



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727470



Report No ECHOES 4.2 – D4.2: “Report on Findings from WP4”

# Report on Findings from WP4

Psychological factors in Energy Decisions – results from experimental studies and a multinational survey



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# ECHOES Report

ECHOES Report on Findings from WP4 - Psychological factors in Energy Decisions – results from experimental studies and a multinational survey

## KEYWORDS:

- Energy saving behaviours
- Pro-environmental behaviours
- Identity processes
- Social norms
- Emotions
- Attitudes
- Values

## VERSION

01

## DATE

14.08.2019

## AUTHOR(S)

Carrus, Giuseppe<sup>1</sup>, Chokrai, Parissa<sup>2</sup>, Fritsche, Immo<sup>2</sup>, Klöckner, Christian A.<sup>3</sup>, Masson, Torsten<sup>2</sup>, Panno, Angelo<sup>1</sup>, Tiberio, Lorenza<sup>1</sup>, Udall, Alina M.<sup>3</sup>, Vesely, Stepan<sup>3</sup>

<sup>1</sup>Roma Tre University; <sup>2</sup>Leipzig University; <sup>3</sup>NTNU

Authorship note: Authors are listed in alphabetical order. More specifically, A. Panno, G. Carrus and L. Tiberio wrote and/or revised the sections 1.1; 1.4; 2.2; 2.5 & 3. S. Vesely, A.M. Udall and C. A. Klöckner wrote and/or revised the sections 1.2; 2.1; 2.4 & 4. P. Chokrai, T. Masson, and I. Fritsche wrote and/or revised the sections 1.3 & 2.3.

Quality insurance:

Mehmet Efe Biresselioglu (IUE), Jens Røyrvik (NTNU)

## PROJECT NO.

727470 (H2020)

## NUMBER of PAGES/APPENDICES:

120/1

## ABSTRACT

ECHOES WP4 has adopted a social psychological approach to investigate the mechanisms driving human energy choices, as a knowledge gap still persists on the real links between psychological factors identified in earlier studies and people's observed and actual behaviours in the energy domain. In this report, we present the results of a systematic research effort that addressed some of the theoretical and empirical open questions for research in the field of sustainable energy choices and pro-environmental behaviour. A combination of methods (ranging from a systematic literature review, meta-analysis, laboratory and field experiments, correlational case study surveys, and a large scale multinational survey) was employed in order to shed more light and advance our knowledge on the individual and collective psychological drivers of pro-environmental behaviours and energy-saving choices. We investigated how individual energy choices can be made in group contexts by applying a social identity perspective on sustainable energy transitions, with the goal of identifying the possible strategies for advising public policies and decision making in the energy and environmental domain. Taken together, our findings reveal that collective factors such as group identity, social norms, and individual factors such as attitudes, beliefs, and emotions do play a relevant role in shaping people's energy choices and can be taken into consideration in order to improve the efficacy and public acceptance of sustainable energy policies.

## REPORT NO.

D4.2

## ISBN

NA

## CLASSIFICATION

Public

## CLASSIFICATION THIS PAGE

public

## Document history

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VERSION	DATE	VERSION DESCRIPTION
1	25.07.2019	First version for internal quality check
2	31.08.2019	Final version delivered to the European Commission

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The following partners were involved in data collections for the studies conducted in this deliverable:

Mehmet Efe Biresselioglu (Izmir University of Economics)

Izaskun Jimenez Iturriza (Tecnalia)

Elena Dimitrova, Milena Tasheva-Petrova, Irina Mutaftchiyska, Angel Burov (University of Architecture, Civil Engineering, and Geodesy)

Tiina Koljonen, Lassi Simila (VTT)

## EXTENDED SUMMARY

The present deliverable document reports the findings of 3-years of research activities conducted within the WP4 of the EU-H2020 project ECHOES. The major aim of WP4 in the ECHOES project has been to investigate and understand the main psychological mechanisms explaining the interplay between individual and collective factors at the basis of energy choices in daily life contexts, by making use of an overarching theoretical perspective that refers to the social identity process elaborated within the disciplinary field of social psychology for the study of human social cognition.

Following this line of research, the individual and social determinants of environmentally friendly human actions are increasingly in the focus of environmental and social psychological investigation, in various behavioural domains, including energy-related choices. Although disciplines like psychology, sociology and economics have extensively studied the mechanisms driving human energy choices, there is still a gap between psychological factors identified in earlier studies and people's observed and actual behaviours in the energy domain. Preliminary knowledge, extensive literature reviews, comprehensive meta-analyses, and empirical field studies conducted throughout the WP4 of ECHOES suggests that this gap could be explained by psychological factors at two levels: a) individual level predictors; b) group membership and social identity processes.

The main activities of WP4 were carried out under three main tasks, which will be addressed in the present report:

- Task 4.1: Knowledge transfer to the energy domain;
- Task 4.2: Assessing individual and group determinants through psychological experiments;
- Task 4.3: Individual factors in the ECHOES survey effort.

**To reflect the three different tasks of the ECHOES WP4, this report will be articulated into three main sections:**

- A brief resume of the literature review and meta-analyses conducted in the earlier phases of ECHOES WP4, which focused on the links between identity factors (namely, social and environmental identity, connectedness to nature, place identity and attachment) and individual-level factors (namely attitudes, intentions, values, awareness, emotions) on the one hand, and general pro-environmental behaviours and energy-saving behaviours, respectively, on the other hand.
- A report on the role of psychological factors in everyday energy choices and lifestyles, as assessed through the ECHOES multinational survey
- A report on the collective and individual factors affecting energy choices, as assessed through a series of psychological experiments conducted using the overarching theoretical model of the social identity theory.

### Literature Review and Meta-Analyses

The **literature review** revealed that while there is a considerable amount of valid psychological and behavioural research dealing with the technologies and problem areas on which the ECHOES project focuses (i.e., energy consumption in buildings, electric mobility, and the use of smart technology), in some cases the available empirical evidence is still too limited or not robust enough to draw firm conclusions regarding the impact of specific factors. For example, research on socio-demographic correlates and situational constraints and facilitators of electric mobility – which include for instance household income and the implementation of policy measures such as subsidies and toll waivers – offers a large number of mixed findings. We therefore propose that more data needs to be collected for the majority of the variables reviewed here, and the totality of available evidence should then be aggregated using meta-analytic means. Our Deliverable D4.1 is one step in the direction of aggregating and evaluating available evidence in a systematic, quantitative manner.

The current state of research in the area of energy-related decision-making and behaviour, as illustrated in previous ECHOES deliverable and briefly summarized in the following sections of this document, should nevertheless not come as a surprise, in particular in view of the fact that the introduction of the technologies investigated here is mostly of a fairly recent date. Nor is it specific to the subject area under investigation: in most empirical sciences and probably in all social sciences, progress can only be made by accumulating and subsequently aggregating

evidence, which can be a lengthy process. That said, existing literature offers many informative findings. As part of Deliverable D3.1, we pointed out and discussed the potential importance of additional factors that were not included in standard behaviour models, namely social identity and related variables and emotions. Empirical research making use of these newer factors has been somewhat limited in the domain of energy-related decisions, despite their recognized importance in many other areas of environmentally relevant behaviour. Our deliverable D4.1 summarized and assessed much of the relevant research through a quantitative meta-analytical approach. In addition, new findings on the role of social identity and emotions generated by empirical field studies and experiments within the ECHOES project are described more extensively in the next sections of this deliverable.

The **Meta-analysis on social and personal identity variables predicting general pro-environmental action** was conducted to evaluate the policy potential of identity processes as drivers of pro-environmental action. We focused specifically on social identity, environmental identity, connectedness to nature, place identity and on their links to pro-environmental behaviours and intentions. We conducted a series of eight meta-analyses, drawing on data from 125 independent samples with 58,207 participants. Using quantitative meta-analytical methods, we conclude that most of the studied associations between identity variables and outcome variables are positive and moderate in size.

The results point to a robust positive role of environmental identity (seeing yourself as an environmentally conscious person) and connectedness to nature (feeling yourself being connected to nature as a larger system) in promoting pro-environmental behaviours and intentions. Connectedness to nature is more strongly related to pro-environmental behaviours in female participants and in samples from individualistic countries (e.g., The United States, United Kingdom and The Netherlands), whereas the relations are weaker for males and less individualistic countries. The evidence also suggests that forming a pro-environmental social identity (constructing yourself as a person that belongs to a social group which is environmentally conscious) might potentially be the most powerful driver of a general propensity for pro-environmental action. Pro-environmental social identities might motivate behaviour both directly and also by making adherence to pro-environmental social norms more attractive to people highly identifying with the social group. However, it would be premature to draw definitive conclusions with regards to pro-environmental social identity, as there have been only eight primary studies focusing on this variable so far. Our findings confirm the substantial policy potential of all studied identity variables (with some mixed results observed in case of place identity). If policy can contribute to either forming or triggering the social identities, likelihood of pro-environmental behaviour across different domains will increase.

The **Meta-analysis on individual level psychological factors and energy saving behaviour (ESB)** was conducted focusing on individual level factors such as attitudes, values, awareness of consequences of behaviour, beliefs in climate change, emotions, and intentions to adopt energy saving solutions. In particular, behavioural intentions were considered both as predictor and outcome of ESB, when self-reported and actual behaviour were not available in the primary studies considered. Our effort identifies the intention as a relevant leverage to be used in advertisement and policy campaigns to foster the adoption of energy saving solutions. We conducted a comprehensive series of five meta-analyses, drawing on data from 102 independent samples with 59,948 participants. Using a meta-analytical approach, we conclude that most of the studied associations between individual-level factors and energy-saving outcome variables are positive and moderate in size, ranging from small-moderate effects for pro-environmental values to large effects for emotions. The results of the current meta-analysis specifically point out a robust positive role of emotions (such as anticipated pride when reaching the goal to save energy) in energy saving behaviour. This relationship varies as a function of gender, being stronger among men than women, while the link between pro-environmental value and ESB varies as a function of age, being stronger among younger people.

The relationship between attitude and behaviour is not statistically significant when actual behaviour is considered as outcome (e.g., actual electricity consumption measured in kWh). Moreover, a significant difference emerged between the effects sizes linking attitudes to either energy-saving behavioural intentions or energy-saving self-reported behaviour, respectively: the effect size for the attitude-intention link is large, while the effect size for the attitude-behaviour link is moderate. Based on these results, policy makers promoting interventions or campaigns for the sustainable energy transition should keep in mind that changing attitudes might not be enough to change actual behaviour. In sum, the results of the current meta-analysis confirm the substantial associations between the individual-level factors investigated and ESB, but that further relevant factors need to be taken into account when tailoring policies and campaigns for the transition towards more sustainable energy sources in the society at large.

## The psychological factors in the ECHOES survey

As reported in more detail in other ECHOES documents (e.g, Deliverable D7.1) a relevant task effort in the ECHOES project was dedicated to the conduction and elaboration of an international survey consisting of a comprehensive questionnaire on individuals' energy related behaviours, attitudes and choices covering six main areas of life (Housing, Mobility, Diet, Consumption, Leisure, and Acquisition of Information). The survey was implemented across 31 European countries (EU-28, Norway, Turkey, and Switzerland) between August and December 2018, with about 600 respondents recruited in each country through a random sampling procedure, ensuring national representativeness for gender, age, occupation, and residence (urban/ rural), for a total sample of over 18,000 completed surveys. A series of WP4-based items were included in the survey, to measure psychological predictors of energy related choices. In particular, these WP4-based items refer to three main domains at the basis of energy-related choices:

- 1) Identity factors;
- 2) Social norms;
- 3) Individual level factors.

Because social identity and social norms are strongly interrelated and interdependent mechanisms at a social psychological level, we aggregated the results of these two classes of factors into a single section. In particular, we assessed how identity (individually-, group-, and place-focused identity types) predicts energy intention, and energy policy acceptance via social and personal norms. Furthermore, this model is studied from a multi-group perspective, by focusing on the effects of framing energy choices on different political decision making levels as follows: Municipality, Country, or European Union (EU). We also focused on the effects of these framing on different Pro-Environmental Energy Behaviour (PEB) types: i.e., building related, mobility related, and smart technology related as compared to more general support of the energy transition or energy saving.

Results reveal that, irrespective of the political reference frame (EU, Country, Municipality), and PEB type (buildings, mobility, smart technology), the main consistent drivers of energy policy acceptance are pro-environmental behavioural intentions and an individually-focused environmental identity (individualistic perspective). Furthermore, what we think others expect from us (injunctive norms, social influence perspective), what we expect of ourselves (personal norms, individualistic perspective), and what we see others doing (descriptive norms, social influence perspective) are substantially correlated with an individually-focused environmental identity. Personal norms are also affected by a place-focused identity, and injunctive norms. Finally, a group-focused identity predicts these injunctive norms. We can thus recommend that policy acceptance can be promoted by making it personally relevant (cueing intention and an individually-focused identity). Furthermore, there is a need for policies to support consumer-driven energy choices towards pro-environmental energy behaviour from an individualistic, and social influence perspective.

Furthermore, the individual-level psychological factors at the basis of energy choices assessed in the ECHOES survey are: 1) Economic and Social Political Ideology; 2) Emotion Regulation; 3) Consideration of Future Consequences; 4) Mindfulness; 5) Collective Pride; 6) Moral Anger 7) Climate change perception; 8) Anthropocentric climate change perception. The more conservative people are with respect to economic issues, the more conservative they are also about social issues, the more they suppress their emotions, and the more mindful they report to be. Furthermore, more conservative people report to adjust their behaviour less for future consequences, experience less pride if other people save energy and less moral anger when other people waste energy. They also are more sceptical about climate change and human causes to it. A similar pattern can be observed for the social political orientation. People who suppress their emotions more, report to more often change their thinking in situations that bother them, to consider the future more in their actions, to be more mindful, to experience more collective pride and moral anger, but to have more doubts about the human causes of climate change. People who adjust their thinking more to the situation, consider the future consequences of their actions more, are more mindful, and feel more collective proud and moral anger. They also are less in doubt about climate change being a reality. Individuals' perception about future consequences follows the same pattern as described for the variables before. More mindful people feel more collective pride, moral anger and perceive climate change as more real. Also feelings of collective pride were positively related to following variables: moral anger, climate change perception and anthropogenic climate change perception. Accepting climate change as real and man-made leads to a higher degree of moral anger if other people do not save energy. Finally, people's climate change perception was significantly and positively related to anthropogenic climate change perception, showing that the two components are usually seen together.



## **The social identity processes at the basis of energy choices assessed through the ECHOES psychological experiments**

As a final step in the ECHOES WP4 research activities, we conducted a series of empirical studies employing different methods (i.e., psychological experiments and correlational field studies), to investigate the role of social identity factors, social norms, and other social psychological variables in the decision making process leading to more sustainable energy choices as part of people's daily life behaviours.

In particular, a series of experiments was run, using a common protocol, starting from a pilot experiment conducted in Germany at the University of Leipzig, which was then replicated in Germany, Italy, Turkey, Bulgaria, and Norway. In addition to that, a computerized experiment, focusing on the interplay of social norms and identity process in affecting energy choices was conducted in Spain, and a web-based correlational survey focusing on individual and collective predictors of sustainable energy choices was conducted among employees of a large energy provider in Italy.

Taken together, the results of these empirical studies suggest the following:

Social norms in favour of the energy transition and observability of the decision motivate people to be more supportive of renewable energy. We show this in the context of monetary donations to a large, well-established renewable energy development initiative. Social norms and decision observability might thus increase support for renewable energy, even at a financial cost to oneself. When exposed to pro-environmental social norms, and when having the perception that their actions are being monitored or are observable by others, people might decide to more systematically pursue renewable energy options and invest personal money to this purpose. In addition to that, after taking these sustainable decisions, people might experience feelings of happiness and pride, might make energy policy interventions more easily accepted by the public at large.

People who are employed to a chronically strong pro-environmental and energy-sensitive working context and organizational culture, such as in the case of employees of the energy provider, ecological behaviour at the workplace and willingness to donate money for an organization that counteracts global climate change can be systematically linked to factors such as job satisfaction, identification with the organization, environmental identity and collective self-efficacy. These factors, in turn, can be directly or indirectly linked to emotional processes like feelings of guilt for not acting in an eco-friendly way, feelings of pride for acting in an eco-friendly way, collective pride, and moral anger.

The results from an additional series of experiments showed the expected positive (yet small) effect of social identity salience on collective action intentions. That is, when the social self was activated, respondents were more willing to engage in collective action to fight climate change. Interestingly, this main effect was qualified by an interaction effect of identity salience and environmental identity. Especially participants with lower levels of environmental identity (i.e. people who are usually less interested in environmental issues) reported greater intentions to engage in collective action when their social identity (vs. personal identity) was salient. In other words, salient social identities could motivate people, who are otherwise not (or less) motivated to engage for environmental issues, to join in (collectively) fighting climate change. The results also showed that these effects were mediated through social identification (i.e. ingroup solidarity). Salient social identity increased social identification (i.e. solidarity with the ingroup) which in turn led to higher action intentions.

### **Therefore, based on the results of the entire WP4 research, we recommend the following policy focus:**

- Strengthening personal connections to nature and pro-environmental beliefs should be a focus of educational policies, as it has broad-range effects on people's receptiveness concerning pro-environmental behaviour changes. For instance, fostering the mental connection between nature and people's self (i.e., identity), might help to support a large-scale transition to sustainable lifestyles.
- Emotions and affective factors (such as pride for reaching "energy saving" goals) can be a relevant motivational driver of energy saving behaviour, particularly in cultural and societal contexts where the sustainable energy options become the dominant norm and one's individual choices can be easily monitored by other people in the social context. The role of emotions in energy saving might be particularly relevant for specific social groups (for instance among men, compared to woman), while the link between identity and pro-environmental behaviour seems to be stronger among women than men. Thus, men might

be more successfully addressed by campaigns using emotional arguments, while women by campaigns using social identity arguments. Finally, value-driven appeals could be particularly affective in policies and campaigns targeting younger generations.

- Energy policy acceptance could be fostered by strategies and campaigns that promote the individual identification as a person that cares for the environmental sustainability; This, in turn is linked to factors such as injunctive norms (what we think others expect from us), personal norms (what we expect of ourselves), and descriptive group norms (what we see others doing). All these aspects should thus be incorporated in successful energy transition interventions and campaigns, as energy policy acceptance could be promoted by making environmental identity issues personally relevant for the targeted public. Furthermore, there is a need for policies to support consumer-driven sustainable energy choices from a psychological perspective, rather than from an economic and technological perspective.
- Because social norms and decision observability increase support for renewable energy even when this implies a personal financial cost, policy makers and other stakeholders could harness people's propensity to share their pro-social and pro-environmental behaviours with others, through electronic social media platforms and other fora. In turn, making people's pro-social and pro-environmental actions more visible could help to cultivate pro-social and pro-environmental normative perceptions in the public at large, thus strengthening citizens' motivations to act in a socially and environmentally beneficial manner.
- Work and organizational context could represent a particularly suitable arena in order to promote and foster individual and collective propensity towards more sustainable energy choices, by making people more aware, self confident and emotionally positive in relation to pro-environmental behaviours and sustainable energy choices in the workplace.
- Collective or social identities can be powerful drivers of pro-environmental action intentions when people associate them with pro-environmental values and goals in their everyday life. Thus, policies that highlight the distinct collective nature of sustainable energy projects could be an effective way to promote transitions to more sustainable energy use in people's daily life decisions. This may be fostered on both the level of face-to-face groups and with regard to broader social categories. That means, for instance, incentivizing local communities, neighbourhoods or private associations to engage in collaborate energy action. At the same time the transition to sustainable energy supply should be framed as a collective challenge on the country or EU level. This should be even more effective if collective projects can be defined that are specific for the respective collective (e.g., the nuclear phase-out in Germany) or that create intergroup competition (who is winning the race to the age of renewable energy, the EU, the US, or China?).



## TABLE OF CONTENTS

<b>1</b>	<b>Background of the Empirical work in WP4 .....</b>	<b>10</b>
1.1	<i>Introduction and scope of the WP4.....</i>	<i>10</i>
1.2	<i>Key psycho-social predictors of energy-related behaviours: A literature review .....</i>	<i>10</i>
1.3	<i>Summary of findings on social and personal identity variables predicting pro-environmental action (Meta Analysis 1) .....</i>	<i>20</i>
1.4	<i>Summary of findings on individual level psychological factors and energy saving behaviour (Meta Analysis 2) .....</i>	<i>21</i>
<b>2</b>	<b>REPORT ON FINDINGS FROM WP4 PSYCHOLOGICAL EMPIRICAL STUDIES AND WP4-BASED MULTINATIONAL SURVEY .....</b>	<b>24</b>
2.1	<i>Report on WP4-based multinational survey: Identity factors and social norms .....</i>	<i>24</i>
2.2	<i>Report on WP4-based multinational survey: individual factors.....</i>	<i>31</i>
2.3	<i>Report on WP4 experiments: Identity factors .....</i>	<i>37</i>
2.3.1	<i>Introduction and theoretical background .....</i>	<i>37</i>
2.3.2	<i>The ECHOES WP4 experiments .....</i>	<i>39</i>
2.3.3	<i>The ECHOES WP4 survey .....</i>	<i>46</i>
2.4	<i>Report on WP4 experiments: Social norms .....</i>	<i>57</i>
2.5	<i>Report on the WP4 field study: The case study in an Italian energy provider.....</i>	<i>67</i>
<b>3</b>	<b>GENERAL DISCUSSION AND CONCLUSIONS .....</b>	<b>78</b>
<b>4</b>	<b>ECHOES WP4 GLOSSARY .....</b>	<b>81</b>
<b>5</b>	<b>APPENDIX.....</b>	<b>87</b>
<b>6</b>	<b>General References.....</b>	<b>104</b>

# 1 BACKGROUND OF THE EMPIRICAL WORK IN WP4

## 1.1 Introduction and scope of the WP4

Within the ECHOES project, the major goal and scope of WP4, to which the present report pertains, is the understanding of how energy related decision making works on the individual level, and how groups and collective factors might impact these decisions. Coherently with this purpose, the first activities of ECHOES WP4 have been to conduct two comprehensive Meta-Analyses (MA) on the psychological factors at the basis of energy-related and pro-environmental choices, at both an individual and collective level, based also on an extensive literature review that was previously conducted within ECHOES WP3. Below we report a brief summary of the results of this WP4-related tasks, which were more extensively reported in previous ECHOES documents, where more detailed results of these activities can be found (e.g., ECHOES Deliverable D3.1 and ECHOES Deliverable D4.1).

