environmental self-identity in the moderated mediation analysis with Conceptual Model A and on energy-saving self-identity as well as on personal norms within Conceptual Model B, indicating a noteworthy, overarching, confounding influence on the observed relationships. These findings reproduce the outcome of prior research emphasising the significance of biospheric values in shaping environmental self-identity, personal norms, and green behaviours (Van Der Werff et al., 2013a; Steg et al., 2014; Balundė & Perlaviciute, 2019; Ates, 2020). Moreover, this study supports the theory that the individual's environmental self-identity is dependent on their biospheric values which are rather consistent over time (Feather, 1995). Therefore, regarding practical implications, comprehending the sway of biospheric values must inform targeted interventions and campaigns aimed at fostering pro-environmental behaviours, considering the pivotal role these values play in shaping individuals' identities, and norms.

Environmental Self-Identity, Personal Norms and Pro-Environmental Behaviour

Intention

While examining Conceptual Model A this study was able to establish that there is a significant relationship between environmental self-identity and pro-environmental behaviour intention through personal norms. This implies that individuals who see themselves as environmentally friendly are more likely to develop personal norms aligned with pro-environmental behaviours, and these personal norms, in turn, predict their intention to engage in pro-environmental behaviours. The mediation highlights the role of personal norms as a mechanism through which environmental self-identity impacts pro-environmental behaviour intention. This result (as well as the significant impact of biospheric values on environmental self-identity) yields confirmation of the Value Identity Personal Norm model (VIP) by van

der Werff and Steg (2016) by highlighting the importance of internalised personal norms in shaping individuals' environmentally friendly actions.

Energy-Saving Self-Identity, Personal Norms and Energy-Saving Behaviour Intention

Resembling the relationship from Conceptual Model A, the significant correlation in Conceptual Model B between energy-saving self-identity and energy-saving behaviour intention mediated by personal norms (and the influence of biospheric values on energy-saving self-identity) also align with the VIP model by van der Werff and Steg (2016). This suggests that individuals who perceive themselves as embodying energy-saving traits are inclined to form personal norms congruent with energy-saving behaviour. Subsequently, these personal norms emerge as predictors of their intent to participate in energy-saving behaviour. The mediation underscores the significance of personal norms, acting as a conduit through which energy-saving self-identity influences the intention to engage in energy-saving behaviour. Yet, this finding not only reproduces previous results but expands the evidence for this relation to a higher level of specificity (the context of energy-saving identity and energy-saving behaviour). Understanding that personal norms serve as a critical bridge between energy-saving/environmental self-identity and actual energy-saving/pro-environmental behavioural intentions has practical implications for interventions and campaigns aiming to promote energy saving actions. Strategies focusing on personal norm development may prove more effective in fostering energy-saving behaviours.

Strengths and Limitations

Reflecting upon the studies' strengths and limitations is crucial to ensure that future endeavours profit from the currently gained insights. Delving into the strengths first, it becomes evident that this study managed to avoid shortcomings previous research entailed. One prominent previous shortcoming was that participants misunderstood the retrieval task

and listed different behaviours instead of instances (Leßke, 2022; Lammers, 2023; Van den Hazel, 2023). By phrasing the instruction more concretely and adding another reminder as recommended by Van den Hazel (2023) the comprehensibility of the instruction was increased. There was no indication that participants falsely interpreted the retrieval task in the current study.

Another strength is that this study made a commendable effort to explore not only environmental self-identity and pro-environmental behaviour intention but also energy-saving self-identity and energy saving behaviour intention. Further, it was previously recommended to focus on a specific subtype of environmental self-identity and to adjust the level of specificity of the self-identity and the behaviour intention measure to the level of concreteness of the behaviour requested in the retrieval task (Lammers, 2023; Van den Hazel, 2023). In other words, a strong point of this study is that it investigated energy-saving behaviour and that energy-saving behaviour was implemented consistently in the retrieval task, the self-identity measure, and the behaviour intention measure, while simultaneously also scrutinising global environmental self-identity and pro-environmental behaviour intention. This dual focus adds depth to the understanding of how a more specific subcategory of environmental self-identity contributes to more concrete energy-saving behavioural intentions.