Then, we will provide an extensive report of a series of empirical studies, conducted within the context of ECHOES Task 4.2 (Assessing individual and group determinants through psychological experiments) and ECHOES Task 4.3 (Individual factors in the ECHOES survey effort), where we aimed to test the major assumptions derived from the extensive literature review and from the comprehensive Meta-analysis already documented in the above mentioned WP3 and WP4 deliverable reports.

## 1.2 Key psycho-social predictors of energy-related behaviours: A literature review

Our previously submitted Deliverable D3.1 (Biresselioglu et al., 2017) offers a detailed overview of existing research on modeling energy-related behaviours and decisions (see also our published paper based on this work, Biresselioglu et al., 2018). A more concise summary of the literature that examines the psycho-social factors implicated in energy-related decisions is provided here.

The overall conclusion that can be drawn from reviewing the relevant literature is that there is a considerable amount of valid psychological and behavioural research dealing with the technologies and problem areas on which the ECHOES project focuses (i.e., energy consumption in buildings, electric mobility and the use of smart metering). Also, with the advent of new interdisciplinary journals dedicated to investigations in this and related domains, such as Energy Research & Social Science, further progress, as well as an integration of the different lines of research can be expected.

However, it also needs to be noted that the available evidence is in many cases still too limited and preliminary to draw firm conclusions regarding the impact of specific factors. For example, research on socio-demographic correlates and situational constraints and facilitators of electric mobility – which include for instance household income (Jansson et al., 2010, 2011; Hidrue et al., 2011; Jansson, 2011; Nayum & Klöckner, 2014; Barth et al., 2016; Mersky et al., 2016; Nayum et al., 2016; Zhang et al., 2016; She et al., 2017; White & Sintov, 2017) and the implementation of policy measures such as subsidies and toll waivers (Hackbarth & Madlener, 2013; Lai et al., 2015; Bjerkan et al., 2016; Mersky et al., 2016; Zhang et al., 2016; She et al., 2017) – offers a large number of mixed findings. We therefore propose that more data needs to be collected for the majority of the variables reviewed here, and the totality of available evidence should then be aggregated using meta-analytic means (for an example see Dimitropoulos et al., 2013 who perform a meta-analysis of the effect an electric vehicle's driving range has on people's willingness to pay for this type of car). Our Deliverable D4.1 (Masson et al., 2017) is one step in the direction of aggregating and evaluating available evidence in a systematic, quantitative manner.

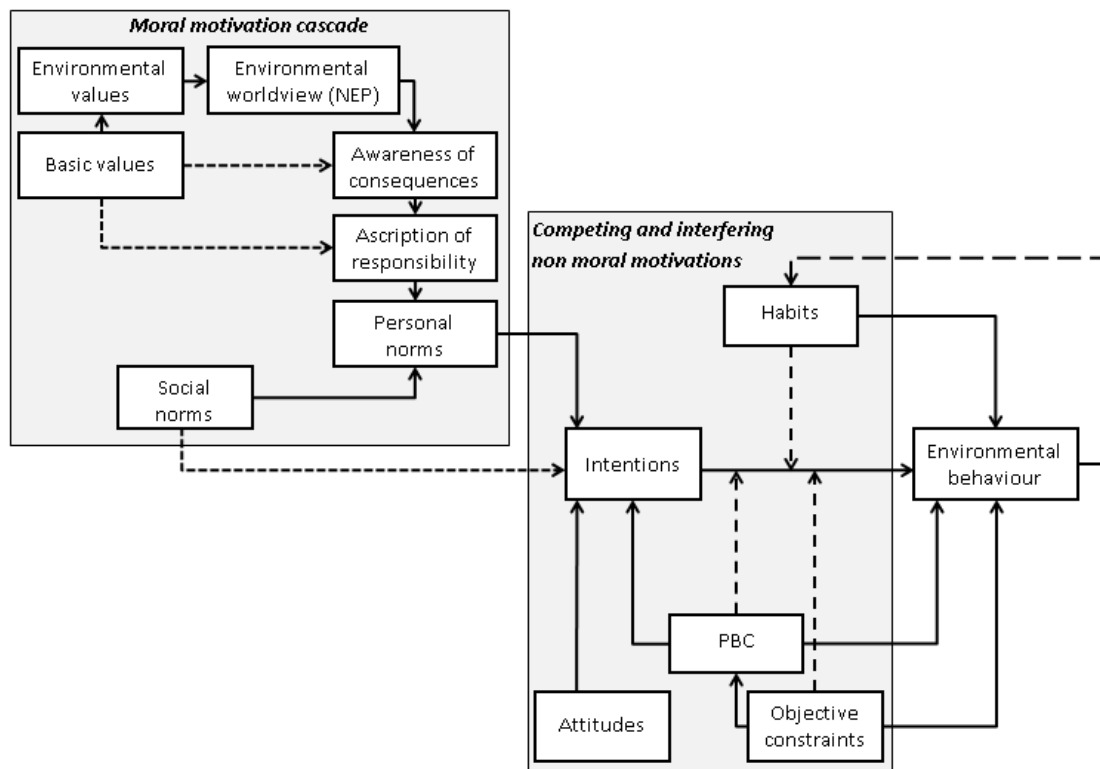
The current state of research in the area of energy-related decision-making and behaviour, as illustrated in the previous paragraph, should nevertheless not come as a surprise, in particular in view of the fact that the introduction of the technologies investigated here is mostly of a fairly recent date. Nor is it specific to the subject area under investigation: in most empirical sciences and probably in all social sciences, progress can only be made by accumulating and subsequently aggregating evidence (e.g., Maniadis et al., 2014), which can be a lengthy process. That said, existing literature offers many informative findings, some of which we outline below.

We organize our review around variables included in the Comprehensive Action Determination Model (CADM, Klöckner & Blöbaum, 2010), briefly described in the next section. Afterward, we focus on variables from this model as they have been studied in the context of the adoption and use of electric vehicles. In the following section, we do the same in the context of energy use in buildings, and similarly we present some key findings in the context of smart metering.

As part of Deliverable D3.1 (Biresselioglu et al., 2017), we pointed out and discussed the potential importance of additional factors that were not included in the CADM, namely social identity and related variables and emotions. We offer a brief discussion of these variables below. Empirical research making use of these newer factors has been somewhat limited in the domain of energy-related decisions, despite their recognized importance in many other areas of environmentally relevant behaviour (e.g. Terry et al., 1999; Carrus et al., 2008; Fielding et al., 2008; Kaiser et al., 2008; White et al., 2009; Ferguson & Branscombe, 2010; Harth et al., 2013; Onwezen et al., 2013; Masson & Fritsche, 2014; Passafaro et al., 2014; Rees et al., 2015; Bissing-Olson et al., 2016; Russell et al., 2017; Chatelain et al., 2018; Fritsche et al., 2018). Our deliverable D4.1 (Masson et al., 2017) summarizes much of the relevant research quantitatively (see also Chapters 1.2 and 1.3 below). In addition, Chapter 2 presents new findings on the role of social identity and emotions generated as part of the ECHOES project.

When analyzing individual drivers of energy behaviour in general and within the three technological foci in ECHOES in particular, our literature review revealed a substantial number of papers from environmental and social psychology that build on three major action models, namely the Theory of Planned Behaviour (Ajzen, 1991), the Norm Activation Theory (Schwartz & Howard, 1981), and the Value-Belief-Norm Theory (Stern, 2000). Whereas the first model conceptualizes decisions as following a mandate of rational choice (where rationality is defined within the decision maker's frame of reference, and can include non-monetary costs and benefits like the person's utility derived from following social norms, see Krupka & Weber, 2013), the other two models incorporate the importance of value orientations and moral norms for making decisions. Put in simple terms, whereas the Theory of Planned Behaviour highlights the best balance of costs and benefits, the Norm Activation Theory and the Value-Belief-Norm Theory underline the importance of doing what feels morally right to do.

More recently, empirical research has shown that energy-related decisions usually combine elements from both of the above perspectives, which means that models combining these previous approaches can be of benefit for creating a more comprehensive and accurate understanding of individual energy-related choices (Bamberg et al., 2007; Bamberg & Möser, 2007; Sopha & Klöckner, 2011; Nayum & Klöckner, 2014). We therefore decided to structure our analysis of past research on energy-related behaviour around an influential integrative model (CADM; Klöckner & Blöbaum, 2010; Klöckner, 2013a), as this model incorporates most of the frequently used individual predictors of energy-related behaviour. This model, which is depicted in Figure 1, consists of four main groups of variables: rational choice variables based on the Theory of Planned Behaviour (intentions and attitudes), routine processes (habits), situational influences (objective constraints and perceived behavioural control), and normative variables taken from the Norm Activation Theory and the Value-Belief-Norm Theory (and in part reflected in the Theory of Planned Behaviour as well). The CADM model arranges moral and non-moral processes in a two-step order, indicating that moral processes might motivate the decision-making process, but are vulnerable to being overridden by non-moral proximal motivations (e.g., whether or not a behaviour is feasible, see e.g. Guagnano et al., 1995). For more details on the CADM model see Deliverable D3.1 (Biresselioglu et al., 2017), as well as Klöckner & Blöbaum (2010) and Klöckner (2013a).



**Figure 1:** The Comprehensive Action Determination Model (Klöckner, 2013b, p. 462). Used by permission of Springer.

### Psycho-social predictors of e-mobility

In this section we provide a brief summary of previous research on psycho-social determinants of e-mobility. The section is organized around the key predictors from the CADM model, which has been presented in the previous section.

#### Social norms

Social norms have been shown to influence the adoption and the intention to adopt an electric vehicle (Moons & De Pelsmacker, 2012; Klöckner, 2014; Peters & Dutschke, 2014; Barth et al., 2016; Kaplan et al., 2016; Nayum et al., 2016; Schmalfuß et al., 2017; Smith et al., 2017). Consistent with CADM, the impact of social norms on the decision to adopt is mediated by personal norm and, in the final step, by intention in Nayum & Klöckner (2014).

#### Personal norms

Personal norms have been shown to influence the intention to adopt an electric vehicle (Klöckner, 2014; Nordlund et al., 2016). When modeling differences on a within-subject level, Klöckner (2014) finds that variation in personal norms over time explains changes in one's intention to adopt an electric vehicle in his longitudinal study. In Barbarossa et al. (2015), personal norm affects attitude, which in turn influences the intention to adopt an electric car (see also Fornara et al., 2016 who report the same chain of influences in the context of energy-related investments in the home). This ordering of influences is therefore somewhat different than what is postulated in the CADM, although some previous studies have argued for a norm-attitude link (e.g. Kaiser, 2006; see also Terry & Hogg, 1996 who focus specifically on the social norm-attitude link). Partial mediation of personal norms via attitudes might be considered as a possible addition to CADM.

#### Awareness of Consequences

Awareness of consequences and other similar variables, such as awareness of need or perceived severity of environmental problems, have been shown to increase the intention to adopt an electric vehicle (Bockarjova & Steg, 2014). Similarly, people with higher awareness of consequences were more likely to adopt an electric car, rather than most types of conventional cars (Nayum et al., 2016). In line with the CADM, awareness of need has

been shown to be linked to personal moral obligation to adopt an electric vehicle indirectly via ascribed responsibility (Klößner, 2014; also see Jansson et al., 2011; Nayum & Klößner, 2014).

#### Ascribed responsibility

Ascribed responsibility is associated with the decision to adopt an electric vehicle (Nayum et al., 2016), as well as with adoption of an alternative fuel vehicle more generally (Jansson et al., 2011). Consistent with the CADM, ascribed responsibility has been shown to predict personal moral obligation to adopt an electric vehicle (Klößner, 2014) or an alternative fuel vehicle more generally (Jansson et al., 2011).

#### Values

Values are considered to be a distal, rather than a proximal predictor of behaviour (see Figure 1). Consistent with this view, Jansson et al. (2011) show that values predict the New Environmental Paradigm score, awareness of consequences and ascription of responsibility. Similarly, in Nordlund et al. (2016), self-enhancement and self-transcendence values predict the New Environmental Paradigm score. There is, nevertheless, also some evidence suggesting a more immediate influence of values on behaviour. In Jansson et al. (2011), egoistic values have a direct effect on the adoption of an alternative fuel vehicle, and biospheric values have a direct effect on personal norm towards purchasing an alternative fuel vehicle (see also Fornara et al., 2016).

#### New Environmental Paradigm

Consistent with the CADM, the New Environmental Paradigm score is predicted by biospheric, altruistic and egoistic values (see Jansson et al., 2011; Nordlund et al., 2016). Also consistent with the CADM, the New Environmental Paradigm score predicts awareness of consequences (see Nayum & Klößner, 2014) and similar variables, such as environmental problem awareness (Nordlund et al., 2016). As with values, New Environmental Paradigm is considered to be a distal predictor of behaviour. However, in Jansson et al. (2011), the New Environmental Paradigm score also has a direct effect on adoption of an alternative fuel vehicle. Similarly, in Nayum & Klößner (2014), the New Environmental Paradigm influences the intention to adopt a fuel-efficient vehicle also relatively directly via its effect on attitude, besides its more indirect influence via the moral motivation cascade.

#### Habits

Jansson et al. (2010) find that car habit strength decreases the willingness to adopt an alternative fuel vehicle, i.e. frequent drivers are less willing to adopt. Similar findings are reported by Klößner et al. (2013) and Nordfjærn et al. (2016) – frequent drivers are less likely to adopt an electric car. In Klößner et al. (2013), this is, however, only true for households with a single car. For households owning more than one car, no such link between annual mileage and adoption exists.

#### Attitudes

Moons & De Pelsmacker (2012), Bühler et al. (2014), Barbarossa et al. (2015), Kaplan et al. (2016), Morton et al. (2016), and Nayum et al. (2016) report a positive link between favourable attitudes towards electric cars and different adoption indicators.

#### Perceived Behavioural Control

Perceived behavioural control has been shown to influence adoption and intention to adopt an electric vehicle (Bockarjova & Steg, 2014; Kaplan et al., 2016; Nayum et al., 2016; Schmalfuß et al., 2017) and fuel-efficient vehicles more generally (including electric ones, see Nayum & Klößner, 2014). In some studies, however, no such link has been detected (Klößner, 2014). Consistent with the CADM, perceived behavioural control is in part explained by objective constraints, such as income (Nayum & Klößner, 2014) or purchase price (Kaplan et al., 2016).

#### Contextual Factors

Contextual factors constraining the adoption of electric (and alternative fuel and fuel-efficient) vehicles may include income (Jansson et al., 2010, 2011; Hidrue et al., 2011; Jansson, 2011; Nayum & Klößner, 2014; Barth et al., 2016; Mersky et al., 2016; Nayum et al., 2016; Zhang et al., 2016; She et al., 2017; White & Sintov, 2017), household size (Jansson et al., 2010, 2011; Jansson, 2011; Nayum & Klößner, 2014; Nayum et al., 2016; She et al., 2017), policy measures, such as subsidies, toll waivers or bus lane access for electric cars (Hackbarth & Madlener, 2013; Lai et al., 2015; Bjerkan et al., 2016; Mersky et al., 2016; Zhang et al., 2016; She et al., 2017; for

an early review see Leurent & Windisch, 2011), as well as a number of monetary and non-monetary cost factors, such as high purchasing price, limited range, long charging time, and underdeveloped charging infrastructure (Hidrué et al., 2011; Lieven et al., 2011; Franke et al., 2012; Hackbarth & Madlener, 2013; Jensen et al., 2013; Schuitema et al., 2013; Bockarjova & Steg, 2014; Noppers et al., 2015; Barth et al., 2016; Hardman et al., 2016; Junquera et al., 2016; Kaplan et al., 2016; Skippon et al., 2016; Zhang et al., 2016; Schmalfuß et al., 2017; She et al., 2017; Smith et al., 2017; White & Sintov, 2017). Note that findings concerning the impact of contextual factors are often mixed, hence their meta-analytic aggregation can be useful.

## **Psycho-social predictors of energy use in buildings**

In this section, we briefly summarize existing research on psycho-social determinants of energy use in buildings. It is possible to distinguish three types of actions that influence how much and what type of energy is consumed in buildings: curtailment behaviour, investment behaviour and purchasing green vs. grey energy.

Curtailment behaviour means reducing one's energy consumption within one's current structural setting (e.g. one's home or office). This mostly includes simple actions, such as unplugging unused electric devices or cooking with lids on pots. Investment behaviour means investing resources (typically money, but possibly also labor) to change one's current structural setting by improving its energy efficiency. This might include the purchase of energy-efficient electric appliances, insulating one's house or installing solar panels. Finally, grey energy comes from non-renewable sources, such as coal, while green energy comes from renewable sources, such as wind, water or solar (Clark et al., 2003).

### *Social norms*

There is a growing corpus of studies showing that social norms influence energy-related behaviours in buildings. According to Cialdini et al. (1990), there are two types of social norms: descriptive social norms, which are behaviours that are common in a given situation, and injunctive social norms, which are widely shared beliefs of how one ought to behave in a given situation. Overall, there is considerable evidence that both injunctive norms and descriptive norms influence curtailment behaviours and intentions. Examples of curtailment actions that may be affected by social norms include turning off lights in unused rooms (Sussman & Gifford, 2012; Dwyer et al., 2015; Bergquist & Nilsson, 2016) or switching off unused computer monitors (Bator et al., 2014). Some studies (Schultz et al., 2007, 2015; Nolan et al., 2008; Sudarshan, 2017) measure overall household electricity consumption via meter readings. Second, both injunctive norms and descriptive norms influence investment behaviours and intentions, such as the intention to purchase energy-efficient appliances (Yang & Zhao, 2015; Wang et al., 2017), the intention to install a photovoltaic system (Korcaj et al., 2015; Rai & Beck, 2015; Fornara et al., 2016; Wolske et al., 2017, 2018; Curtius et al., 2018; Parkins et al., 2018), installation of a solar thermal system (Welsch & Kühling, 2009), and the intention to improve thermal insulation in one's home (Arpan et al., 2013; Fornara et al., 2016). Finally, there is also evidence that social norms play a role in shaping preferences for purchasing green energy (Ek & Söderholm, 2008; Welsch & Kühling, 2009; but see Litvine & Wüstenhagen, 2011).

### *Personal norms*

Personal norms have been shown to influence curtailment behaviours and intentions (Stern et al., 1983; van der Werff & Steg, 2015; Ruepert et al., 2016; Testa et al., 2016; but see Schultz et al., 2015), investment behaviours and intentions (Stern et al., 1983; Rai & Beck, 2015; Fornara et al., 2016; Testa et al., 2016; Wolske et al., 2017, 2018), and the intention to use green energy (van der Werff et al., 2013a, Study 1), as well as actual decisions to purchase green energy (Litvine & Wüstenhagen, 2011).

### *Awareness of consequences*

Awareness of consequences and other similar variables, such as environmental problem awareness, have been shown to increase the intention to curtail energy consumption (van der Werff & Steg, 2015), as well as actual curtailment behaviour in a field experiment (Asensio & Delmas, 2015). The intention to make energy-related investments and the probability of making actual investment decisions is also affected by awareness of consequences (Stern et al., 1983; Wang et al., 2017; Wolske et al., 2017). In van der Werff & Steg (2015), the influence of awareness of consequences on the intention to conserve energy is mediated via outcome efficacy and



personal norm, broadly consistent with CADM (see Figure 1). Similarly, in Wolske et al. (2017), who study interest in installing a photovoltaic system, awareness of consequences is linked to intention via personal norm.

#### Ascribed responsibility

In Fornara et al. (2016), ascribed responsibility predicts personal norm towards improving energy-efficiency of one's home. While this is consistent with the CADM, the authors also report a direct association of ascribed responsibility with intention. In Ek & Söderholm (2008), ascribed responsibility exerts a direct influence on preferences for green electricity, controlling for social norms, New Environmental Paradigm, price and other factors. Personal norm was not measured.

#### Values

In the context of improving energy-efficiency of one's home, biospheric values have been shown to predict environmental worldview (measured by a scale similar to NEP, see Corral-Verdugo et al., 2008). Environmental worldview in turn predicted awareness of consequences, which in turn predicted moral norm (see Fornara et al., 2016). These links are thus very similar to the moral motivation cascade proposed in the CADM. Biospheric values have been shown to predict the intention to conserve energy (van der Werff et al., 2013b, Study 1), the intention to use green electricity and the willingness to pay more for it (van der Werff et al., 2013b, Study 2). In each case, values were linked to intention indirectly via energy-saving self-identity (Study 1) or environmental self-identity (Study 2). Similarly, in Ruepert et al. (2016), environmental self-identity partially mediated the link between biospheric values and energy conservation personal norm. In Wolske et al. (2017), who study interest in adopting a photovoltaic system, values predicted awareness of consequences and personal norm (which was also predicted by awareness of consequences). Personal norm in turn predicted interest in adoption.

#### New Environmental Paradigm

New Environmental Paradigm is considered to be a distal predictor of behaviour (see Figure 1, see also Fornara et al., 2016). Nevertheless, in Clark et al. (2003), the New Environmental Paradigm score is a direct predictor of participation in a green electricity program (controlling for demographics and for "altruism", which captures personal norms, awareness of consequences and ascription of responsibility). Similarly, the New Environmental Paradigm score directly predicted preferences for green electricity in a hypothetical choice experiment by Ek & Söderholm (2008), controlling for ascribed responsibility, social norms, price, and other factors.

#### Habits

A good understanding of whether and how habits shape energy-related behaviour in buildings is important for designing interventions to discontinue undesirable habits and instill new, better ones. However, research on the role habits play in energy-related behaviour seems to be limited. There is some evidence that past behaviour influences energy conservation (Macey & Brown, 1983; Webb et al., 2013; Schultz et al., 2015) and investment behaviour (Macey & Brown, 1983; Sopha & Klöckner, 2011; Wang et al., 2017; Wolske et al., 2017).

#### Attitudes

Attitudes have been shown to influence curtailment behaviours and intentions (e.g. Macey & Brown, 1983; Ajzen et al., 2011; Smith et al., 2012; Dixon et al., 2015; but not in Webb et al., 2013), investment behaviours and intentions (Macey & Brown, 1983; Korcaj et al., 2015; Rai & Beck, 2015; Yang & Zhao, 2015; Yun & Lee, 2015; Fornara et al., 2016), and the intention to purchase green energy (Litvine & Wüstenhagen, 2011).

#### Perceived behavioural control

Perceived behavioural control has been shown to influence curtailment behaviours and intentions (Ajzen et al., 2011; Smith et al., 2012; Webb et al., 2013; Dixon et al., 2015), investment behaviours and intentions (Korcaj et al., 2015; Rai & Beck, 2015; Yun & Lee, 2015), and intentions to purchase green energy, as well as actual purchase decisions (Litvine & Wüstenhagen, 2011; Alam et al., 2014). Consistent with the CADM, perceived behavioural control is in part explained by objective constraints and facilitating conditions, such as availability of technical support (Yun & Lee, 2015).

#### Situational influences

Situational influences on energy consumption may include weather conditions (Allcott, 2011; Ayres et al., 2012; Asensio & Delmas, 2015), square footage and construction year of one's home (Stern et al., 1983; Allcott, 2011; Ayres et al., 2012), household size (Allcott, 2011; Ayres et al., 2012; Harries et al., 2013; Komatsu & Nishio, 2015),

energy prices (Jessee & Rapson, 2014; Sudarshan, 2017), income (Allcott, 2011; Ayres et al., 2012; Schultz et al., 2015), as well as automatization and other technological factors (Murtagh et al., 2015). Situational influences on energy-related investment intentions and behaviours may include income (Welsch & Kühling, 2009; Yao et al., 2014; Korcaj et al., 2015; Rai & Beck, 2015; Yang & Zhao, 2015; Wang et al., 2017; Wolske et al., 2017), monetary costs (Korcaj et al., 2015; Wang et al., 2017), household size (Stern et al., 1983; Welsch & Kühling, 2009; Wolske et al., 2017), square footage of one's home (Wolske et al., 2017), and policy interventions, such as subsidies and regulation (Yao et al., 2014; Yang & Zhao, 2015; Wang et al., 2017; see de la Rue du Can et al., 2014 for a thorough overview of different policy measures). Situational influences on preferences for green electricity may include income (Clark et al., 2003; Ek & Söderholm, 2008; Welsch & Kühling, 2009), monetary costs (Ek & Söderholm, 2008; Welsch & Kühling, 2009; Litvine & Wüstenhagen, 2011; Alam et al., 2014), and household size (Clark et al., 2003; Welsch & Kühling, 2009). Note that findings concerning the impact of situational constraints are often mixed, and thus aggregating previous results by meta-analytic means is important in this case. Meta-analyses of situational factors should take into account that their influence may be behaviour-specific (i.e., it may not be advisable to group together studies on investment and curtailment behaviours, for example).

### **Psycho-social predictors of smart energy technology**

In this section, we provide a brief outline of previous psycho-social research on smart energy technology acceptance and use. Due to a smaller number of relevant studies, this section is structured differently than the previous two sections, i.e., we review relevant papers individually, rather than grouping them according to the variables from the CADM.

Smart energy technology represents one of the three technological foci in the ECHOES project. The term includes a range of energy efficiency technologies that allow to phase in more renewable energy and to consume that energy more effectively through better monitoring of energy production and use and through providing households with detailed feedback on their energy consumption.

Uncertainty exists regarding households' willingness to accept smart energy technology. Van der Werff and colleagues (2016) discuss important findings from psychological studies aimed at understanding and promoting human behaviour in relation to smart energy technology. The authors highlight the role of motivational factors (notably values), as well as contextual factors (costs and benefits) influencing technology adoption. Consistent with the structuring of influences postulated in the CADM, values affect how people evaluate the costs and benefits of behaviours, how important they find different consequences of smart grids, and how they evaluate these consequences.

A recent overview of the literature (Ellabban & Abu-Rub, 2016) reveals that the most widely used theoretical frameworks for understanding consumers' smart grid acceptance include the Theory of Reasoned Action (Fishbein & Ajzen, 1975), the Theory of Planned Behaviour, and the Technology Acceptance Model (TAM, Davis, 1989).

Perri & Corvello (2015) applied the Theory of Planned Behaviour to explain users' intention to adopt smart grid solutions and technologies. Their results show that resistance to change (which can be broadly seen as a proxy of habit) was negatively correlated with attitudes towards the technology and with adoption intention. Attitudes, perceived behavioural control, and social norms were positive predictors of adoption intention.

Kranz et al. (2010) used an extended TAM model to study household acceptance of smart metering technology. The authors added the construct of subjective control to capture consumers' concerns about loss of control after installing a smart meter and the associated negative emotions. The results showed that attitude towards use was the most important determinant of the intention to use, while subjective control had medium indirect effect on intention to use, mediated through attitude.

Toft et al. (2014) conducted an online survey in Denmark, Norway, and Switzerland investigating private consumers' acceptance of smart grid technology. The TAM model was employed in the study with the addition of personal norm. The results showed that perceived usefulness and perceived ease of use were significant predictors of attitude towards smart grid technology in all three countries. Attitude was the most important predictor of smart grid acceptance.

Park et al. (2014) studied perceived risk of using the technology (e.g., perceived lack of cyber security) as an additional factor affecting the intention to accept the smart grid, besides other factors included in the TAM model.

Previous studies reported that perceived risk has a negative impact on technology acceptance and intention to use (Wu & Wang, 2005; Lee, 2009). For this reason, Park et al. (2014) proposed the so called “RITAM” (Risk Integrated TAM) as a modified model reflecting the assumption that users’ perceived risk about a new technology might have a negative impact on the intention to use. Park et al. (2014) in fact show that the higher the perceived risk of the technology, the lower its perceived usefulness.

Kranz & Picot (2011) investigated the factors influencing consumers’ intention to adopt smart meter technology, showing that attitude was the most influential determinant of intention. Intention was also driven by secondary sources’ influence (e.g. media, inspirational public figures), and by environmental concern, while perceived behavioural control did not have a statistically significant effect on intention.

## **Emotions and general environmental behaviour**

A review of the literature shows that the most studied emotion in relation to pro-environmental behaviour is guilt, followed by pride. Less attention has been paid to other emotions such as fear and anger, which also have been shown to play a relevant role in the formation of human judgment and habits (Lerner & Keltner, 2000; Reese & Jacob, 2015). Fear has been investigated in relation to the issue of nuclear energy, and it seems to play an interesting role in this field of research (Selimbegović et al., 2016).

Bierhoff (2002) posits that the formation and activation of moral norms, which are frequently related to eco-friendly behaviour (and also to energy-related decisions, see the sections above), is likely due to the interplay of cognitive, emotional (e.g., guilt), as well as social factors. Guilt can be considered an emotional reaction arising from an internal attribution of a harmful behaviour to the self (e.g., Baumeister et al., 1994). Such an emotion represents an interpersonal phenomenon which is functionally linked to communal relationships among individuals. Based on this, we can claim that it is an important pro-social emotion as it results in a felt obligation (moral norm) to compensate for the caused damage (Baumeister, 1998).

Moreover, feelings of guilt are also closely related to social norms, which have been shown to be important for energy-related decisions in previous research (see the sections above). In particular, Baumeister and colleagues indicate that a perceived mismatch between one’s own behaviour and social norms may engender guilt (Baumeister et al., 1994; Baumeister, 1998).

According to Onwezen and colleagues (2013), we can categorize studies that focus on feelings of guilt and pride into three groups:

First, we find studies proposing that the effects of anticipated pride and guilt on behaviour are mediated by personal norms (e.g., Hunecke et al., 2001; Kaiser & Shimoda, 1999). For example, Hunecke et al. (2001) show that personal ecological norms mediate the relationship between feelings of guilt and subway use.

Second, other authors point to a mediating role of guilt in the association between social and personal norms in the prediction of public transportation use (Bamberg et al., 2007). Bamberg et al. point out that the effects of social norms on behaviour are based on social pressure (i.e. fear of social sanctions), whereas the effects of personal norms on behaviour are based upon anticipated emotions (i.e. anticipation of negative self-related feelings). This reasoning implies that personal norms are related to anticipated emotions, which in turn, are associated with ecological behaviour. However, Baumeister (1998) indicates that an observed mismatch between one’s own behaviour and perceived social norms gives rise to feelings of guilt, which in turn activate personal norms. Bamberg & Möser’s (2007) meta-analysis supports this statement by showing that guilt is determined by both social norms and awareness of consequences, and that in turn, the feeling of guilt activates personal norms.

Third, some studies refer to the moderating role of anticipated guilt in the association between personal norm and behaviour (e.g., De Ruyter & Wetzels, 2000). Future studies are needed to investigate these possible mechanisms more deeply, and to disentangle the relationships among these factors.

Reviewing studies that investigate the role of guilt and pride in the environmental psychological field, there are some gaps to be filled. For example, there are some studies that integrate anticipated feelings of pride and guilt into the definition of personal norms, without using an explicit measure of such feelings (e.g., Vining & Ebreo, 1992; Harland et al., 1999). Other research includes feelings of guilt as an item in the measurement of personal norms (e.g., de Groot & Steg, 2009; Steg & de Groot, 2010). These kinds of studies do not differentiate between the constructs, and (more or less explicitly) assume that these emotions are part of a process in which personal norms

influence behaviour. Future studies in this field should thus try to measure these constructs as distinct variables. Moreover, previous studies have less frequently included anticipated pride in explaining eco-friendly behaviours (compared to studies on guilt). Thus, guilt has received much more attention than pride in previous research, and future studies should probably aim at filling such a gap.

The above summary of research on the role of emotions in the context of environmentally relevant behaviour may encourage researchers interested in energy-related decision-making to explore the role of emotions in this specific domain in detail. Chapter 2 provides results from our own experiments that go in this direction.

### **Social identity theory and general environmental behaviour**

Recent psychological research suggests that collective-level (i.e. social identity) variables play an important part in motivating pro-environmental conduct. Fritzsche et al. (2018) have introduced a model integrating these influences (the SIMPEA model), outlining how social identity processes affect (and are affected by) environmental crisis appraisal and how they drive individuals' responses. The model sketches a number of processes that seem crucial for creating people's collectively shared understanding of the challenges tied to environmental problems and the ways to tackle these challenges, including self-categorization and identification, ingroup norms and goals, as well as perceptions of collective efficacy.

While previous research on energy-related behaviour has often focused on private-sphere behaviour, SIMPEA has a broader conception of collective pro-environmental action, including both public activist and private-sphere behaviour (Stern, 2000). Although on the surface, adopting environmentally friendly modes of transportation or saving energy at home may seem to be merely private decisions, research shows that this is not the case. Instead, personal cost-benefit analyses are accompanied or even outperformed by social identity considerations such as perceived ingroup norms or collective efficacy as predictors of travel-mode choice intentions (Barth et al., 2016), food purchase (Masson & Fritzsche, 2014) or private energy-saving behaviour (Nolan et al., 2008; Schultz et al., 2015). Although SIMPEA applies to both private-sphere and activist environmental action and research supports this, it is still an open question whether both kinds of action are predicted equally well by social identity processes.

SIMPEA provides a network of hypotheses still to be appropriately and sufficiently tested and it may stimulate research in related theoretical and applied fields, including energy-related behaviours (see also Postmes et al., 2014; Fielding & Hornsey, 2016). For instance, whereas much work confirms that salient pro-environmental norms increase respective intentions and behaviour, this research is often unspecific with regard to the process underlying this effect. Do people conform to any more or less "significant" other (Ajzen & Fishbein, 2005) who reminds us of pro-environmental behaviour opportunities or unfolds some kind of social pressure (Cialdini & Trost, 1998), and what is it that determines "significance"? From a SIMPEA perspective, we assume a specific influence process elicited by perceived ingroup norms (i.e. referent informational influence, Hogg & Turner, 1987). Obviously, sufficiently testing the determinants and consequences of ingroup norms requires careful analysis or manipulation of these social identity contexts. This, in turn, may help to develop effective interventions targeting the creation of contexts that facilitate behaviour targeted at, among others, reducing energy consumption, such as increasing the salience of pro-environmental ingroups or suggesting social comparisons that highlight pro-environmental norms of chronically important ingroups (e.g., nations). Other social identity processes proposed by SIMPEA still lack extensive consideration. This is particularly true for the effects of social identity variables on environmental appraisal. For instance, comparing the ingroup of the actual world population with future generations may elevate perceived collective controllability of climate change, as present day activities will have higher potential to mitigate climate change than actions in the distant future.

A social identity perspective on environmental attitudes and behaviour may thus inspire a new generation of theory-based interventions for fostering pro-environmental action. Most importantly, it complements CADM and other individualistic models (e.g., Bamberg & Möser, 2007) by suggesting that successful environmental campaigns (e.g., campaigns to foster the transition to renewable energies) should take into account collective-level factors. In addition, it should teach campaigners that environmental self-efficacy and norms, as critical ingredients of pro-environmental motivation, do not entirely originate from personal attributes or inter-personal relations. Instead, practitioners have to be aware that individuals live in collective realities where group memberships determine to a large degree whether people consider pro-environmental action an appropriate expression of their (collective) self and even whether they think that environmental crises exist at all. This insight should turn campaigners' and policy



makers' attention to considering and possibly affecting the three critical social identity processes outlined in SIMPEA (i.e., ingroup identification and self-categorization, collective efficacy, and ingroup norms and goals).

Ingroup identification and self-categorization. Campaigners may affect people's ingroup identifications to change their environmental appraisals and actions. For instance, making people for whom climate change only poses a low personal risk think of themselves as citizens of the world might increase subjective risk to their self, as humanity is and will be affected in the future. In a similar vein, campaigns may highlight membership in generational groups that are ascribed responsibility for pro-environmental action (see Ferguson et al., 2011) or that are inherently characterized by pro-environmental norms ("we, the environmentalists vs. them, the harm-doers"). As a second identification-based strategy, framing environmental action as a collective endeavor should help to overcome barriers to personal action that rest on personal helplessness. For instance, defining the production and use of green energy as a collective project of the ingroup rather than as personal attitudes and individual decisions, may instigate personal actions (e.g., saving energy, using green technology) that people perceive as joining in a collective effort. "Joining in" means that people may not only experience connectedness and validation in line with ingroup norms and goals but also act on a level of their self, which is more appropriate for bringing about relevant changes than the personal self. Besides intragroup consensus, collective distinctiveness facilitates the perception of collective projects. As an example, for Germans, considering "Energy Transition" as a uniquely German project (Germany was the only European state that decided to shut down all of its nuclear power plants after the Fukushima disaster in 2011) should make salient a green energy norm of the ingroup. Although collective projects are most salient when they are unique for the ingroup, that does not mean that collective environmentalism of one group can only be attained at the cost of demolishing the pro-environmental collective self-image of another. Instead, the collective goal of protecting the environment may be held constant while groups or nations can be distinct with regard to the way they pursue it.

#### Collective efficacy

Global environmental crises can deeply threaten individuals. Although it is true that fear can motivate environmental action intentions (van Zomeren et al., 2010), in intervention campaigns it needs to be coupled with a sense of collective efficacy to truly increase willingness to act (Morton et al., 2011; Jugert et al., 2016). Thus, campaigns should emphasize possible solutions that can be – and possibly have been – achieved by a group's joined efforts. At the same time, perceptions of high ingroup effectiveness or agency (Stollberg et al., 2015) might be fostered by highlighting intragroup consensus over autonomously chosen collective action goals ("we as a people decided to go for sustainable energy"), and by ongoing goal-directed collective action ("the country is actually breaking-up towards a sustainable future"). The perception that "We" can make a difference will then motivate individuals to contribute to the collective project, especially those who highly identify as group members.

#### Ingroup identification

Both laypersons and environmental decision-makers underestimate the impact perceived social norms have on pro-environmental behaviour (Nolan et al., 2008; Barth et al., 2016). Thus, practitioners should be reminded of the effectiveness of group-tailored social norm information campaigns. At the same time, the "invisibility" of normative influence may be used to subtly influence people's environmental behaviour by directing their attention to descriptive pro-environmental ingroup norms (e.g., to statistics indicating that a clear majority is approving of or actually protecting the environment or respective trend information). These efforts should be accompanied by the promotion of pro-environmental cultural worldviews (e.g., through leaders, Amel et al., 2017) and by avoiding the impression that a majority is failing to conform to prescriptive pro-environmental norms (i.e., ambiguous norms, Cialdini, 2003; Smith et al., 2012).

SIMPEA suggests that referring to pro-environmental norms of a (situationally) self-relevant ingroup instead of norms of some nominal groups or undefined others will catalyse norm salience effects on behaviour (Masson & Fritsche, 2014). It should do even more so when the specific pro-environmental norm in question is presented as distinguishing the ingroup from outgroups, as then conforming to this norm is a distinct expression of group membership (e.g., when identified citizens are reminded that their city is known for its particularly high rate of bike users, biking will become more attractive for them). At the same time, norm information interventions might be less effective when people do not think that the information is specific for their ingroup or may even backfire in case people suspect that it describes an outgroup norm (Oyserman et al., 2007).

In the Chapter 2 of the present report, we provide results from ECHOES experiments and empirical studies that test different hypotheses derived from the SIMPEA model and related theories in the context of energy-related decision-making and behaviour.

### **1.3 Summary of findings on social and personal identity variables predicting pro-environmental action (Meta Analysis 1)**

As already reported in ECHOES D4.1, identity processes are increasingly recognized as potential drivers of pro-environmental action. This is true for different types of identity variables, such as social identity, environmental identity, connectedness to nature, and place identity. As social and personal identity effects on pro-environmental action have different implications for implementing pro-environmental policies, we were particularly interested in comparing the relative impact of these different kinds of identities.

To evaluate the policy potential of identity processes, one needs to look at the totality of available evidence, rather than on single experiments or surveys. While narrative reviews on some of the relevant predictors have been published recently (Restall & Conrad, 2015; Fielding & Hornsey, 2016; Fritsche, Barth, Jugert, Masson & Reese, 2018), a quantitative review of the literature has not been available up until now. The task of the present work is, therefore, to systematically evaluate existing research on the links between pro-environmental behaviours and behavioural intentions and different types of personal and social identity. We focus, specifically, on social identity, environmental identity, connectedness to nature, place identity and on their links to pro-environmental behaviours and intentions.

We conduct a series of eight meta-analyses, drawing on data from 125 independent samples with 58,207 participants. The following criteria were applied to select data for inclusion in the analysis. (1) The data has to be published in a scientific journal or in an edited book. (2) The dependent variable has to be an environmentally-relevant behaviour or an environmentally-relevant behavioural intention. (3) Among the independent variables has to be at least one of the following: social identity, environmental identity, connectedness to nature, or place identity. (4) Correlations between the respective dependent and independent variables and the sample size need to be reported in the paper. The main strategy consisted of searching five electronic databases of scientific literature (PsycINFO, Sage, ScienceDirect, Scopus, and Web of Science) using different combinations of search terms, such as “connectedness to nature”, “connectivity with nature”, “ecological identity”, “energy-saver”, “environmental identity”, “environmentalist identity”, “environmentally conscious consumer”, “environmentally friendly consumer”, “green consumer”, “green self-identity”, “group identification”, “inclusion of nature in self”, “place identity”, “pro-environmental identity”, and “social identity”. In order not to miss potentially relevant studies, we also used combinations of a number of search terms that only have a more distant link with the focal variables, for example “norm” and “theory of planned behaviour”. When applicable, we used both American and British English spelling. Bivariate correlations between an outcome variable and a predictor variable extracted from primary studies were used as observations in the analyses. When a study contained multiple outcome variables of the same type (such as two different intention measures) or multiple predictors of the same type, we aggregated the correlations according to the “shifting unit of analysis” method.

Following the procedures outlined so far, we arrived at 168 correlations extracted from primary studies. Before estimating the population effect size, we converted the correlations from primary studies to a standard normal metric using Fisher r-to-Z transformation. The population Z-scores we obtained were transformed back to r at the end. We obtained the estimate of the correlation size in the population from which the observations are drawn by estimating a random effects model. Random effects models assume the presence of unidentified sources of variance that are randomly distributed across studies (e.g., due to different procedures used to collect data). For each analysis, we also calculated Rosenthal’s fail-safe N and generated a funnel plot in order to address the possibility of a publication bias. Meta-analytic calculations were performed using the Comprehensive Meta-Analysis software (CMA). The MedCalc software was used to compare the size of correlations.

Using these quantitative meta-analytical methods, we conclude that most of the studied associations between identity variables and outcome variables are positive and moderate in size.

The evidence, specifically, points to a robust positive role of environmental identity (seeing yourself as an environmentally conscious person) and connectedness to nature (feeling yourself being connected to nature as a larger system) in promoting pro-environmental behaviours and intentions. Connectedness to nature is more



strongly related to pro-environmental behaviours in female participants and in samples from individualistic countries (e.g., The United States, United Kingdom and The Netherlands), whereas the relations are weaker for males and less individualistic countries.

The evidence also suggests that forming a pro-environmental social identity (constructing yourself as a person that belongs to a social group which is environmentally conscious) might potentially be the most powerful driver of a general propensity for pro-environmental action. Pro-environmental social identities might motivate behaviour both directly and also by making adherence to pro-environmental social norms more attractive to high identifiers (Fritzsche et al., 2017). However, it would be premature to draw definitive conclusions with regards to pro-environmental social identity, as there have been only eight primary studies focusing on this variable so far.

The results with respect to the effects of place identity (or place attachment) are mixed. Place identity (the feeling of belongingness to a physical space such as a city or region) is a moderately strong predictor of behaviour but it does not appear to be linked to pro-environmental intentions. Interestingly, place identity has a more pronounced influence on younger people. However, the mixed results may – partly – stem from differences in the measurement of place identity.

One limitation of this work is that we were able to locate only a couple of studies on energy consumption, electric mobility and smart energy technology. Replications focusing on these important areas are therefore needed. The broad scope of our literature search, nevertheless, suggests that our results are very likely generalizable to these specific behavioural domains.

In sum, our findings confirm the substantial policy potential of all studied identity variables (with some mixed results observed in case of place identity). If policy can contribute to either forming or triggering the social identities, likelihood of pro-environmental behaviour across different domains will increase.