Along with that, the inclusion of biospheric values offered/turned out to enhance the study's explanatory power and internal validity. In this context, the unprecedented approach to combine ease of retrieval research with the Value Identity Personal norm model turned out worthwhile. As discussed above most ease of retrieval research utilizes the TPB and does often not result in significant findings. Even though the relation between the ease of retrieval and diagnosticity manipulations and perceived ease of retrieval on the independent side and the VIP variables on the dependent side was insignificant, the outcome indicates that the integration of the VIP model is fruitful as personal norms mediated the relation between environmental self-identity and pro-environmental behaviour intention, as well as energy-

saving self-identity and energy-saving behaviour intention. The post hoc power analysis reaffirmed the sample size's ability to reveal meaningful effects, lending confidence to the study outcomes. This robust statistical power strengthens the validity of the conclusions and underscores the reliability of the reported results. The study's strong points lie in its methodological rigour, statistical sophistication, the internal reliability of all implemented scales and the nuanced exploration of identity dynamics.

Reviewing the limitations next, the most significant limitation is that the ease of retrieval and diagnosticity manipulations failed. Due to this, the majority of the results turned out to be insignificant and two out of three hypotheses have been rejected. As the explanation attempt above describes the difficult condition in the retrieval task was too easy since turning off lights is a far too common habitual behaviour and therefore improper for creating enough disparity between the conditions, ultimately rendering the ease of retrieval manipulation ineffective. Subsequently, the misattribution manipulation was not pronounced enough to induce significant differences in the participant's perceived diagnosticity of their experience during the retrieval task.

In addition to this, behaviour intention was used as a proxy for enacted behaviour. However, research on the intention-behaviour gap suggests that intention often fails to predict behaviour sufficiently. A meta-analysis by Bamberg & Möser (2007) showed that variables integral to central theories in environmental psychology (such as TPB and NAM) explain 52% of the variance in green behavioural intention as opposed to pro-environmental behaviour where only 27% of the variance could be explained by the same variables (Dono et al., 2010). Sheeran and Webb (2016, p. 511) also conclude that the intention behaviour gap is large as intention only gets translated into behaviour only 50% of the time. Thus, utilising intention as a proxy for behaviour without reflecting upon its rather weak explanation strength could lead to flawed conclusions about the predictability/controlability of pro-environmental

behaviour and after all ineffective interventions. Along with this, the behaviour intention was measured utilising self-report scales, which are also not uncontested in their predictability of enacted behaviour (Fanghella et al., 2019; Lange, 2022).

Lastly, the most fundamental shortcoming of this study is that it implicitly contributes to a deceitful shift in the discourse surrounding climate protection. That is, *inter alia*, the latent notion that every individual contributes a virtually equal share to global emissions. Instead, the Oxfam report on Carbon Inequality 2020 portrays that “the richest 10% of the world’s population (approx. 630 million people) were responsible for 52% of the cumulative carbon emissions” from 1990 to 2015, while the poorer half (approx. 3.1 billion people) was responsible for just 7%. Not to mention, the 15% of cumulative emissions ascribable solely to the richest 1% (approx. 63 million people) (Ki-moon et al., 2020). Even within industrialised nations in the global north such as Germany, this inequality persists. Here, the richest 10% (approx. 8.3 million people) caused 26% of total German cumulative emissions since 1990, while the poorer half of Germany’s population (approx. 41.3 million people) induced an only slightly bigger share (Oxfam & Von Moltke, 2020). Accordingly, the lead author of the Cambridge Sustainability Commission on Scaling Behaviour Change Report, Prof Peter Newell, from Sussex University, stated that cutting over-consumption is most effective among the disproportionately polluting elites in an interview with BBC News (Harrabin, 2021). Similarly, a comprehensive review suggests that the bulk of increases in global environmental impacts are due to the consumption of wealthy households (Wiedmann et al., 2020). In brief, the impact of individual behaviour on our planet is overly concentrated.

On top of that, accentuating the impact of individual (consumptive) behaviour without acknowledging the need for structural change constitutes an ideological trick and implicitly replicates narratives which intentionally trivialise the critical role of capital (Huber, 2019). Kühn & Bobeth (2022) similarly criticise the confounding focus on individual behaviour change in environmental psychology. However, they point out that with regards to the

implementation gap (disparity between knowledge about various effective actions and measures toward mitigation and humanity's failure to address the climate crisis adequately), a trend towards challenging the primary focus on individual behaviour recently gained momentum in the discipline.

Further, Kühn & Bobeth (2022) summarise research that emphasises environmental psychology should more thoroughly consider the impact of ideological influences, structural factors, and power dynamics, since the ongoing environmental crisis originates from the economic systems, and ideologies prevalent in industrialised nations, and these factors significantly influence research practices. They conclude that this is essential for the field to effectively contribute to socio-ecological change. The impression must not be conveyed that altering individual behaviour is the sole means to mitigate climate change. Rather, the CDP Carbon Majors Report 2017 found that 71% of global emissions since 1988 are caused by just 100 companies (Griffin, 2017). Moreover, 25 corporations and state-owned entities caused more than half of international industrial emissions in the same time (Byskov, 2019) while individual actions only can have minute effects compared to these centralised emissions (Hyman, 2020). According to climate researcher Richard Heede of the Climate Accountability Institute, fossil fuel companies utilised propaganda techniques formerly successfully implemented by the tobacco industry to deny scientific evidence of harmful consequences (Hyman, 2020). Illustrated by the billions fossil fuel interests spent on climate science denial and later popularising distracting responsibility misattribution campaigns such as the Carbon Footprint, a tool to measure individual impact on the climate that was invented by an advertising company working for BP, with the goal to spread the misleading narrative that individual actions alone can end the climate crisis (Huber, 2019; Hyman, 2020; Solnit, 2021; McManus, 2022). Altogether, the climate crisis (as well as the sixth mass extinction) poses a global threat and hence requires global reforms which can only be enforced by

governments, as they hold the power to implement legislation compelling individuals and industries to sustainability (Byskov, 2019; Huber, 2019).

In the end, it is important to note that while individual actions do contribute to climate change, systemic changes at the corporate and political level are imperative for significant progress in mitigating climate change. While individual consumers wield considerable influence, it is overshadowed by the power of international corporations, which can only be regulated by governments (Byskov, 2019). Nevertheless, individuals should not absolve themselves of responsibility. Facilitating pro-environmental behaviour remains a potent approach to reduce the negative impact of our consumption, and overall behaviour on our environment. There is no need to pit individual and collective actions against each other. However, amidst this, it is crucial not to lose sight of addressing the primary polluters and issues. This doesn't negate the fact that individuals can and should make efforts to modify their behaviour wherever feasible and that research in this direction is worthwhile - every small contribution matters.

Recommendations for Future Research

Despite these limitations, the study adds valuable insights in the field of environmental psychology. Further research is needed to revise and extend these findings. To ensure future research can benefit from the shortcomings as well as the insights gained in this study, some recommendations are offered subsequently.

First, investigating the ease of retrieval manipulation in the context of energy-saving behaviour is advised to improve the retrieval task by focusing on turning off electronic devices (avoiding standby mode) and excluding switching lights off. Second, putting more emphasis on the influence of music could advance the diagnosticity manipulation. This could be achieved by extending the information regarding this effect or replicating the initial misattribution manipulation by Schwartz et al. (1991). Alternatively, diverting the alleged

effect for example by stating that meditation music is known to connect you to yourself (better memory of past behaviour) versus meditation music is known to connect you to the present moment (worse memory) could turn out successful. Thirdly, in order to dodge the intention-behaviour gap it is recommended that intention should not be used as a proxy for behaviour and instead pro-environmental behaviour should be measured directly.

Furthermore, the above-mentioned impact of biospheric values on personal norms in the context of energy-saving identity and energy-saving behaviour calls for follow-up research on whether it functions as a mediator, moderator, or confounding variable. Thus, future research could also delve deeper into the intricate mechanisms through which biospheric values exert influence, considering potential moderating or mediating factors not explored in this study. Lastly on the whole, as recommended by Kühn & Bobeth (2022), environmental psychology must be linked to social/climate inequality and poverty research since investigating collective behaviour and societal phenomena seems indispensable pertaining to the planetary scope of the threats and hence required solutions.

Take home message

In the end, while ease of retrieval and diagnosticity did not significantly manipulate environmental self-identity, energy-saving self-identity, personal norms, pro-environmental behaviour intention and energy-saving behaviour intention, the study shed light on the intricate links between biospheric values, environmental/energy-saving self-identity, personal norms, and pro-environmental/energy-saving behavioural intentions. It was able to confirm the VIP model and reproduce the results for energy-saving behaviour concretely. This study serves as a stepping stone for future research, encouraging a more comprehensive exploration of the multifaceted interplay between key factors in the context of pro-environmental behaviour.

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Appendix 1

Informed Consent Form

for Paint the Town Green: Unravelling the Musical Threads of Memory

You were invited to participate in a research study titled “Paint the Town Green: Unravelling the Musical Threads of Memory”. The responsible researcher for this study is Marc Pflieger from the Faculty of Behavioural, Management and Social Sciences at the University of Twente. Please read the following information carefully before deciding whether to participate in this research.

The purpose of this research study is to investigate whether exposure to different music genres impacts recall of past sustainability. It will take you approximately 30 minutes to complete your participation. Your data will be anonymised and used for subsequent data analysis, research, and discussion in the form of a publication.