#### **1.4 Summary of findings on individual level psychological factors and energy saving behaviour (Meta Analysis 2)**

In addition to identity factors, individual level factors such as ecological attitudes, pro-environmental values, awareness of consequences of one's behaviour, beliefs in climate change, emotions intended as motivational drivers of human behaviour, and intentions to adopt energy saving solutions have been frequently considered as potential antecedents of energy saving behaviour (ESB).

Also in the case of the individual-level factors at the basis of the transition towards more sustainable energy consumption and renewable energy sources, a systematic review of the literature considering all of these factors has not been conducted up until now. Thus, the main task of the current work was to systematically evaluate existing solid empirical evidence on the links between all of these factors (i.e., ecological attitudes, pro-environmental values, awareness of consequences, beliefs in climate change, emotions, and intentions to adopt energy saving solutions) and ESB. In particular, the intention to adopt energy saving solutions has been considered both as predictor of self-reported and actual ESB or as an outcome, when self-reported and actual behaviour were not available in the primary studies considered. A number of studies use the measure of intention only as an outcome of antecedent factors aimed to explain the adoption of energy saving solutions but, in doing so, it is not clear whether individuals' intention can be considered as a real proxy of behaviour in the energy domain or it is only integrating the more proximal antecedents of ESB. The scientific understanding of this crux is relevant to tailor policy campaigns and interventions because, on the one hand, it makes clearer that the intention might be considered as a factor somewhat different from individuals' behaviour. On the other hand, it identifies the intention as a relevant leverage to be used in advertisement and policy campaigns to foster the adoption of energy saving solutions.

We conduct a series of five meta-analyses, drawing on data from 102 independent samples with 59,948 participants. The calculations in this report are based on previously published data. We completed the literature search on June 20th, 2017. Various criteria were applied to select data for inclusion in the analysis. Specifically, studies were included in the meta-analysis if: (1) they were published in a peer-reviewed journal article in the last ten years; (2) they were published in English language; (3) the dependent variable has to be an energy-saving behaviour (actual or self-reported) or an energy-saving behavioural intention. (4) Among the independent variables has to be at least one of the following: attitudes, intentions, pro-environmental values, awareness of consequences, emotions (intentions were considered as predictors only for studies where the criterion variable was behaviour); (5)

in case of researches using an experimental design, the studies were included only if the experimental design had a control group; (6) In the case of papers where bivariate correlations between the respective dependent and independent variables and the sample size were not reported, we contacted authors to have the data via email; in case of no response after 2 email reminders, the correlations were estimated starting from other data available in the paper whenever possible (e.g., regression coefficients). When estimation was not possible, the paper was not included in the analysis. In addition, to excluding studies that did not meet the inclusion criteria cited above, we also excluded those studies that, rather than on energy use and consumption, were focused more on ideological, political or social stances that individuals, groups and communities might have in regard to energy-related issues; in this category, there are for example many studies that investigate people reactions to nuclear energy policies, or people aesthetic judgements or attitudes towards wind turbines, power lines, and so forth: these kind of studies were not included in our meta-analysis. Finally, qualitative studies that did not provide sufficient statistical data to allow the calculation of an effect size were not considered.

The search strategy followed to identify and select the studies to be included in the analysis was the following: studies were firstly identified by searching electronic databases (Scopus and Science Direct) and the reference lists from relevant articles. We used the following search terms for the meta-analysis:

“(attitude and energ\*) or (attitude and electric\*) or (emotion\* and energ\*) or (emotion\* and electric\*) or (guilt and energ\*) or (guilt and electric\*) or (pride and energ\*) or (pride and electric\*) or (anger and energ\*) or (anger and electric\*) or (“belief\* in climate change” and energ\*) or (“belief\* in climate change” and electric\*) or (“belief\* in global climate change” and energ\*) or (“belief\* in global climate change” and electric\*) or (“belief\* in global warming” and energ\*) or (“belief\* in global warming” and electric\*) or (“belief\* of climate change” and energ\*) or (“belief\* of climate change” and electric\*) or (“belief\* of global climate change” and energ\*) or (“belief\* of global climate change” and electric\*) or (“belief\* of global warming” and energ\*) or (“belief\* of global warming” and electric\*) or (“belief\* about climate change” and energ\*) or (“belief\* about climate change” and electric\*) or (“belief\* about global climate change” and energ\*) or (“belief\* about global climate change” and electric\*) or (“belief\* about global warming” and energ\*) or (“belief\* about global warming” and electric\*) or (“climate change risk perception\*” and energ\*) or (“climate change risk perception\*” and electric\*) or (“perception\* of climate change ” and energ\*) or (“perception\* of climate change ” and electric\*) or (“climate change perception\*” and energ\*) or (“climate change perception\*” and electric\*) or (“knowledge in climate change” and energ\*) or (“knowledge in climate change” and electric\*) or (“knowledge in global climate change” and energ\*) or (“knowledge in global climate change” and electric\*) or (“knowledge in global warming” and energ\*) or (“knowledge in global warming” and electric\*) or (“knowledge about climate change” and energ\*) or (“knowledge about climate change” and electric\*) or (“knowledge about global climate change” and energ\*) or (“knowledge about global climate change” and electric\*) or (“knowledge about global warming” and energ\*) or (“knowledge about global warming” and electric\*) or (awareness and energ\*) or (awareness and electric\*) or (intention\* and energ\*) or (intention\* and electric\*) or (“environment\* value\*” and energ\*) or (“environment\* value\*” and electric\*) or (“value system\*” and energ\*) or (“value system\*” and electric\*)”.

Our search strategy found a set of 5802 potentially relevant articles. This number includes duplicate hits (e.g., when the same paper was located in both databases). After removing the duplicates, in the initial screening of the articles, we examined the abstracts of potentially relevant papers to determine whether they met our inclusion criteria or they fell in our exclusion criteria. Thus, a sample of 582 full-text research articles remained to be inspected. Based on this set, we eliminated entries that were inconsistent with our eligibility criteria and those papers that shared the same dataset of a study already selected for the MA, such as multiple analyses conducted with an identical dataset on an identical variable pair ( $K = 480$ ). Finally, we contacted authors for additional data where whose articles were published within the last ten years that did not include sufficient information for us to compute the effect sizes. A final set of 102 research articles was included in the current meta-analysis after the application of all the inclusion criteria.

We used the correlation  $r$  as the effect size metric for the current meta-analysis. For studies that only reported the  $\beta$ s we had applied Peterson and Brown's formula:  $r = \beta + 0.05 \lambda$  (where  $\lambda = 1$  for non-negative  $\beta$ s, and  $\lambda = 0$  for negative  $\beta$ s) in imputing the corresponding  $r$ s. We also computed  $r$  values for studies that did not conduct correlational analyses via sample sizes along with  $t$ -values,  $\chi^2$  values,  $p$ -values, and standardized mean differences (i.e., Cohen's  $d$ ). In addition, we reverse-scored several measurements to assure that each positive effect size computed would represent a direct positive association between the various predictors (attitude/awareness of consequences/beliefs in climate change/emotions/pro-environmental values/intentions) and energy saving behaviour (ESB).

We adopted a random-effects model to calculate the combined effect size of each predictor on ESB. Because our sample contained studies conducted with noticeably different features, we did not follow the fixed-effect model. In fact, the latter model assumes that all the studies included are functionally identical and share a single canonical effect size. Additionally to relaxing this assumption, the random-effects model allows for more unconditional inferences (i.e., a generalizable conclusion to situations beyond the sampled studies) of the results.

Using this meta-analytical approach, we conclude that most of the studied associations between individual-level factors and energy-saving outcome variables are positive and moderate in size, ranging from small-moderate effects for pro-environmental values to large effects for emotions.

The results of the current meta-analysis specifically points out a robust positive role of emotional processes (such as anticipated pride when reaching the goal to save energy), considered as motivational drivers, in relation to energy saving behaviour. More interestingly, the relationship between this factor and energy saving behaviour would seem to vary as a function of gender and age. In particular, such a relationship would seem to be stronger among men than women (which also contrasts with the effects found for identity in the first section of this report). This implies that men can be more successfully addressed by behaviour-specific emotional factors, whereas women seem more receptive for the overarching social identity focus. Furthermore, the link between pro-environmental value and ESB varies as a function of age, being stronger among younger people.

The relationship between attitude and ESB revealed interesting results, in particular when considering the different ways through which ESBs have been operationalized as an outcome. In particular, the relationship between attitude and behaviour is not statistically significant when actual behaviour is considered as outcome (e.g., actual electricity consume measured in kWh). Moreover, a statistically significant difference emerged between the effects sizes linking attitudes to either energy-saving behavioural intentions or energy-saving self-reported behaviour, respectively: the effect size for the attitude-intention link is large, while the effect size for the attitude-behaviour link is moderate. Based on these results, policy makers and all actors involved in the transition towards sustainable energy sources should keep in mind these differences when tailoring policies, interventions or campaigns fostering such a transition in the society at large. In fact, changing attitudes is not enough to change actual behaviour, since the links between attitudes, intentions and behaviour in the energy saving domain (especially actual behaviour) are not always that strong.

In sum, the results of the current meta-analysis confirm the substantial associations between the individual-level factors investigated and ESB. In particular, our moderation analyses show further relevant factors that need to be taken into account when researchers investigate this phenomenon or policy makers tailor policies and campaigns aimed to foster a transition towards more sustainable energy sources in the society at large.

## **2 REPORT ON FINDINGS FROM WP4 PSYCHOLOGICAL EMPIRICAL STUDIES AND WP4-BASED MULTINATIONAL SURVEY**

As reported in more detail in other ECHOES documents (e.g., Deliverable D7.1) a relevant task effort in the ECHOES project was dedicated to the conduction and elaboration of an international survey consisting of a comprehensive questionnaire on individuals' energy related behaviours, attitudes and choices covering six main areas of life (Housing, Mobility, Diet, Consumption, Leisure, and Acquisition of Information) and pairing them with their socio-demographic characteristics, economic and financial profiles, and energy and resource consumption and mobility patterns. This permitted to foster a more holistic understanding of how different societal groups conduct their everyday lives and how they make energy and climate relevant decisions in different areas of life. The survey was implemented across 31 European countries (EU-28, Norway, Turkey, and Switzerland) during a 4-month period, between August and December 2018, with about 600 respondents recruited in each country through a random sampling procedure, and a total sample of over 18,000 completed surveys. Smaller participant responses were collected from Malta (n=263) and Cyprus (n=251). We had a representative sample for each country with respect to gender, age, occupation, and where the people lived (urban versus rural areas)

The average duration of the interviews was 20 minutes on the web survey. Respondents were recruited via email panels and were allowed into the sample if they could satisfy the representativity quotas in the dimensions of (age, income, gender). Participation was compensated with 5 euros and a small amount that is given by the panel company.

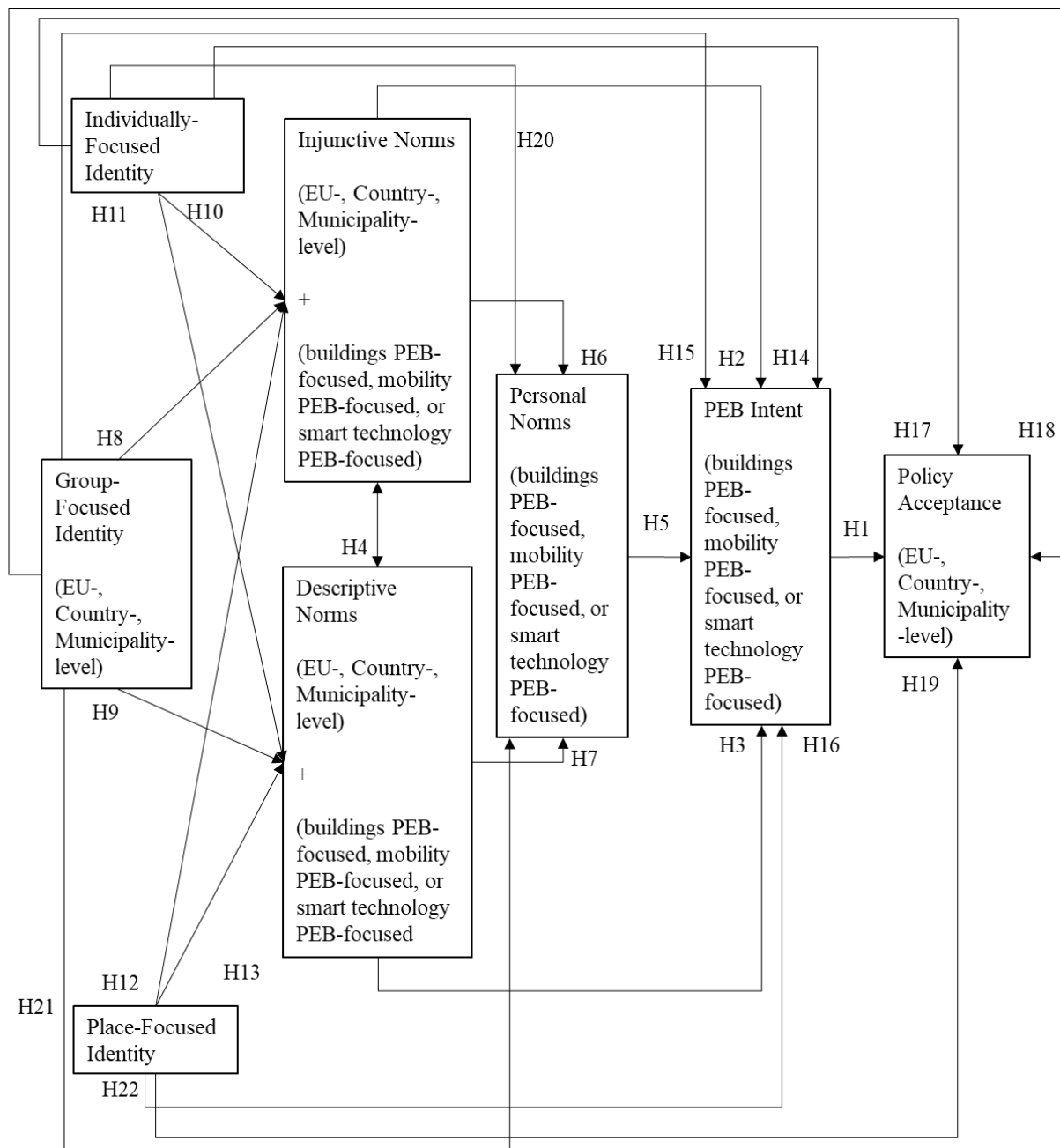
Within the context of this ECHOES international survey, a series of items were included based on the WP4 concepts and findings about the psychological predictors of energy related choices. In particular, these WP4-based items refer to three main domains, which were highlighted as central to the psychological dimensions of energy-related choices in the previous ECHOES WP3 and WP4 activities, which are:

- 1) Identity factors at the basis of energy-related choices;
- 2) Social norms at the basis of energy-related choices;
- 3) Individual level factors at the basis of energy-related choices.

### **2.1 Report on WP4-based multinational survey: Identity factors and social norms**

In this section, we briefly report the results of the survey sections that refer more specifically to the identity factors and social norms at the basis of energy-related choices. Because social identity and social norms are strongly interrelated and interdependent mechanisms at a social psychological level, we aggregate and report the results of these two classes of factors into a single section.

In particular, we assessed how identity (individually-, group-, and place-focused identity types) predicts energy intention, and energy policy acceptance via social and personal norms, which we name as the identity-norm-action model (INAM: see Figure 2). Furthermore, this model is studied depending on where the identification frame is positioned. Specifically, we focus on the effects of framing choices on different political levels: Municipality, Country, or European Union (EU). Furthermore, we focus on the effects for different types Pro-Environmental Energy Behaviour (PEB) types: buildings, mobility, and smart technology. Therefore, we can establish the generalizability and robustness of this model as well as explore the importance of reference frames for political action (local, national, trans-national).



**Figure 2:** The identity-norm-action model (INAM) tested in the ECHOES multinational survey

Several hypotheses were elaborated on the basis of the previous literature reviewed throughout WP3 and WP4 as well on the basis of the meta analyses conducted in ECHOES WP4 and already reported in the previous WP4 deliverable (D4.1). Table 1 describes these hypotheses in detail.

**Table 1:** Main hypotheses (H) and assumptions (A) tested by social norms and identity items included in the ECHOES multinational survey

H1	We expect policy acceptance (Stern, 2000), to be determined by PEB intent.
H2	We expect injunctive norms to save energy to predict PEB intention.
H3	We expect descriptive norms to save energy to predict PEB intention.
H4	We expect these injunctive norms and descriptive norms to save energy to correlate positively.
H5	We expect PEB intent to be determined by personal norms to save energy.
H6	We expect injunctive norms to save energy to predict personal norms to save energy.
H7	We expect descriptive norms to save energy to predict personal norms to save energy.
H8	We expect a group-focused identity to predict injunctive norms to save energy.
H9	We expect a group-focused identity to predict descriptive norms to save energy.
H10	We expect an individually-focused environmental identity to predict injunctive norms to save energy.
H11	We expect an individually-focused environmental identity to predict descriptive norms to save energy.
H12	We expect a place-focused identity to predict injunctive norms to save energy.
H13	We expect a place-focused identity to predict descriptive norms to save energy.
H14	We expect an individually-focused identity to predict PEB intent.
H15	We expect a group-focused identity to predict PEB intent.
H16	We expect a place-focused identity to predict PEB intent.
H17	We expect an individually-focused environmental identity to predict policy acceptance.
H18	We expect a group-focused identity to predict Policy Acceptance.
H19	We expect a place-focused identity to predict Policy Acceptance.
H20	We expect an individually-focused environmental identity to predict personal norms.
H21	We expect a group-focused identity to predict personal norms.
H22	We expect a place-focused identity to predict personal norms.
A1	All identity types are needed for understanding PEB: Individually-, group-, and place-focused identity as explained by theories of identity, specifically, identity theory (Stryker & Burke, 2000), social identity (Tajfel & Turner, 1979), and place identity theory (Proshansky et al., 1983), respectively (Murtagh et al., 2012; Stets & Burke, 2000; Stryker & Burke, 2000).

## Measures



To test our main hypotheses, several questions related to participants social norms and identity were included in the survey (see Table 2).

**Table 2:** Social norms and identity-based measures, corresponding survey questions

What we measured	How we measured it
Group-Focused Identity (EU-, Country-, Municipality-level)	How much do you see yourself as a citizen of your (EU, Country, or Municipality)? (1= not at all; 5= extremely)
Injunctive Norms 1 (EU-, Country-, Municipality-level)	Many people in my (EU, Country, or Municipality) would support it if I used less energy (e.g., using public transport instead of a personal car, turning off lights when leaving the room, using technical appliances which help to save energy). (1= strongly disagree; 5= strongly agree)
Injunctive Norms 2 (EU-, Country-, Municipality-level)	Many people in my (EU, Country, or Municipality) would support it if I favoured energy policies that support the energy transition (e.g., policies that increase the prices of fossil fuels). (1= strongly disagree; 5= strongly agree)



What we measured	How we measured it
Descriptive Norms 1 (EU-, Country-, Municipality-level)	A growing number of people in my (EU, Country, or Municipality) try to save energy (e.g., using public transport instead of a personal car, turning off lights when leaving the room, using technical appliances which help to save energy).  (1= strongly disagree; 5= strongly agree)
Descriptive Norms 2 (EU-, Country-, Municipality-level)	A growing number of people in my (EU, Country, or Municipality) favour energy policies that support the energy transition.  (1= strongly disagree; 5= strongly agree)
Injunctive Norms (buildings PEB-focused)	Many people in (EU, Country, or Municipality) would support me decreasing my energy consumption for heating and cooling my dwelling.  (1= strongly disagree; 5= strongly agree)
Descriptive Norms (buildings PEB-focused)	A growing number of people in (EU, Country, or Municipality) have decreased their energy consumption for heating and cooling their dwelling.  (1= strongly disagree; 5= strongly agree)
Injunctive Norms (mobility PEB-focused)	Many people in (EU, Country, or Municipality) would support me purchasing an electric bicycle.  (1= strongly disagree; 5= strongly agree)
Descriptive Norms 1 (mobility PEB-focused)	A growing number of people in (EU, Country, or Municipality) will buy an electric bicycle within the next five years.  (1= strongly disagree; 5= strongly agree)
Descriptive Norms 2 (mobility PEB-focused)	In my opinion, people will buy many more electric bicycles as soon as the current obstacles have been dealt with.  (1= strongly disagree; 5= strongly agree)
Injunctive Norms (smart technology PEB-focused)	Many people in (EU, Country, or Municipality) would support me if I allowed my grid operator to remotely switch on and off non-critical appliances in my home.  (1= strongly disagree; 5= strongly agree)
Descriptive Norms (smart technology PEB-focused)	A growing number of people in (EU, Country, or Municipality) have allowed their grid operator to remotely switch on and off non-critical appliances in their home.  (1= strongly disagree; 5= strongly agree)
Personal Norms 1	I feel a personal obligation to be energy efficient (e.g., using public transport instead of a personal car, turning off lights when leaving the room, using technical appliances which help to save energy).  (1= strongly disagree; 5= strongly agree)
Personal Norms 2	I feel a personal obligation to support energy policies that support the energy transition.  (1= strongly disagree; 5= strongly agree)
Personal Norms (buildings PEB-focused)	I feel a personal obligation to decrease my current energy consumption for heating and cooling my dwelling.  (1= strongly disagree; 5= strongly agree)
Personal Norms (mobility PEB-focused)	I feel a personal obligation to purchase an electric bicycle within the next five years. (If you already have an electric bicycle, please indicate whether you felt a personal obligation to buy it prior to the purchase.)  (1= strongly disagree; 5= strongly agree; 6= I do not ride a bike)

What we measured	How we measured it
Personal Norms (smart technology PEB-focused)	I feel a personal obligation to allow my grid operator to remotely switch on and off non-critical appliances in my home. (1= strongly disagree; 5= strongly agree)
Individually-Focused Identity	Acting pro-environmentally is an important part of who I am. (1= strongly disagree; 5= strongly agree)
Place-Focused Identity	Please choose the picture below which best describes your relationship with the natural environment.  <div> 1=Me – Nature  </div> <div> 5=Me – Nature  </div>
PEB Intent	I intend to use energy in a way that helps bringing the transition to a renewable energy system. (1= strongly disagree; 5= strongly agree)
Policy Acceptance	I would accept energy policies that protect the environment even when these induce higher costs (e.g., policies that increase the prices of fossil fuels). (1= strongly disagree; 5= strongly agree)
Policy Acceptance (EU-, Country-, Municipality-level)	I would accept energy policies that create new jobs in (EU, Country, or Municipality) even when these induce higher costs (e.g., policies that increase the prices of fossil fuels). (1= strongly disagree; 5= strongly agree)
PEB Intent (buildings PEB-focused)	I intend to decrease my energy consumption for heating and cooling my dwelling. (1= strongly disagree; 5= strongly agree)
PEB Intent (mobility PEB-focused)	I intend to purchase an electric bicycle within the next five years. (1= strongly disagree; 5= strongly agree)
PEB Intent (smart technology PEB-focused)	Would you allow your grid operator to remotely switch on and off non-critical appliances in your home if you were offered an annual discount? (1= strongly disagree; 5= strongly agree)

#### Group size questions: EU-, Country-, Municipality-level

For the questions named 'Group-Focused Identity', 'Injunctive Norms 1', 'Injunctive Norms 2', 'Descriptive Norms 1', 'Descriptive Norms 2' and 'Policy Acceptance', the reference to the reference frame from political action was experimentally varied: One third of the sample were randomly presented with the name of their municipality in the question (Municipality). One third of the sample were randomly presented with the name of their country in the question (Country). The final third of the sample were randomly presented with the European Union in the question (EU).