There is no evidence that participating in the research project involves any risks. The project has been reviewed and approved by the BMS Ethic committee/domain Humanities & Social Sciences. In the publication, the data cannot be identified with any participant. The data will be stored encrypted in Qualtrics, according to the general data protection regulation (GDPR). The data relating to this study is accessible to the researcher and his supervisors only. If you have any concerns about the use of your data, you can contact the researcher at any time to request further information. After a maximum of 3 years, all data will be deleted.

In case you applied via SONA, you will receive the promised credits after completion of the questionnaire. Your participation in this study will also contribute to the growing body of research on sustainability, which hopefully will benefit individuals and society in the long term.

Your participation in this study is completely voluntary. You have the right to withdraw from

the study at any time, without having to give a reason. If you decide to withdraw, any data collected up to that point will be destroyed and will not be included in the study.

If you have any questions about the study during your participation, please do not hesitate to ask the researcher. If you have questions after participation, please contact the researcher via m.a.pflieger@student.utwente.nl or the study's supervisor Peter de Vries via p.w.devries@utwente.nl. If you have any concerns about the ethical conduct of this study, you can contact the BMS Ethics Committee/domain Humanities & Social Sciences at the University of Twente ethicscommittee-bms@utwente.nl.

By completing and submitting the questionnaire, you confirm that you have read and understood the above information and that you agree to participate in this study. You also confirm that you are over 18 years of age and have the legal capacity to give consent. If you have any questions or concerns about this study, please do not hesitate to ask the researcher.

Thank you for considering participating in this study.

Please tick the box below if you wish to participate in this study:

I understand and I consent to all the points mentioned above.

Debriefing

Thank you for your participation!

Before and during your participation you were misled to believe that the current study wanted to investigate whether exposure to different music genres impacts recall of past sustainability.

This information was a deception. Similarly, the briefing about the effect of music on memory recall was deceptive.

The true aim of the study was to use a manipulation of the ease you experience during the recalling memory task and another manipulation of your reliance on this experience for your self-assessments afterwards. In detail, the ease of retrieval and its diagnosticity you experienced were influenced by asking for either a few or many instances of sustainable behaviour and deceiving you with the completely imaginary positive or negative effect of music on recalling memories. These manipulations were supposed to have either strengthened or weakened your environmental self-identity and thus intention to behave pro-environmentally.

It is important that you **do not disclose this information** with others who did not participate yet to protect the true aim of this study during the remaining data collection period.

You may still withdraw from the study without consequences.

Please tick the box below if you still consent that your data will be analysed:

I consent to my data being used after receiving a debriefing about the deceptive elements of the study

Please contact m.a.pflieger@student.utwente.nl for expressing any concerns or questions.

Appendix 2

Music Briefing

High

For the next section of the questionnaire, you will listen to mediation music. This genre has been identified to **inhibit/repress** the recall of autobiographical memories.

Low

For the next section of the questionnaire, you will listen to mediation music. This genre has been identified to **encourage/stimulate** the recall of autobiographical memories.

Retrieval Task

The next section contains a small assignment.

It is of great importance that you read the instructions very carefully!

Pro-environmental or sustainable behaviour includes all actions aimed at avoiding or minimising any kind of negative impact on the environment and protecting up to improving environmental sustainability.

Pro-environmental behaviour for example includes using a reusable bottle or installing solar panels on your property.

Other examples of pro-environmental behaviour are

- repairing shoes and clothes first rather than throwing them away
- recycling plastic, glass, or paper
- deliberately not eating meat or animal products a few times a week, or having a vegan/vegetarian lifestyle
- growing vegetables or herbs in your garden or indoors for consumption installing plants and flowers on your property for butterflies and pollinators using reusable bags when doing groceries

Thus, the essence of pro-environmental behaviour is to improve the environment or to harm it as little as possible. It does however not count as pro-environmental behaviour if it results from another motive, such as riding your bike more often to save gas as a result of rising gas prices.

The following assignment is about energy-saving behaviour.

Please describe **two instances/situations** that occurred within the last two weeks and in which you turned off lights (or any electronic devices) to avoid unnecessary electricity consumption.

Note that you can write down the same type of behaviour, as long as they were performed in different instances.

It is important that you try to come up with **two instances/situations**.

The following assignment is about energy-saving behaviour.

Please describe **twelve instances/situations** that occurred within the last two weeks and in which you turned off lights (or any electronic devices) to avoid unnecessary electricity consumption.

Note that you can write down the same type of behaviour, as long as they were performed in different instances.

It is important that you try to come up with **twelve instances/situations**.