#### PEB- Type Questions: Buildings, Mobility, and Smart Technology

Furthermore, the type of PEB-focused questions varied where one third of the sample received buildings PEB-focused questions: Questions named 'Injunctive Norms (buildings PEB-focused)', 'Descriptive Norms (buildings PEB-focused)', 'Personal Norms (buildings PEB-focused)', and 'PEB Intent (buildings PEB-focused)' (see Table 2, Column 1). The second third of the sample received mobility PEB-focused questions: Questions named 'Injunctive Norms (mobility PEB-focused)', 'Descriptive Norms 1 (mobility PEB-focused)', 'Descriptive Norms 1 (mobility PEB-

focused)', 'Personal Norms (mobility PEB-focused)', and 'PEB Intent (mobility PEB-focused)'. The final third of the sample received smart technology PEB-focused questions: Questions named 'Injunctive Norms (smart technology PEB-focused)', 'Descriptive Norms (smart technology PEB-focused)', 'Personal Norms (smart technology PEB-focused)', and 'PEB Intent (smart technology PEB-focused)'.

#### PEB-Type Questions: Energy Transition and Energy Saving

Also, questions named 'Injunctive Norms 2', 'Descriptive Norms 2', 'Personal Norms 2', and 'PEB Intent' referred to PEB that was 'supporting the Energy Transition'. However, questions named 'Injunctive Norms 1 (EU-, Country-, Municipality-level)', 'Descriptive Norms 1 (EU-, Country-, Municipality-level)', 'Injunctive Norms (buildings PEB-focused)', 'Descriptive Norms (buildings PEB-focused)', 'Personal Norms 1', 'Personal Norms (buildings PEB-focused)', 'Policy Acceptance', 'Policy Acceptance (EU-, Country-, Municipality-level)' and 'PEB Intent (buildings PEB-focused)' (see Table 2, Column 1) referred to PEB that related to 'energy saving'. The term 'Energy Transition' can be defined as 'the transition to a renewable energy system including individual energy choices' (Klöckner, 2019, p. 6).

### **Analysis Strategy**

Our model was tested in parallel on the different versions of the questionnaire (multi-group analysis). For example, we provide three tests of the "Intent – Policy Acceptance" link on the three thirds of the sample framed with the different political levels. The purpose of the multiple parallel tests is to provide support for the generalizability of the INAM across different political levels as mentioned earlier. Our model was also tested in parallel different versions of the questionnaire with respect to the different behavioural foci (buildings, mobility, smart technology). For example, we provide an additional four tests of the "Intent – Policy Acceptance".

### **Results**

The statistical analysis conducted reveals that irrespective of the political reference frame (EU, Country, Municipality), and behavioural focus (buildings, mobility, smart technology), we could find the main consistent drivers of policy acceptance, which are PEB intent and an individually-focused environmental identity. Furthermore, what we think others expect from us (injunctive norms, social influence perspective), what we expect of ourselves (personal norms, individualistic perspective), and what we see others do (descriptive norms, social influence perspective) are correlated with an individually-focused identity. Personal norms are affected by identity, in this case, nature specifically (pro-environmentally focused), and injunctive norms. Finally, a group-focused identity predicts these injunctive norms.

We can thus recommend that policy acceptance can be promoted by making it personally relevant (cueing intention and an individually-focused identity aspects such as its relation to personal values and norms), which is PEB-focused. Furthermore, there is a need for policies to support consumer-driven energy choices towards pro-environmental energy behaviour from an individualistic, and social influence perspective.

To summarise the results, we found that intent directly predicted policy acceptance irrespective of the of political level (Municipality, Country, EU) and behavioural focus (supporting H1 seven times).

Furthermore, intent was to some extent predicted by injunctive norms. That is, evidence for H2 was not found for the municipality and EU level, and for mobility (supporting H2 four times).

Additionally, what a person perceives others are doing (the descriptive norms) often predicted intent. That is, evidence for H3 was not found for the municipality and EU level (supporting H3 five times).

Injunctive norms and descriptive norms did always correlate irrespective of the of political level (Municipality, Country, EU) and behavioural focus (supporting H4 seven times).

Intent was predicted by personal norms only a few times. That is, evidence for H5 was only found for the three behaviour focus specific models but not for general energy saving or energy transition support (supporting H5 three times).

Furthermore, injunctive norms always predicted personal norms irrespective of the of political level (Municipality, Country, EU) and behavioural focus (supporting H6 seven times).

Furthermore, descriptive norms always predicted personal norms irrespective of the of political level (Municipality, Country, EU) and behavioural focus (supporting H7 seven times).

Additionally, a group-focused identity always predicted injunctive norms irrespective of the of political level (Municipality, Country, EU) and behavioural focus (supporting H8 seven times).

Additionally, a group-focused identity mostly predicted descriptive norms. That is, evidence for H9 was not found for smart technology (supporting H9 six times).

An individually-focused environmental identity has a consistent influence on injunctive norms (supporting H10 seven times).

An individually-focused environmental identity has a consistent influence on descriptive norms (supporting H11 seven times).

A place-focused identity has a weak but rather consistent influence on injunctive norms. That is, evidence for H12 was not found for the buildings focus. Furthermore, the effect was weaker for smart technology (supporting H12 six times).

A place-focused identity also has a weak but rather consistent influence on descriptive norms. That is, evidence for H13 was not found for the buildings focus (supporting H13 six times).

An individually-focused environmental identity predicted PEB intent in most tested models. That is, evidence for H14 was not found for the Country level (supporting H14 six times).

A group-focused identity mostly did not predict intent. That is, evidence for H15 was only found for mobility, which was significant at a weaker level (supporting H15 one time).

A place-focused identity had a weak influence on intent. That is, evidence for H16 was only not found for smart technology (supporting H16 six times).

An individually-focused environmental identity consistently predicted policy acceptance irrespective of the of the political level (Municipality, Country, EU) and behavioural foci (supporting H17 seven times).

A group-focused identity consistently predicted policy acceptance only when the results were split by political level and behavioural focus, which means H18 was not supported in the total sample for general support of the energy transition (supporting H18 six times).

A place-focused identity has a weak but fairly consistent influence on policy acceptance. That is, evidence for H19 was not found for the Country and EU level. Furthermore, the H19 link was weaker for the Municipality level (supporting H19 five times).

An individually-focused environmental identity has always an influence on personal norms, irrespective of the political level (Municipality, Country, EU) and behavioural foci (supporting H20 seven times).

A group-focused identity mostly has an influence on personal norms. That is, evidence for H21 was not found for the mobility. Furthermore, the H19 link was weaker for the different political levels (Municipality, Country, and EU), and behavioural foci than for the general support of the energy transition (supporting H21 six times).

A place-focused identity has always an influence on personal norms, irrespective of the political level (Municipality, Country, EU) and behavioural foci (supporting H22 seven times).

Finally, all identity types were needed for understanding PEB: Individually-, group-, and place-focused identity (supporting A1).

## 2.2 Report on WP4-based multinational survey: individual factors

In this section, we briefly report the results of the WP4-based items that refer more specifically to the individual-level factors at the basis of energy-related choices.

### Measures

#### Economic and Social Political Ideology

These factors were assessed using economic and social items (Federico et al., 2014). Participants responded to the following items: “How would you describe your political outlook with regard to economic issues?” and “How would you describe your political outlook with regard to social issues?”. Ratings were made on a 5-point scale ranging from 1 (left) to 5 (right), so higher responses to both of these items indicated a greater conservatism in economic and social dimensions respectively.

#### Emotion Regulation Questionnaire

We assessed both emotional suppression and cognitive reappraisal with the following items: “I control my emotions by not expressing them” (emotional suppression), and “I control my emotions by changing the way I think about the situation I am in” (cognitive reappraisal). They have been borrowed from the Emotion Regulation Questionnaire (ERQ), which is a 10-item self-report questionnaire consisting of two sub-scales: cognitive reappraisal and emotional suppression. Instructions asked the participants “some questions about their emotional life, in particular, how they control (that is, regulate and manage) their emotions.” These two items were rated on a 5-point-Likert scale from 1 (strongly disagree) to 5 (strongly agree). Higher scores of these measures revealed greater emotional suppression and greater cognitive reappraisal respectively.

#### Consideration of Future Consequences

We assessed people’s consideration about future consequences with the following item: “I consider how things might be in the future, and try to influence those things with my day to day behaviour”. It has been borrowed from Strathman et al.’s (1994) scale, which measures the extent to which individuals consider the potential distant outcomes of their current behaviours and the extent to which they are influenced by these potential outcomes. This item was rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree)”. Higher scores of this measure reflect greater consideration of future consequences.

#### Mindfulness

We used an item borrowed from the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R), which is a 12 item self-reported questionnaire developed by Feldman, Hayes, Kumar, Greeson, and Laurenceau (2007). The CAMS-R is a refined version of an earlier scale which consisted of 18 items (Kumar, 2005; Kumar, Feldman, & Hayes, 2008). Following this initial measure, the authors of CAMS-R revised the previous scale in an attempt to establish a brief self-reported measure that can nevertheless capture the multi-faceted conceptualization of mindfulness. The item was: “It is easy for me to concentrate on what I am doing”. This item was rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree)”. Higher scores of this measure reflected greater mindfulness. This item focused on the degree to which people experience their thoughts and feelings, without any mention to particular type of meditation training in order to be administrable to general population.

#### Collective Pride measure

We assessed participants’ collective pride with the following item: “I feel proud if other people save energy”. Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater collective emotion of proud.

#### Moral Anger measure

We assessed participants’ moral anger with the following item: “I am angry about the fact that many people do not save energy”. A similar measure has been used in the Reese and Jacob’s (2015) study. Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater moral anger.

#### Climate change perception

People’s climate change perception has been assessed with the following item: “Most scientists say that the world’s temperature has slowly been rising over the past 100 years. Do you think this has been happening?” Ratings were

made on a 5-point Likert type scale (1 = No, definitively not – 5 = Yes, definitively). Higher scores of this measure indicated a greater perception of climate change.

#### Anthropocentric climate change perception

People's anthropocentric climate change perception has been assessed with the following item: "Assuming that the world's temperature is rising, do you think this is caused mostly by natural causes, about equally by natural causes and human activity, or mostly by human activity?". Ratings were made on a 3-point scale (1 = mostly by natural causes, 2 = about equally by natural causes and human activity, 3 = mostly by human activity). Higher scores of this measure indicated a greater anthropocentric perception of climate change.

## **Results**

### Bivariate correlations

We computed zero-order correlations among the variables investigated (see Table 3). A short summary of the most important relations is given below.

People's economic outlook concerning the political orientation was significantly and positively related to the following variables: a social outlook concerning the political orientation, individuals' emotional suppression and mindfulness. In other words, the more conservative people are with respect to economic issues, the more conservative they are also about social issues, the more they suppress their emotions, and the more mindful they report to be. Furthermore, people's economic outlook was significantly and negatively related to following variables: individuals' consideration about future consequences, collective pride, moral anger, climate change perception and anthropogenic climate change perception. This means that more conservative people report to adjust their behaviour less for future consequences, to experience less pride if other people save energy and less moral anger when other people waste energy. They also are more sceptical about climate change and human causes to it.

A similar pattern can be observed for the social political orientation. A more conservative social political outlook was significantly and positively related to the following variables: emotional suppression and mindfulness. This variable was significantly and negatively related to following variables: individuals' consideration about future consequences, collective pride, moral anger, climate change perception and anthropogenic climate change perception.

Individuals' emotional suppression was significantly and positively related to the following variables: cognitive reappraisal, consideration of future consequences, mindfulness, collective pride and moral anger; whereas it was significantly and negatively related to anthropogenic climate change perception. This means that people who suppress their emotions more, report to more often change their thinking in situations that bother them, to consider the future more in their actions, to be more mindful, to experience more collective pride and moral anger, but to have more doubts about the human causes of climate change.

Cognitive reappraisal was significantly and positively related to the following variables: consideration of future consequences, mindfulness, collective pride, moral anger and climate change perception. In other words, People who adjust their thinking more to the situation, consider the future consequences of their actions more, are more mindful and feel more collective pride and moral anger. They also are less in doubt about climate change being a reality.

Individuals' perception about future consequences of their actions was significantly and positively related to the following variables: mindfulness, collective pride, moral anger, climate change perception and anthropogenic climate change perception. This follows the same pattern as described the variables before.

Individual differences in mindfulness were significantly and positively related to the following variables: collective pride, moral anger and climate change perception, meaning that more mindful people feel more collective pride, moral anger and perceive climate change as more real.

Also feelings of collective pride were significantly and positively related to following variables: moral anger, climate change perception and anthropogenic climate change perception.

Feelings of moral anger were significantly and positively related to following variables: climate change perception and anthropogenic climate change perception, showing that accepting climate change as real and man-made leads to a higher degree of moral anger if other people do not save energy.



Finally, people's climate change perception was significantly and positively related to anthropogenic climate change perception, showing that the two components are usually seen together.

The effect sizes of these relationships range from null/small to very large effects ( $r = .00$  to  $r = .79$ ). Note that the significant correlations have been reported once when describing the relationships among variables. For example, whether emotional suppression is related to cognitive reappraisal and such a relationship has been reported when describing the correlations of emotional suppression, then it has been not reported when describing the correlations of cognitive reappraisal.

### Interaction effects

Based on the relationships pointed out from the correlation analyses, we tested two moderation models. We show how a dysfunctional emotion-regulation strategy (i.e., emotional suppression), which might lead people to suppresses and discard (from a functional point of view) important collective and moral emotions (i.e., collective pride and moral anger aimed at counteracting climate change), can negatively influences individuals' beliefs in climate change. First, we tested the combined interaction effect of collective pride and emotional suppression as key predictor, and the beliefs in climate change as the outcome of the model. Second, we tested combined interaction effect of moral anger and emotional suppression as the key predictor, and the beliefs in climate change as the outcome of the model. To test these models, we computed a composite score of beliefs in climate change with both measures of anthropocentric climate change perception and climate change perception reported above (see measures section for more details).

Let us describe the first model in more details. We first tested the notion that the collective pride would be positively associated with beliefs in climate change. Moreover, we expected that the effect of collective pride on beliefs in climate change would be moderated by emotional suppression. To test this model, we used the PROCESS macro (model #1; see Hayes, 2013 for more details) that runs under the SPSS software and we specified a moderated regression model including, along with the main effects for collective pride and emotional suppression, the crucial collective pride X emotional suppression interaction parameter. Furthermore, this model included age and gender as covariates. Variables of interest were mean centered prior to analysis.

The model accounted for 9% of the variance in the criterion ( $F(5,1834) = 350.50$ ,  $p < .001$ ). The covariate of age was negatively and significantly connected with the criterion variable pointing out that older individuals showed disbelief in climate change ( $b = -.06$ ,  $se = .01$ ,  $p > .001$ ); whereas gender did not show a significant effect on the criterion variable in this model ( $p > .10$ ). Once these covariates were taken into account, the collective pride scores provided a unique contribution in accounting for beliefs in climate change ( $b = .38$ ,  $se = .01$ ,  $p < .001$ ). Individuals' emotional suppression was also significantly related to the dependent variable ( $b = -.02$ ,  $se = .01$ ,  $p < .05$ ). More germane to our interaction hypothesis, the collective pride X emotional suppression interaction was also significant ( $b = -.02$ ,  $se = .01$ ,  $p < .01$ ). Simple slope effects revealed that, even if there was a significant association between collective pride and beliefs in climate change ( $b = .36$ ,  $se = .01$ ,  $p = .000$ ) at higher levels of emotional suppression (1 sd above the mean), as the emotional suppression decreased to a mean value the association became stronger ( $b = .38$ ,  $se = .01$ ,  $p = .000$ ), and became strongest ( $b = .40$ ,  $se = .01$ ,  $p = .000$ ) for those participants showing the lowest levels of suppression (1 sd below the mean), compared with those observed at low and medium levels.

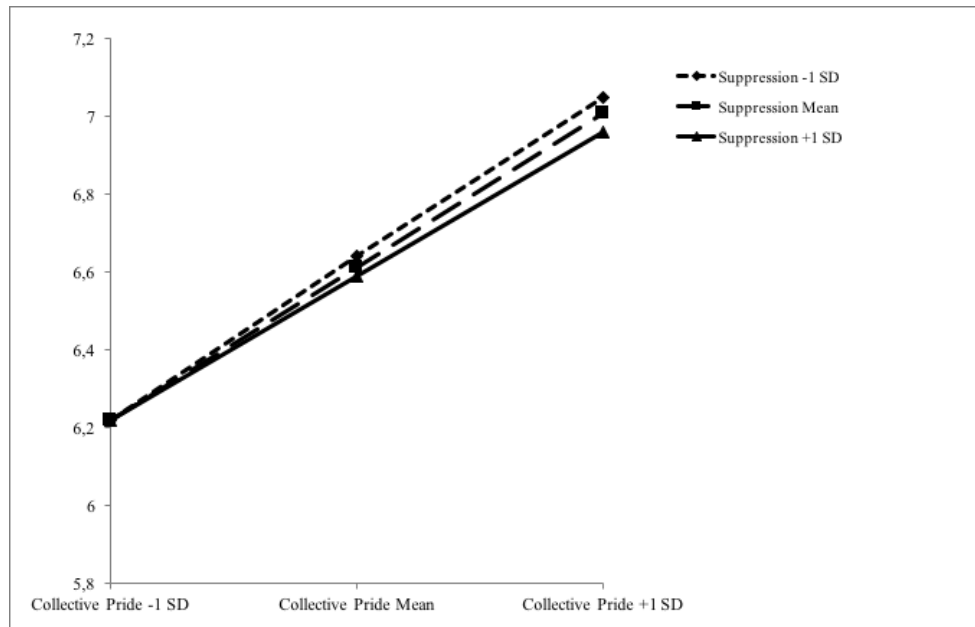
Let us describe the second model in more details. We first tested the notion that the moral anger would be positively associated with beliefs in climate change. Moreover, we expected that the effect of moral anger on beliefs in climate change would be moderated by emotional suppression. As for the previous model, we used the PROCESS macro (model #1; see Hayes, 2013 for more details) that runs under the SPSS software and we specified a moderated regression model including, along with main effects for moral anger and emotional suppression, the crucial moral anger X emotional suppression interaction parameter. Furthermore, this model included age and gender as covariates. Variables of interest were mean centered prior to analysis.

The model accounted for 8% of the variance in the criterion ( $F(5,1834) = 325.53$ ,  $p < .001$ ). The covariates of age and gender was both significantly connected with the criterion variable with older people and men showing more disbeliefs in climate change than younger and women (age's  $b = -.07$ ,  $se = .01$ ,  $p > .001$ ; gender's  $b = .05$ ,  $se = .02$ ,  $p > .05$ ). Once these covariates were taken into account, the moral anger scores provided a unique contribution in accounting for beliefs in climate change ( $b = .35$ ,  $se = .01$ ,  $p < .001$ ). Individuals' emotional suppression was also significantly related to the dependent variable ( $b = -.03$ ,  $se = .01$ ,  $p < .01$ ). More germane to our interaction hypothesis, the moral anger X emotional suppression interaction was also significant ( $b = -.03$ ,  $se = .01$ ,  $p < .01$ ). Simple slope effects revealed that even if there was a significant association between moral anger and beliefs in

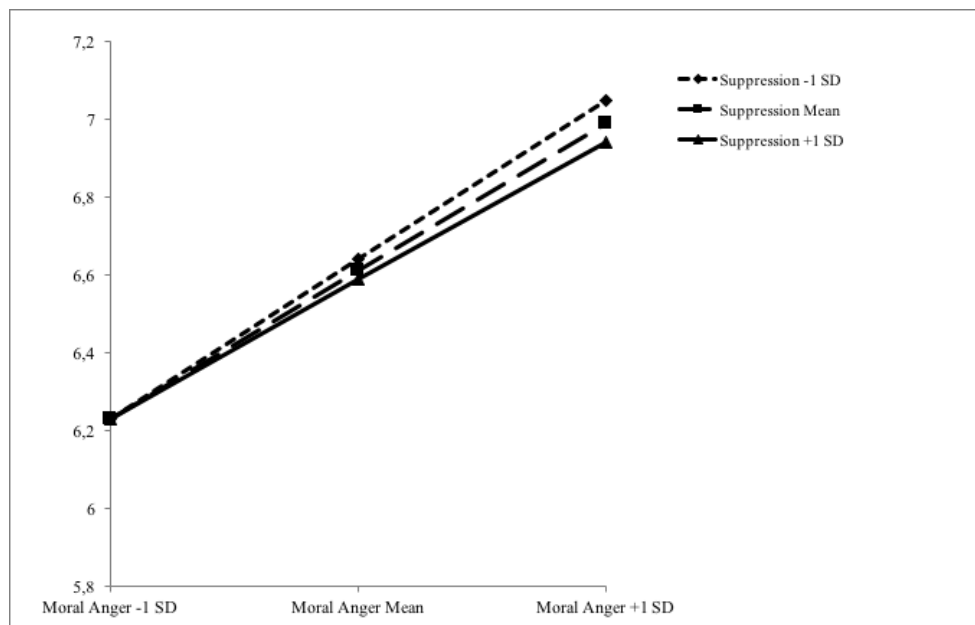
climate change ( $b = .33$ ,  $se = .01$ ,  $p = .000$ ) at higher levels of emotional suppression (1 sd above the mean), as the emotional suppression decreased to a mean value the association became stronger ( $b = .35$ ,  $se = .01$ ,  $p = .000$ ), and became strongest ( $b = .38$ ,  $se = .01$ ,  $p = .000$ ) for those participants showing the lowest levels of suppression (1 sd below the mean), compared with those observed at low and medium levels.

These interaction effects and simple slopes analyses are described in figures 3 and 4

**Figure 3:** Interaction effects of collective pride and emotional suppression on beliefs in global climate change



**Figure 4:** Interaction effects of moral anger and emotional suppression on beliefs in global climate change



## Summary and conclusions

Taken together, the results of our analyses on the individual-level psychological variables included in the multinational survey revealed some interesting patterns, in particular for what it concerns the role of emotions and emotion-regulation processes in shaping people's beliefs in global climate change.

In fact, in line with our predictions and on the previous work we conducted in the earlier phases of the ECHOES project, which is reflected in the literature review and in the Meta-Analysis, we found that both individual and collective emotions (such as collective pride and moral anger) do play a role in shaping the way people perceive and judge global environmental change. Together with these basic emotions per se, an important role is played also by emotions regulations strategies, such as for example emotion suppression.

Coherently with our arguments, the correlation patterns we detected, and the specific moderation models that we tested suggest that those individuals who are less keen to adopt this often unadaptive psychological affective strategy, are also those for which basic emotions like pride and anger are more direct predictors of perception of global environmental change and its attribution to human causes, and thus should be more prone to change their lifestyles and energy choices in a more sustainable direction, or more generally act in favour of the environment, or even more broadly to support policies that are aimed at reducing the environmental impact of human activities.

This is an important piece of information and knowledge that we were able to acquire thorough the ECHOES survey, as it shows that, to achieve a sustainable energy trasntion, the potential changing power of basic psychological factors such as emotions and emotion regulation could be relatively shared across large portions of current European people.

**Table 3:** Means, standard deviations, and bivariate correlations among the individual level WP4-based items in the ECHOES multinational survey

	1	2	3	4	5	6	7	8	9	10
1 Economic PO	1									
2 Social PO	.787**	1								
3 Emotional Suppression	.034**	.025**	1							
4 Cognitive Reappraisal	.012	.005	.287**	1						
5 CFC	-.016*	-.022**	.111**	.260**	1					
6 Mindfulness	.038**	.047**	.065**	.135**	.226**	1				
7 Collective Pride	-.065**	-.057**	.046**	.151**	.312**	.162**	1			
8 Moral Anger	-.078**	-.068**	.056**	.086**	.241**	.107**	.476**	1		
9 CCP	-.114**	-.129**	.011	.073**	.188**	.089**	.284**	.263**	1	
10 ACCP	-.116**	-.133**	-.031**	.001	.095**	.000	.192**	.196**	.412**	1
M (SD)	2.93 (1.14)	2.89 (1.17)	3.06 (1.09)	3.29 (.97)	3.72 (.88)	3.83 (.10)	3.77 (1.04)	3.66 (1.08)	4.14 (.96)	2.47 (.64)

**Note.** Economic PO (Economic Political Orientation); Social PO (Social Political Orientation); CFC (Consideration of Future Consequences); CCP (Climate Change Perception); ACCP (Anthropogenic Climate Change Perception). \* $p < .05$ ; \*\*  $p < .001$ .

## 2.3 Report on WP4 experiments: Identity factors

### 2.3.1 Introduction and theoretical background

In order to achieve the Great Transformation (WBGU, 2011) towards a more sustainable society it will be necessary to reach actors on all relevant societal levels on a broad scale (Beling et al., 2018; Geels, 2002; Samadi et al., 2017; Schneidewind & Zahrt, 2014; WBGU, 2011). Research on when and why people are acting in a pro-environmental fashion has usually focused on individual behaviours (for an overview see e.g., Bamberg & Möser, 2007; Klöckner, 2013). Indeed, there is evidence that household consumption (e.g. housing, food, mobility) alone represent a high proportion of the total amount of emissions (e.g., Hertwich & Peters, 2009; Ivanova et al., 2016). Thus, approaches at the micro-level seem to be very promising because of the enormous resource saving potential in consumption behavior – provided that many individuals get involved (Dietz, Gardner, Gilligan, Stern, & Vandenberg, 2009; Fritzsche, Barth, Jugert, Masson, & Reese, 2018a). Notwithstanding the relevance of these findings for interventions and policy makers – environmental crises are collective crises that can only be solved by collective efforts and not by individuals (Fritzsche, Barth, Jugert, Masson, & Reese, 2018b; Fritzsche et al., 2018a). Taking this into account, the Social Model of Pro-Environmental Action (SIMPEA, Fritzsche et al., 2018a) was proposed to explain how social identity processes could affect environmental appraisals and responses. More precisely, these appraisals and responses depend on the degree to which people identify with a group, the effectiveness which they attribute to this group to tackle environmental crises and the group norms related to pro-environmental behaviour. Therefore, it provides explanations for pro-environmental behaviours beyond established personal-level predictors.

It is important to note that it is not intended to replace previous models that explain pro-environmental behaviour on an individual level, but rather to complement them. However, in order to respond to the scale of the problem, a psychology of the environmental crisis has to acknowledge the collective dimension of human cognition and action for understanding, and potentially changing different perceptions of and responses to environmental crisis (Fritzsche et al., 2018b).

Within the scope of the ECHOES project it is now possible for the first time, to investigate systematically and in different countries within and outside the EU not only typical influential factors of pro-ecological behaviour on the individual level, but also those of the collective level. The standardised research design allows us to compare the effects of the single factors across culturally diverse regions. This knowledge can be used to better target interventions and policy measures aimed at fostering pro-environmental behaviour among the respective citizens. In this context, we conducted seven experimental studies in four EU countries (Germany, Italy, Finland, Bulgaria) and two non-EU countries (Turkey, Norway). Additionally, a multinational quantitative survey was conducted to investigate individuals' energy related behaviour. Here, too, data regarding the above mentioned key factors was collected. To increase the relevance of the results presented here for political decision-makers the focus was laid on those variables, the efficacy of which has been shown also in meta-analytical studies.

#### Social identity processes

People often define themselves in their daily life through their affiliation to groups. Social identity has an important impact on behaviour (Turner, Oakes, Haslam, & McGarty, 1994) and it is accompanied by an internalisation of norms, values and goals of the group in question (Haslam, 2011; Turner & Oakes, 1986) and feelings of belongingness with the group (Hornstein, 1972). As a result of internalisation these group-related norms, values and goals become obligatory, in other words individuals act with respect to group goals and interests (Simon, 2004). Hence, social identities are either defined by dissociating one's own group from others, or on the basis of shared opinions or destinies, which in turn can lead to jointly initiated projects or movements (Thomas, Mavor, & McGarty, 2011; Sherif, 1966). In order to overcome individuals' feelings of climate change helplessness environmental action has to be taken on the collective level ("WE act!" instead of "I act."). In the face of climate change threat this ability of „We“-thinking might be a way out of the crisis (Fritzsche et al., 2018a). Activists of the Fridays For Future



movement are a striking example of how a perceived common fate (a climate change threatened future) can lead to think and act in line with collectives. There is empirical evidence that the environmentalist identity increases the willingness to consume environmentally friendly products or to engage in pro-ecological collective actions (e.g. signing a petition; Bartels & Onwezen, 2014; Fielding, McDonald, & Louis, 2008). However, the true potential of the Social Identity Model of Pro-Environmental Action does not lie in the prediction of pro-environmental behaviour of individuals whose identity is already defined by pro-ecological norms (e.g. the Fridays For Future activists), but to understand, which social identities relevant to everyday life (e.g., gender, ethnic, political affiliations) determine pro-environmental behaviour. In this regard, perceived group norms and collective efficacy are essential (Fritsche et al., 2018a). For instance, experimental studies showed that high identifiers (within a group of students) increased the willingness to engage in pro-environmental action only when pro-ecological group norms were salient (Masson & Fritsche, 2014). Whether people engage in environmentally friendly behaviour also depends on perceived efficacy. Homburg and Stolberg (2006) found, that collective efficacy was associated with problem-orientated coping behaviour (e.g., search for information about environmental problems), which itself was positively correlated with pro-environmental behaviour. Moreover, within another experimental study, Jugert and colleagues (2016) showed, that perceived collective efficacy also increased perceived self-efficacy, which in turn increased pro-environmental action intentions. In a representative study, which was recently carried out for the Federal Agency for Nature Conservation (BfN) we found the interaction between social identity, group norms and collective efficacy, which is assumed by the Social Identity Model of Pro-Environmental Action: The more participants identified with people of their region/all humanity, the more environmentally friendly social norms and collective efficacy were perceived, the higher the intention, to engage in actions aimed at nature conservation (Hoppe, Chokrai, & Fritsche, in prep.).

## Further influential factors for environmental-relevant behaviours

### Moral obligation

*Moral obligation* (or *personal norm*) was described early within the norm activation theory, originally developed to explain when and why people engage in pro-social, altruistic behaviour. In theory, altruistic behaviour occurs when individuals perceive threatening negative consequences (*awareness of consequences*) for third parties (e.g., other people, the environment) and at the same time feel responsible to avert these consequences (*ascription of responsibility*). Central to the norm-activation theory is the assumption that altruistic behaviour is caused by feelings of moral obligation (Schwartz, 1977). Over the last three decades several meta-analyses (Bamberg & Möser, 2007; Hines, Hungerford, & Tomera, 1987; Klöckner, 2013) identified moral obligation as a central predictor for pro-environmental intentions (which in turn affect pro-environmental behaviours) across various domains such as energy-saving behaviour (Black, Stern, & Elworth, 1985), travel mode choice (Hunecke, Blöbaum, Matthies, & Höger, 2001), recycling (Guagnano, Stern, & Dietz, 1995) or pro-environmental consuming (Thøgersen, 1999).

### Environmental identity

*Environmental identity* was first introduced by Sparks and Shepherd (1992) who showed that one's identity as a green consumer can explain pro-environmental behaviour beyond typical predictors such as attitudes, personal efficacy or norms (Dean, Raats, & Shepherd, 2012; Lois, Moriano, & Rondinella, 2015; Lokhorst, Hoon, le Rutte, & de Snoo, 2014; Whitmarsh & O'Neill, 2010). Since then different conceptualizations of environmental identity were developed. Some of which are rather domain- or behaviour-specific such as recycler and (water-)conserver identity (Lauren, Fielding, Smith, & Louis, 2016; Nigbur, Lyons, & Uzzell, 2010; Van der Werff, Steg, & Keizer, 2013; White & Hyde, 2012) or more broader concepts like pro-environmental consumer or person (Dean et al., 2012; Gatersleben, Murtagh, & Abrahamse, 2014; Sparks & Shepherd, 1992; Van der Werff et al., 2013). There is empirical evidence for pro-environmental identity as a significant predictor for people's efforts to reduce waste, water or energy consumption (e.g., Nigbur et al., 2010; Whitmarsh & O'Neill, 2010) as well as for eco-shopping and food consumption (Dean et al., 2012; Kashima, Paladino, & Margetts, 2014) or for the intention to use an electric car (Barbarossa, Beckmann, De Pelsmacker, Moons, & Gwozdz, 2015). Further studies also found indirect or interaction effects involving environmental identity. For instance, Gatersleben and colleagues (2014) showed that environmental identity mediated the relationship between biospheric values and green behaviour and the

relationship between environmental attitudes (combined within the so called *New Environmental Paradigm*, NEP, Dunlap & Van Liere, 1978) and green behaviour. There is further evidence for indirect effects of environmental identity on behaviour, for example mediated through personal norms (Barbarossa et al., 2015; Klöckner, 2013; Van der Werff et al., 2013). Another study pointed to the moderating role of environmental identity in predicting environmental behaviour (Carfora, Caso, Sparks, & Conner, 2017).

### Helplessness

Following Salomon, Preston and Tannenbaum (2017) we define *helplessness* as a prospect that a negative outcome seems beyond personal control (see also Abramson, Seligman, & Teasdale, 1978; Hiroto & Seligman, 1975). In view of the growing threat caused by climate crisis people often feel helpless, because they believe that their individual actions can not affect the climate. This feeling is reinforced by the fact that one cannot see any impact of personal pro-environmental behaviour (e.g. avoiding air travel, buying unpacked food, or saving energy) on global warming. Furthermore, the size of problem feels disproportionally big in comparison to what is practically within an individuals' power. In several studies, Salomon and colleagues (2015) showed that people who felt helpless in the face of climate crisis had lower intentions to conserve energy. However, they also found that participants who read high efficacy messages regarding individual pro-environmental actions reported stronger intentions to conserve energy than those who read low efficacy messages. Furthermore, Fritsche and colleagues (2018a) presume that climate change helplessness may be overcome by perceived efficacy. In contrast to Salomon et al., however, they refer to the perceived collective (instead of personal) efficacy of a self-relevant group. Thus, following the assumptions of their model people should feel less helpless when they believe their group or collective effort can mitigate the impact of climate change. Yet, the empirical and systematic evaluation of this assumption has not been approved.

## **2.3.2 The ECHOES WP4 experiments**

Based on the assumptions of the *Social Identity Model of Pro-Environmental Action* the present study explores whether reminders of group membership (salient social identity) foster climate-protective behavior (e.g. energy-saving behavior).

More specifically, the following research questions were investigated:

- (1) We test whether a salient social identity (a "group of people aged under 30") increases participants' intentions to engage in collective climate-protective action.
- (2) More exploratory, we also test whether personal pro-environmental action intentions (personal action intentions, willingness to pay higher prices for ecological products, acceptance of "green" policies) are significantly stronger in the social identity salience condition than in the personal identity salience condition.
- (3) Additionally, we assume less feelings of helplessness with regard to climate change in participants of the social identity salience condition in comparison to persons who were reminded of their personal identity.

### **The ECHOS WP4 survey**

- (4) We will explore the relationships between influential factors of the social, respectively individual level and pro-ecological action intentions or behaviour. Concretely we will investigate the bivariate correlations between social identification, social norms, collective efficacy and three dependent variables, pro-environmental action intentions, policy acceptance and actual behaviour. Furthermore, we will analyse the bivariate correlations between moral obligation and environmental identity on the one hand and action intentions or actual behaviour. We expect positive correlations between all potential influential factors and the considered action intentions or actual behaviour.

## Methods

### Participants and Design

The WP4 experiments were carried out by the respective ECHOES partners in Germany, Italy, Finland, Bulgaria, Turkey and Norway between February 2017 and May 2019. After data cleaning<sup>1</sup>, a total of  $N = 1217$  questionnaires has been considered in the analyses, including  $n = 543$  male and  $n = 668$  female,  $n = 17$  diverse participants and  $n = 6$  persons whose gender was not specified, with a mean age of  $M = 21.83$  years ( $SD = 2.24$ , range = 18-25 years). Broken down by individual countries the composition of the samples were as follows: Germany 1 with  $N = 144$  ( $M = 21.63$  years,  $SD = 1.87$ ), including  $n = 58$  male and  $n = 84$  female and  $n = 2$  diverse participants; Germany 2 with  $N = 130$  ( $M = 21.09$  years,  $SD = 2.44$ ), including  $n = 76$  male,  $n = 48$  female,  $n = 2$  diverse and  $n = 4$  participants whose gender was not specified; Italy with  $N = 139$  ( $M = 21.59$  years,  $SD = 2.01$ ), including  $n = 36$  male and  $n = 103$  female participants; Finland with  $N = 196$  ( $M = 21.71$  years,  $SD = 2.46$ ), including  $n = 98$  male and  $n = 98$  female participants; Bulgaria with  $N = 147$  ( $M = 21.61$  years,  $SD = 1.71$ ), including  $n = 59$  male and  $n = 87$  female and  $n = 1$  diverse participants; Turkey with  $N = 211$  ( $M = 22.88$  years,  $SD = 2.17$ ), including  $n = 86$  male and  $n = 125$  female participants; Norway with  $N = 250$  ( $M = 21.40$  years,  $SD = 2.34$ ), including  $n = 130$  male and  $n = 106$  female,  $n = 12$  diverse participants and  $n = 2$  participants whose gender was not specified.

All respondents were assured of the anonymous nature of the survey and were asked to fill in the questionnaires after they provided their informed consent to participate in the study. The current data is based on a cross-sectional, experimental design with two conditions (between-subject design).<sup>2</sup> While the questionnaires used in Leipzig and Rome were longer, we applied shorter versions in Finland, Bulgaria, Turkey and Norway due to different economical circumstances.<sup>3</sup> Two studies, Germany 1 and Italy were conducted as paper-pencil studies among students. The other experiments were carried out online with participants recruited by survey companies (such as Clickworker) in the respective countries. All respondents were either compensated with a small monetary allowance (2-3 Euros, Germany 2, Turkey, Norway, Bulgaria, Finland), got a bar of vegan chocolate (Germany 1) or earned credit towards a course requirement for their participation (Italy).

The first two experiments were conducted in Germany (Germany 1, Germany 2). On the basis of exploratory factor and reliability analyses, items and scales were selected for the replication studies in the other countries. Afterwards all items were translated from German into English language and then retranslated into local languages. In Norway, we used the English version of the questionnaire and it was made sure that participants felt confident enough to take part in a foreign language survey.

### Measures

In the following, only variables relevant for the present study are reported<sup>4</sup>. A detailed list of all items is provided in Table A1 of Appendix A. Unless otherwise specified all ratings were made on a 9-point Likert scales from 1 = *fully disagree* to 9 = *fully agree*, except for the second German Study (Germany 2) with ratings on a 7-point Likert scale.

At the very beginning of all questionnaires participants read a text, stressing the enormous ecological, social and economical dangers an unabated climate change carries, for instance food and water scarcity, wars or mass migrations. In this way, climate change threat was made salient for all study participants.

**Manipulation.** To manipulate the experimental conditions - social identity salience versus personal identity salience - we applied the three things manipulation developed by Haslam, Oakes, Reynolds, and Turner (1999): After

<sup>1</sup> Data of participants who did not gave their consent to participate in the study or did not fit into the targeted age group (18-25 years) were excluded. The Italian sample includes only persons who participated at both measurement points.

<sup>2</sup> An exception is Rome. Here we had the opportunity to conduct a longitudinal study with two measurement points. While the questionnaire of Wave 1 contained only constructs that were considered as potential moderator or mediator variables, the second (main) questionnaire of Wave 2 was similar to those which were used in the other countries..

<sup>3</sup> Questionnaires used in all six countries will be available in the ECHOES data archive.

<sup>4</sup> All questionnaires will be available in full length in the open-access archive of the ECHOES project.

reading a short text about the consequences of climate change all participants were asked to identify three things that they (a) do often, (b) do rarely, (c) do well, and (d) do badly. The social identity salience was manipulated by asking participants for example to identify activities most other members of the younger generation are engaged in. Within a second manipulation participants cited activities in which they personally engaged. The first manipulation intended to make the social identity salient (identification with the younger generation), the second served to focus them on their individuality and thus on their personal identity.

In Germany and Italy, *social identification* was measured by a set of nine items adopted from the translated and validated German version of the subscale self-investment of identification Leach and colleagues (2008) developed in 2008 (Roth & Mazziotta, 2015). Three facets were captured, with three items for each facet: Centrality (e.g., "The fact that I am part of the younger generation is an important part of my identity."), solidarity (e.g., "I feel solidarity with the younger generation."), and satisfaction (e.g., "I am glad to be part of the younger generation."). In the shorter versions of the questionnaire social identity was measured with four items, comprising three items of the solidarity-facet of the self-investment scale and a single-item measure developed by Postmes, Haslam, and Jans (2013; across studies Cronbach's  $\alpha$  ranged from .86 to .95)<sup>5</sup>.

*Collective efficacy* was measured by three (to four) items adopted by Jugert et al. (2016; e.g., "The members of the younger generation ("generation under 30") can collectively do something to reduce the negative effects of climate change."; across studies Cronbach's  $\alpha$  ranged from .89 to .96).

In order to measure *social norms* two (to four) items were adopted from Cialdini, Reno, and Kallgren (1990; e.g., "Most younger people consider climate concerns in their everyday lives."; across studies Cronbach's  $\alpha$  ranged from .64 to .88).

*Moral obligation*<sup>6</sup> was measured by one (to two) item(s) as follows: "I feel morally obliged to take action against climate change."

We used three items to measure *environmental identity* (Clayton, 2003; e.g., "If I weren't able to act environmentally friendly, it would matter to me a lot."; across studies Cronbach's  $\alpha$  ranged from .74 to .94).

To measure *helplessness* we developed four items, e.g., "I feel helpless in the face of climate change" (across studies Cronbach's  $\alpha$  ranged from .76 to .85).

As dependent variables we measured the following four scales:

Seven (to twelve) items used by Jugert et al. (2016) captured *personal action intentions* (e.g., "For environmental reasons, I will take measures to save energy."; across studies Cronbach's  $\alpha$  ranged from .73 to .92).

Based on Trivedi, Patel and Savalia (2015) six items were adopted to capture *willingness to pay* (e.g., "I would be willing to pay, 20% more for public transport which is operated with climate friendly energy."; across studies Cronbach's  $\alpha$  ranged from .82 to .92).

Another set of six items measured *policy acceptance* (e.g., "I would be willing to pay higher taxes."; across studies Cronbach's  $\alpha$  ranged from .82 to .92) inspired by de Groot and Schuitema (2012).

*Collective action intentions* (Klandermans, 1984; Simon et al., 1998) were captured by four (to five) items, assessing the willingness to engage in a variety of behaviours items (e.g., "participate in collective actions by the "generation under 30" to protect nature, e.g. in demonstrations."; across studies Cronbach's  $\alpha$  ranged from .82 to .95).

Statistical analyses were conducted using SPSS 25.0.

<sup>5</sup> Due to technical problems the data set of the Norway study does not include items capturing social identification, willingness to pay or policy acceptance.

<sup>6</sup> *Moral obligation* is used here synonym to *personal norms* as it is described in the context of the norm-activation theory (Schwartz, 1977) or in Klöckner's (2013) comprehensive action determination model.

## Results: Experimental results

### Research questions 1 & 2

In order to test whether a salient social identity (a “group of people aged under 30”) increases participants’ intentions to engage in collective climate-protective action we conducted analyses for the aggregated sample (see Table 1) and also for every single study (statistical values can be obtained from Appendix C, Table C1-C7). Applying basic t-test analysis, we found no significant differences in the willingness to participate in collective action (as well as in the three personal dependent variables) between the social and personal identity salience conditions. To increase statistical power, we also conducted a meta-analysis including data of all seven experiments, while controlling for respondents’ level of (personal) environmental identity. In line with our predictions, we found positive, yet small main effect of the manipulation on collective action intentions (Hedges  $g = .18$ ), indicating that reminders of the group (younger generation) led to higher intentions to engage in collective action as compared to reminders of personal identity. For the more personal action variables (personal action intentions, willingness to pay a premium for eco-friendly products, acceptance of green policies), no significant meta-analytical effects were found.

To explore possible boundary conditions of the positive effect of salient social identity on collective action intentions, we conducted regression analysis with interaction tests, including identity salience as the independent variable and environmental identity as the moderator variable. We reasoned that the positive effect of social identity on collective actions intentions might be stronger for people with relatively low levels of environmental identity, as highly environmentally committed persons may act in favor of the environment regardless of salient social or personal identities. Results supported our assumption and showed a significant interaction effect of identity salience and environmental identity. Inspection of the simple slopes revealed that reminders of group membership only increased collective action intentions for people with low levels of environmental identity. In other words, participants with (otherwise) low interest in environmental issues showed a higher willingness to engage in climate protection when a social (vs. personal) identity was made salient.

To shed some light on the process underlying the positive meta-analytical effect of salient social (vs. personal) identity on collective actions, we further explored the data. Applying basic t-test analysis, results showed that the values of social identification and collective efficacy were significantly higher when social (vs. personal) identity was salient (Table 4). We thus conducted mediation analysis, including identity salience (personal vs. social identity salient) as the independent variable, social identification (i.e. strength of people’s psychological bond with the group) or collective efficacy as the mediator variables and collective action intentions as the dependent variable. We found a positive indirect effect of identity salience on collective action intentions through social identification. More specifically, reminders of the group increased respondents’ identification with the younger generation which in turn led to higher intentions to engage in collective action to fight climate change. Results showed a similar indirect effect of identity salience on collective action intentions through collective efficacy.

### Research question 3

Contrary to our assumptions, reminders of the group membership did not decrease personal helplessness (Table 4). Furthermore, the mean values of helplessness in both conditions were clearly above the average of the scales, indicating a rather higher perception of helplessness among all respondents.

One explanation might be that helplessness was measured after our central dependent variables (collective and personal action intentions). Reporting higher intentions to engage in collective action in both conditions might have provided the participants with an opportunity to restore their feelings control after salient climate change threat, thereby reducing feelings of personal helplessness. Similarly, reminders of collective action (as induced by the collective action intention items) might have shifted the mental focus of the participants in the personal identity salience condition from the personal self to the social self. Finally, we had to measure possible moderator variables such as collective efficacy or social identification after our central dependent variables (action intentions, willingness to pay etc.) to avoid that reminders of collective variables weaken the effectiveness of the identity salience manipulation. However, measuring moderators after the manipulation and the dependent variables may risk biased perception of these constructs, thus limiting their predictive power as possible moderators. From this perspective,



the positive correlations between personal helplessness on the one hand and collective efficacy or social identification on the other hand may hint at motivated social cognition, i.e. people with higher feelings of personal helplessness reported higher levels of (perceived) collective efficacy and social identification to cope with their helplessness (Table 5). Further research is needed, applying longitudinal designs or more focused experimental designs, to test the effect of social identity salience on personal helplessness.

**Table 4:** Contrast of Personal Condition With Collective Condition (total Sample)

Variable	Personal condition		Collective condition		<i>t</i>	<i>p</i>	BCa 95 % CI	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>
Social identification	5.25	1.89	5.53	1.93	-2.35	<b>.019</b>	-.59	-.06
Collective efficacy	6.10	1.89	6.27	1.91	-1.98	<b>.048</b>	-.52	-.02
Perceived helplessness	5.26	1.85	5.26	1.91	0.01	.999	-.26	.25
Personal action intentions	5.78	1.63	5.83	1.71	-1.02	.310	-.34	.10
Willingness to pay	5.37	1.95	5.45	2.08	-0.67 <sup>b</sup>	.500	-.37	.19
Policy acceptance	4.90	2.08	5.02	2.16	-0.67	.500	-.36	.16
Collective action intentions	5.70	1.91	5.95	1.90	-2.07	.390	-.53	-.03

Note. *N* = 1217. <sup>a</sup> *df* = 786.41. <sup>b</sup> *df* = 786.22. BCa = bias corrected and accelerated. CI = confidence interval. *LL* = lower limit. *UL* = upper limit. Bootstrap results are based on 1.000 bootstrap re-samples (Preacher & Hayes, 2008).

## Results: Correlational results

The experimental results provided mixed support for our research questions. On the correlational level, however, results across the seven studies indicate substantial associations between our central collective variables (social identification, collective efficacy, social norms) and the four dependent variables. Previous studies showed a substantial impact of identity-based and also personal level variables on pro-ecological behaviour and intentions (Hoppe, Chokrai, & Fritsche, in prep.). In line with these findings, our results showed moderate to strong positive correlations between social identification, social norms and collective efficacy on the one hand and the four dependent behavioral variables on the other hand. In other words, respondents who strongly identified with the younger generation, perceived the younger generation to be more effective in fighting climate change or perceived eco-friendly behavior as more prototypical for the younger generation reported higher intentions to engage in collective and personal eco-friendly behavior, as well as a higher willingness to pay a premium for eco-friendly products or to accept “green” policies. Additionally, we tested relationships between personal level variables (moral obligation, environmental identity) and the dependent variables. A significant and similarly strong positive relationship was found between moral obligation and environmental identity on the one side and the four dependent variables on the other side. Furthermore, we found moderate to strong relationships between our three collective variables and moral obligation, respectively environmental identity. Perceived helplessness was positively, moderately correlated with collective as well as (rather) personal action intentions. Statistical details can be obtained from Table 5.

**Table 5:** Mean Values, Standard Deviations, Sample Size and Intercorrelations Between Social and Individual Predictors as Well as Dependent Variables for both Conditions (total Sample)

Variable	1	2	3	4	5	6	7	8	9	10
1. Social identification	-									
2. Collective efficacy	.45**	-								
3. Social norms	.50**	.44**	-							
4. Moral obligation	.38**	.63**	.44**	-						
5. Environmental identity	.40**	.58**	.46**	.61**	-					
6. Perceived helplessness	.23**	.28**	.29**	.32**	.22**	-				
7. Personal action intentions	.40**	.69**	.47**	.68**	.65**	.31**	-			
8. Willingness to pay	.36**	.53**	.42**	.60**	.54**	.21**	.71**	-		
9. Policy acceptance	.26**	.45**	.35**	.54**	.48**	.16**	.56**	.67**	-	
10. Collective action intentions	.42**	.72**	.47**	.67**	.64**	.32**	.75**	.66**	.57**	-
<i>M</i>	5.39	6.18	5.09	6.09	5.72	5.26	5.80	5.41	4.96	5.82
<i>SD</i>	1.91	1.90	1.89	2.12	1.84	1.88	1.67	2.02	2.12	1.91
<i>N</i>	963	1213	1208	1213	1207	1212	1213	963	961	1214

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

### 2.3.3 The ECHOES WP4 survey

Within the ECHOES project, we conducted a multinational quantitative survey across 31 countries to investigate individuals' energy related behaviour, attitudes and choices covering six life domains (housing, mobility, diet, consumption, leisure, acquisition of information). Similarly to the WP4 experiments, this study included the three core variables of the Social Identity Model of Pro-Environmental Action (SIMPEA, Fritzsche, Barth, Jugert, Masson, & Reese, 2018a) as well as moral obligation, environmental identity and three dependent variables (pro-ecological action intentions, policy acceptance and actual behaviour). In addition to the analyses we carried out regarding the experimental data, we investigated the relationships between social, respectively personal level variables on the one hand and several pro-ecological action intentions.

#### Methods

##### Participants and Design

The online-survey was implemented across 31 countries (EU-28, Norway, Turkey, and Switzerland) during a 4-month period, with about 600 respondents recruited in each country through a random sampling procedure, and a total sample of  $N = 18.061$  (with  $n = 9062$  male,  $n = 8868$  female and  $n = 132$  not specified participants) completed surveys. Participants can be assigned to the following age groups:  $n = 125$  younger than 18 years,  $n = 6122$  between 18 and 34 years,  $n = 4127$  between 35 and 44 years,  $n = 3573$  between 45 and 54 years and  $n = 4093$  above 54 years.

Respondents were recruited via email panels and were allowed into the sample if they could satisfy the representativity quotas in the dimensions (age, income, gender). Participation was compensated with 5 Euros and a small expense allowance that was given by the panel company.

In the following, only variables relevant for the present analyses are reported.<sup>7</sup> The current data is based on a cross-sectional, correlational design with one condition for all participants and one measuring point. Unless otherwise specified all ratings were made on 5-point Likert scales from 1 = *strongly disagree* to 5 = *strongly agree*. All items can be obtained from Figure 5.

##### Measures

*Social identification* was captured with a single-item measure (1 = *not at all* to 5 = *extremely*). In order to measure *social norms* seven items were adopted from Cialdini, Reno, and Kallgren (1990). *Moral obligation*<sup>8</sup> was measured by three items (Cronbach's Alpha = .84). *Collective efficacy* was captured with one item and another single-item, adopted by Leach and colleagues (2008) measured *environmental identity*.

As dependent variables we measured the following three variables: *Energy related action intentions* were captured by two items (Cronbach's Alpha = .71). Another set of two items measured *policy acceptance* (Cronbach's Alpha = .87). Finally, actual behaviour was measured by asking participants whether they would like to donate their compensation for taking part in the survey to myclimate.org to fight climate change (0 = *No, I don't want to donate*, 1 = *Yes, I donate 1 Euro* to 5 = *Yes, I donate 5 Euros*).

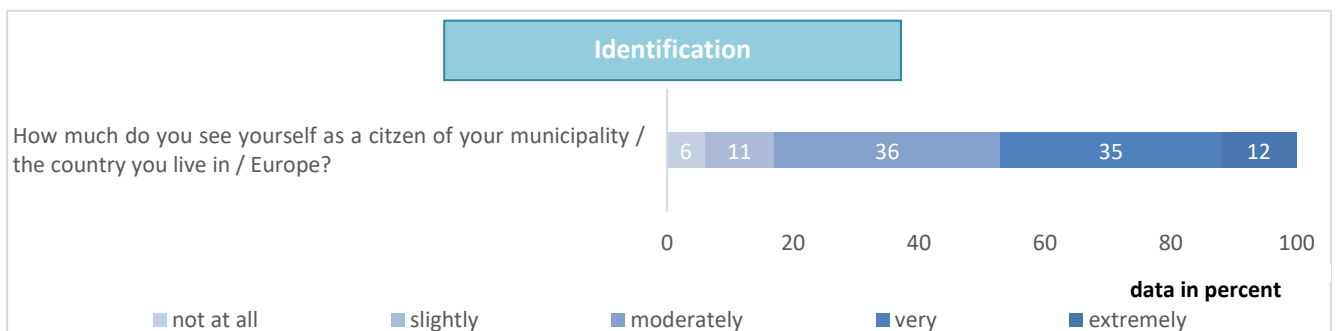
#### Results

In order to test the assumed positive relations between influential factors of the social, respectively individual level and pro-ecological action intentions or behaviour, we conducted bivariate correlation analyses. Beforehand, the frequency distribution of the individual scales was observed (see Figure 10). In addition, Figures 5-9 provide frequency distributions at the level of individual items.

<sup>7</sup> The complete questionnaire can be obtained from the open-access archive of the ECHOES project.

<sup>8</sup> *Moral obligation* as we use it here is identical to the construct *personal norms* as it is used in the context of the norm-activation theory (Schwartz, 1977) or in Klöckner's (2013) comprehensive action determination model.

Almost half of the survey participants (47%) identified themselves (rather) extremely as citizens of their municipality/nation or as citizens of Europe, whereas 6% did not at all and 11% did rather not identify themselves as such. A majority of 64% believed that their fellow citizens were able to achieve the energy transition together, while about 3% were in total disagreement, about 8% tended to disagree. Approximately 43% of the respondents (rather) strongly agreed with the statements that many fellow citizens would support energy saving measures, about 2% strongly disagreed and 10% rather disagreed. When asked whether they felt a moral obligation to support energy policies, 72% (rather) agreed strongly, 2% strongly disagreed and 5% rather disagreed. In reply to the question whether acting pro-environmentally friendly was an important part of their self about 64% (rather) strongly agreed, 3% strongly disagreed and about 6% rather disagreed. About 68% of all participants stated that they were (rather) strongly intending to save energy in order to support the energy transition. About 2% was not at all willing and 4% were rather not willing to support the energy transition. When asking whether respondents would accept policy measures to protect the environment or to support the energy transition 55% (rather) strongly agreed, while 6% strongly disagreed and 11% rather disagreed. Finally, participants were asked to indicate whether they would be willing to donate their compensation for taking part in the survey to myclimate.org. About 3% were willing to donate 4 to 5 Euros, 78% were not about to donate anything and 15% donated only 1 Euro.

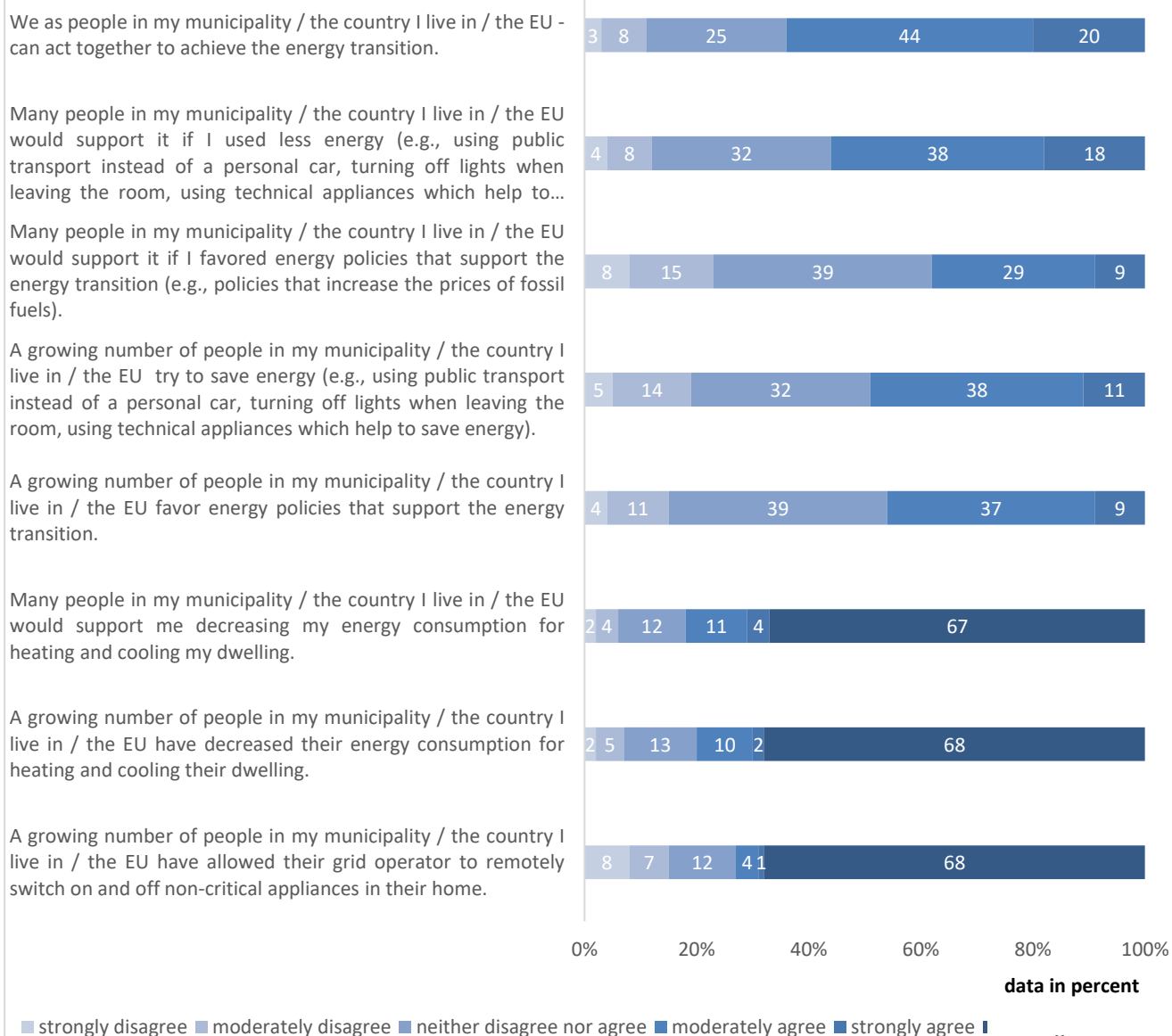


**Figure 5.** Frequency distribution of the single-item measure of social identification.

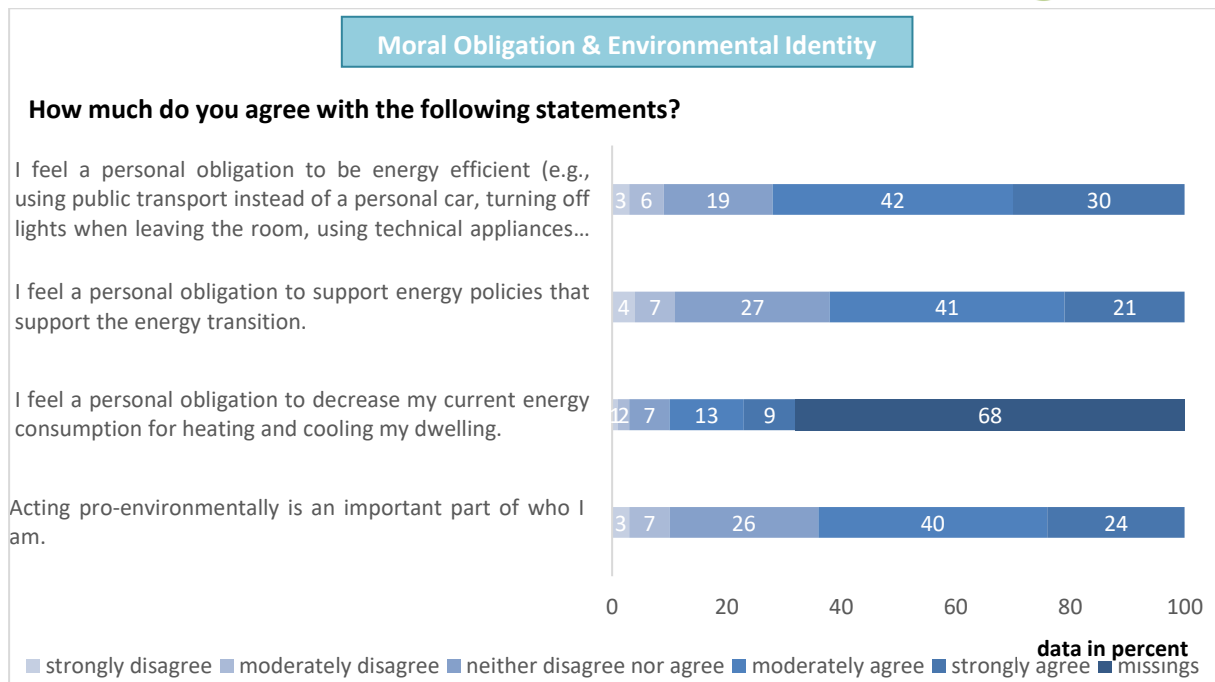


## Collective Efficacy and Social Norms

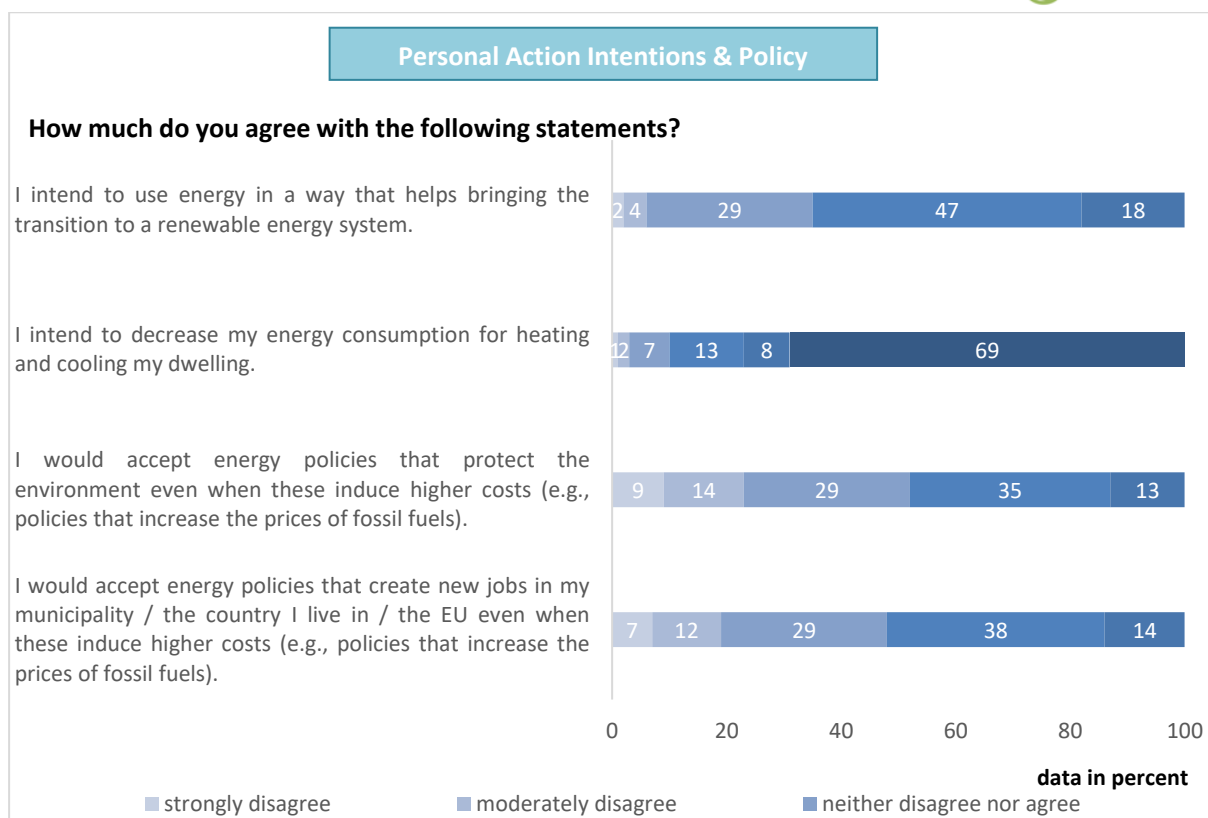
### How much do you agree with the following statements?



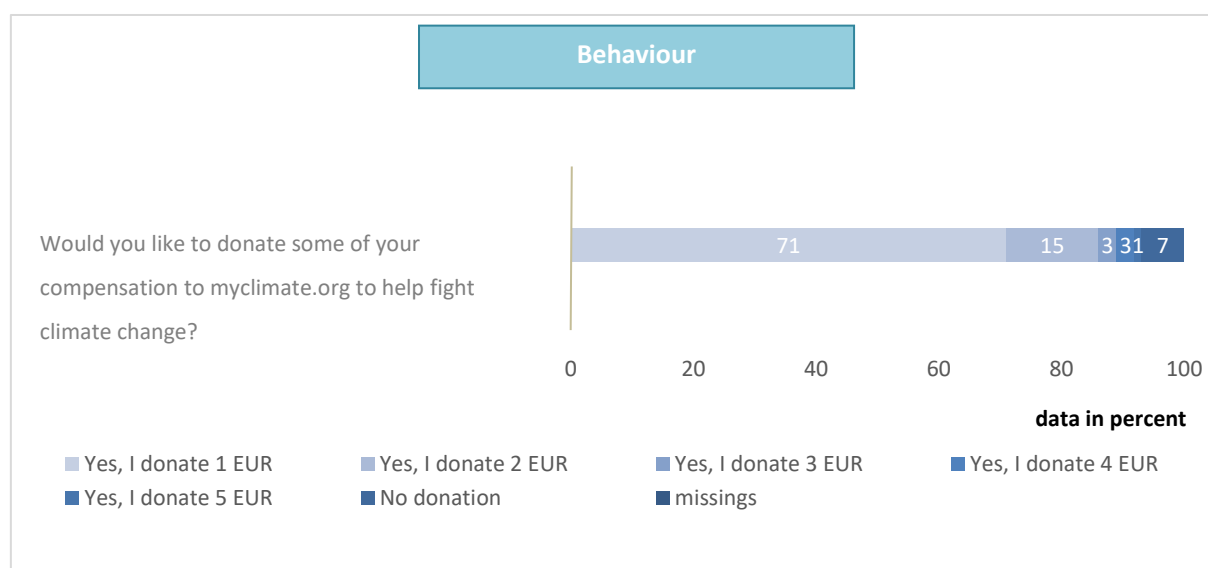
**Figure 6.** Frequency distribution of the single-item measure of collective efficacy and the individual items of the social norms scale.



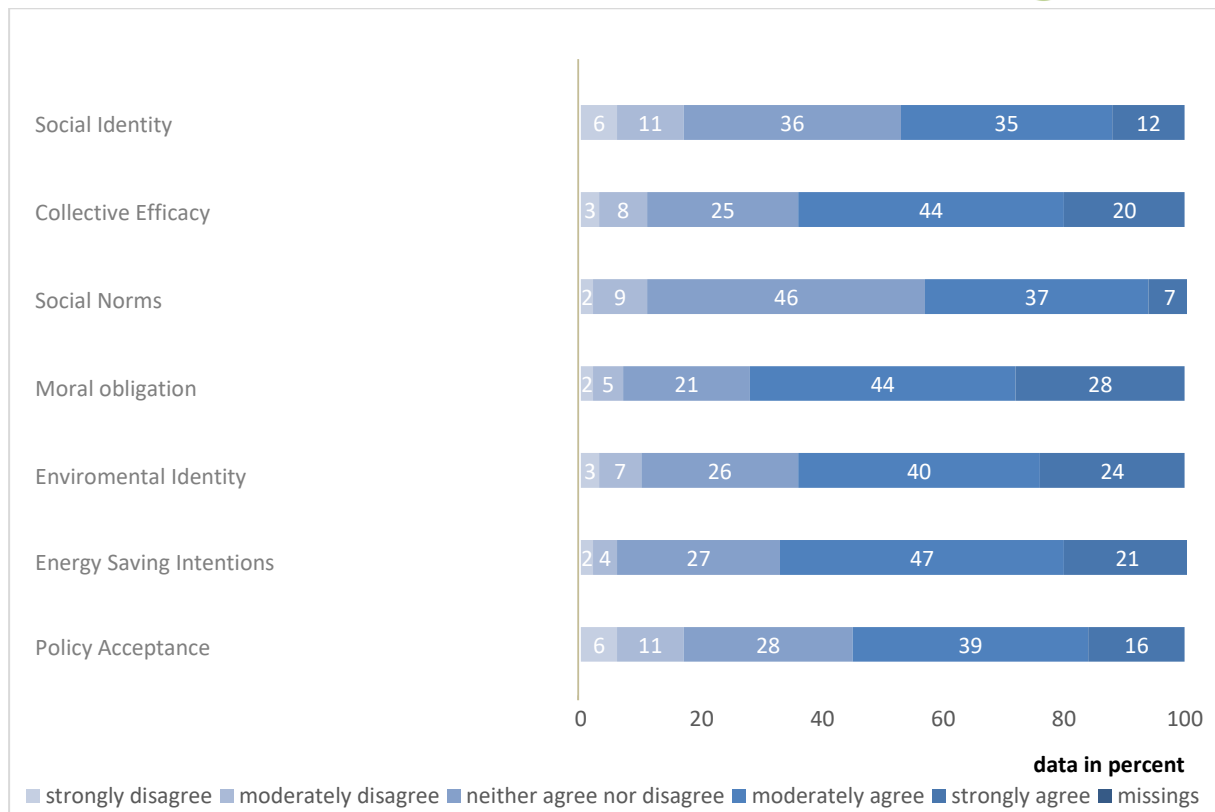
**Figure 3.** Frequency distribution of the individual items of the moral obligation scale and the single-item measure for environmental identity.



**Figure 8.** Frequency distribution of the individual items of the scales capturing energy saving intentions and policy acceptance.



**Figure 9.** Frequency distribution of the individual items of the scales capturing energy saving intentions and policy acceptance.



**Figure 10.** Frequency distribution of the individual scales capturing social identification, social norms, collective efficacy, moral obligation, environmental identity as well as energy related action intentions, policy acceptance and actual behaviour.

Research question 4 was supported.

In order to test the statistical significance of the relationships between identity-based variables (social identity, social norms and collective efficacy), respectively personal level variables (moral obligation, environmental identity) and pro-ecological action intentions bivariate correlations were scrutinized. As expected, all bivariate correlations were positive and significant. Social identification, collective efficacy as well as social norms showed moderate significant relationships to intentions to save energy and policy acceptance and small positive relationships to actual behaviour. Moral obligation as well as environmental identity were strongly correlated to energy saving intentions and policy acceptance and small to moderate positive relations were found regarding actual behaviour. Statistical details can be obtained from Table 6.

**Table 6.** Mean Values, Standard Deviations, Sample Size and Intercorrelations Between Social and Individual Predictors as Well as Dependent Variables (Survey Data)

Variable	1	2	3	4	5	6	7	8
1. Social identification	-							
2. Collective efficacy	.24**	-						
3. Social norms	.25**	.47**	-					
4. Moral obligation	.23**	.46**	.46**	-				
5. Environmental identity	.18**	.36**	.35**	.62**	-			
6. Intention	.20**	.44**	.42**	.66**	.60**	-		
7. Acceptance	.18**	.38**	.43**	.56**	.46**	.54**	-	
8. Behaviour	.06**	.09**	.05**	.12**	.09**	.10**	.16**	-
<i>M</i>	3.37	3.70	3.31	3.78	3.75	3.76	3.34	.67
<i>SD</i>	1.02	.99	.74	.91	1.00	.86	1.05	1.40

Note. *N* = 18040; \*\*  $p < .01$ .

## Summary

Based on the assumptions of the Social Identity Model of Pro-Environmental Action, the present studies aimed to investigate the effects of social identity salience and identity-based factors on collective pro-ecological action intentions. To this end, we conducted seven experiments in four EU-states and two neighboring countries to examine whether a salient social identity (a “group of people aged under 30”) increases participants’ intentions to engage in collective climate-protective action (research question 1). More exploratory, we also tested whether personal pro-environmental action intentions (e.g., willingness to pay higher prices for ecological products, policy acceptance) were stronger when people were reminded of their social (vs. personal) identity (Research question 2). On the level of single studies, significant differences between the two conditions were only found in the Italian sample. Here, participants were significantly more likely to engage in collective action intentions, when exposed to a social identity salience condition (in contrast to participants of the personal identity salience condition).

However, when meta-analysing data from all seven studies, results showed the expected positive (yet small) effect of social identity salience on collective action intentions (but not on the more personal dependent variables). That is, when the social self (vs. personal self) was activated, respondents were more willing to engage in collective action to fight climate change. Interestingly, this main effect was qualified by an interaction effect of identity salience and environmental identity. Especially participants with lower levels of environmental identity (i.e. people who are usually less interested in environmental issues) reported greater intentions to engage in collective action when their social identity (vs. personal identity) was salient. In other words, salient social identities could motivate people, who are otherwise not (or less) motivated to engage for environmental issues, to join in (collectively) fighting climate change. Our results also indicate that the (experimental) effects of social identity were mainly restricted to “typical” collective behaviour (e.g. join environmental organizations), but showed no consistent effects of the manipulation on the more individual types of behaviour (e.g. willingness to pay a premium for eco-friendly products). One reason for this might be that we have framed those behaviours as more individual or personal behaviours. In contrast, applying a different and more collective framing may also increase the effectiveness of social identities. For example, reframing the goal of saving energy from a personal-level goal (“I try to save energy”) to a collective-level goal (e.g. German energy turnaround as a collective transition to renewable energies), may also increase people’s willingness to engage in seemingly personal energy behaviors (e.g. switching off lights) when a social identity is salient. We have found initial evidence for this assumption in the data from Italy, where we measured the perceived character of our four dependent variables as more or less collective vs. personal behavior. Analysis showed that salient social identity increased the willingness to pay a premium for eco-friendly products, but only for respondents who rated this behaviour as more collective behaviour. Further research is needed to test the robustness of our findings.

Our meta-analytical results also showed that the effect of the manipulation on collective action intentions was mediated through social identification (i.e. ingroup solidarity). Salient social identity increased social identification (i.e. solidarity with the ingroup) which in turn led to higher action intentions. However, the strength of this indirect effect might have been limited. We selected the “younger generation” as the target social identity to keep the group consistent across the different study contexts in the six countries (e.g. student vs. non-student samples). However, the potential of this social identity to act as a meaningful identity as well as the content of the ingroup prototype may vary across countries, thus limiting the effectiveness of our identity salience manipulation. This reasoning is supported by the mean value of social identification for the total sample, being close to the scale midpoint as well as by the substantial positive correlations between identification and the four dependent variables. From an applied perspective, a focus on psychologically more important/relevant social identities could increase the effectiveness of the salience manipulation.

For personal helplessness, the results did not support our assumption (research question 3). Overall, we found no (consistent) effect of the identity salience manipulation on personal helplessness. Interestingly, the bivariate correlations between helplessness and our three collective variables (identification, collective efficacy, social norms) were positive. As stated above, this may hint at the fact that people with strong feelings of personal helplessness tended to perceive their ingroup as more effective when fighting climate change to cope with their feelings of personal helplessness. Again, more research is needed to clarify this point.



In sum, the current results only partly support our assumptions. These mixed findings may be attributed to two (mainly methodological) issues:

First, the manipulation might have been insufficient to cause the expected effect (e.g. choice of target social identity). A focus on other groups with higher mean levels of identification or a closer connection to environmental issues, or a direct manipulation of social identification or of social identity salience (e.g. surveying respondents when engaging in collective thinking and action) might be promising next steps to test this idea.

Second, our findings might be attributable to the order of the items in the questionnaire. More specifically, we measured potential moderator variables, such as social identification, social norms and collective efficacy, *after* the identity salience manipulation and the dependent variables.<sup>9</sup> Future research should apply longitudinal designs (i.e. measuring core social identity variables before the manipulation) to avoid possible confoundings between the manipulation and the proposed moderator variables.

On the level of bivariate correlations, however, our findings indicate substantial associations between the social identity variables and the four dependent variables (behavioural intentions). In line with our assumptions, results of correlational analyses showed positive associations between social identification, social norms and collective efficacy, on the one hand, and all of the four collective and personal action intentions on the other hand. The strongest relationships were found between collective efficacy and the dependent variables, indicating that a sense of “We can do it” is crucial to motivate people to engage in pro-environmental behaviour. These results are consistent across all countries. It is also in line with findings obtained from a previous study that examined the three core variables of the Social Identity Model of Pro-Environmental Action (Fritzsche, Chokrai, & Hoppe, in prep.). Besides these substantial relationships between our central collective influential factors and those action-related variables, we found moderate to strong correlations between the three factors and typical predictors of pro-ecological behaviour of the personal level (moral obligation and environmental identity). This means that the more participants identified with the group of the younger generation, the more they perceived pro-environmental ingroup norms or the more they believed being capable to fight climate change the more they perceived an inner obligation to protect the environment and the more they saw themselves as environmentalists. This result is not surprising, taken into consideration that personal attitudes and values are not formed independently of societal influences. Thus, it is reasonable to assume that our collective variables also have an indirect impact on pro-ecological behaviour. Indeed, this presumption is supported by first empirical data. Within a representative study, Hoppe and colleagues (Hoppe et al., in prep.) showed that personal norm (here: moral obligation) was predicted by social norms and collective efficacy. In practical terms this means that manifesting, for instance, pro-ecological societal norms, while emphasizing that the ingroup (e.g., community, nation) is capable of mitigating the climate crisis, might be an appropriate way to foster the willingness to act according to these standards. In addition, future research should investigate more closely how influential factors of the collective level relate to those on an individual level. These insights can contribute to improve interventions and political measures encouraging citizens to act in a more environmentally friendly manner.

Less consistent results concerned correlations between helplessness and action intentions. While we found predominantly positive moderate correlations between helplessness and action intentions, a negative moderate relationship was found for the Italian sample. The more helpless Italian participants felt, the more willing they were to engage in pro-environmental action intentions. In a next step, these partially inconsistent findings will be examined in closer detail. Building upon the theoretical background of the Social Identity Model of Pro-Environmental Action these next steps will include to test the assumed interactions between the three core variables (social identification and norms, collective efficacy). In this context, we would expect that the effects of the single factors on pro-ecological action intentions should reinforce each other.

Furthermore, it would be interesting to look at country-specific differences by considering additional contextual factors such as the rapid development of the climate change movement over recent months. For instance, we could investigate, whether respondents from countries where the Fridays For Future demonstrations started early and took place with a certain regularity over time show more willingness to engage in collective, respectively personal

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<sup>9</sup> Organizational / Budget restrictions in the partner countries did not allow us to apply longitudinal designs (exception: Italy).

action intentions than participants from countries with weaker local groups of activists. It is also conceivable that perceptions of helplessness might be influenced by local presence of the social movement.

Next, we examined data from the multinational survey. First, descriptive statistics for the individual scales were observed. While one-half of the survey participants highly identified with their fellow citizens, no less than 17% (rather) did not identify with this group. A majority of 64% stated that they as citizens would be able to achieve the energy transition together and 3% of respondents perceived no collective efficacy at all. In comparison, the perception of pro-environmental social norms was considerably weaker. Only 43% of all persons interviewed agreed with the statements that many citizens would support energy saving measures, about 12% (rather) strongly disagreed. Interestingly, approval ratings for personal norms or a personal moral obligation to protect the environment were visibly higher, with 72% of participants stating that they felt a (rather) strong moral obligation for instance to support energy policies, while only 7% felt hardly any or no moral obligation. Two-third of respondents indicated that acting pro-environmentally friendly was an important part of their self, about 9 % (rather) did not have any relation to environmentally friendly behaviours. Overall, the analyses revealed very high approval ratings for energy saving intentions (68% strongly or rather strongly intending) or the willingness to accept policy measures to protect the environment (55% strongly or rather strongly willing), but only 3% actually donated (almost) the whole amount of their compensation for participation (4-5 Euros). Nearly all other respondents (93%) were not willing to donate at all or donated only 1 Euro.

As expected, we found positive relationships between identity-based variables (social identity, social norms and collective efficacy), respectively personal level variables (moral obligation, environmental identity) and pro-ecological action intentions and actual behaviour. Similar to the findings of the experiments, social level variables were less strong correlated to action intentions or actual behaviour in comparison to personal level variables. Concretely, social identification, collective efficacy as well as social norms showed moderate significant relationships to energy saving intentions and policy acceptance and a small positive relationship to actual behaviour. In contrast, moral obligation as well as environmental identity were strongly correlated to energy saving intentions and policy acceptance and small to moderate positive relations were found regarding actual behaviour. Thus, the results substantiate previous studies (e.g., Bamberg & Möser, 2007; Chokrai, Hoppe, & Fritsche, in prep.; Klöckner, 2013). This noticeably weaker relationship between potential influential factors and actual pro-environmental behaviour is also in line with previous studies (e.g., Chokrai, Hoppe, et al., in prep.) and might be explained by the so-called intention-behaviour gap (e.g., Ajzen & Fishbein, 2005). The intention-behaviour gap describes the phenomenon that people can have intentions, for instance, to act in an environmentally friendly way but do not take action correspondingly. Nevertheless, action intention is a very important influential factor to predict actual behaviour (e.g., Sheeran, 2002) and empirical studies indicate that the gap can be bridged by feelings of moral obligation (e.g., Godin, Conner, & Sheeran, 2005). As a next step, here, too, it is planned to test the Social Identity Model of Pro-Environmental Action, expecting an interaction and reinforcement between the three core variables of the model (social identification, social norms, collective efficacy).

The results provide some recommendations for action. Regardless the mixed findings we presented above, correlational and meta-analytical analyses showed that reminding people on their social identities can have a significant effect on collective action intentions. Future research should address the mentioned methodological problems to strengthen the robustness of effects on collective action intentions, but also to achieve a better understanding of how (rather) personal action intentions could be fostered.

Future policies of the EU regarding climate crisis should take a whole range of different factors into account. A very first step could be to start talking about a climate crisis (instead of a rather gentle sounding “climate change”) to emphasise that humanity is facing a direct existential threat, which in turn might increase personal and collective action intentions.

Another important lever could be to set appropriate written and unwritten standards, both on a personal (personal norms or moral obligation) and collective level (social norms), which might be accompanied by a strong political message to the countries and citizens appealing to their sense of collective efficacy (“Yes, we can!”). Governments should also focus on strengthening social and self-identities (e.g., environmental identity), for instance by fostering participative projects. There are already promising approaches in the field of community psychology. For instance, it could be shown that particularly fostering identification with the city leads to more sustainable behaviour among

its citizens. This was achieved not only in an environmental, but also in an economic context (Ehmayer, 2014). Masson, Jugert and Fritsche (2016) accentuated the relevance of identity for interventions aiming at encouraging people to adopt pro-environmental behaviours, too, because identity seems to be malleable.

Overall, large databases have been generated that are now available for future research, which are not only of interest to environmental scientist. Disciplines such as sociology, political and economical science or players in the domain of community and urban development or sustainable transformation processes who are involved in developing pro-ecological interventions or policy measures equally benefit from the enormous amount of data.

In order to meet the challenges of the climate crisis, changing human action in everyday life or in the political realm is crucial. The present preliminary results as well as the results of planned analyses (will) provide valuable insights to improve the efficiency of interventions and could help policy makers in designing measures to address climate crisis.

## 2.4 Report on WP4 experiments: Social norms

### Summary

In a laboratory experiment ( $n = 300$ ), we show that social norms and decision observability increase support for renewable energy, even at a financial cost to oneself. When exposed to pro-environmental social norms, participants donated 35 percent more money to a renewable energy initiative than participants in the control condition (Cohen's  $d = 0.35$ ). Participants whose decisions were observable to others donated 23 percent more compared to control ( $d = 0.23$ ). And participants exposed to both treatments (being observed and learning about norms) donated 69 percent more compared to control ( $d = 0.67$ ). In addition, our treatments had a positive effect on participants' post-decisional emotions of happiness and pride, which partly alleviates existing concerns about possible adverse side-effect of social influence interventions. Suggestions for policy makers are presented.

### Introduction and research background

We conduct a tightly controlled laboratory experiment testing the effects of social norms and decision observability on financial donations to a renewable energy initiative. The results are encouraging: both social norms and decision observability increase donations, and we moreover find that this in turn leads to participants experiencing positive emotions of happiness and pride. The fact that we exogenously manipulated both observability and norms and that we were able to measure actual, consequential behaviour with precision enhances the validity of our findings (Kormos & Gifford, 2014; Lange & Dewitte, 2019).

#### Social norms

Social norms are becoming a popular tool for promoting energy and resource conservation (Schultz et al., 2007, 2016; Goldstein et al., 2008; Nolan et al., 2008; Allcott, 2011; Ferraro & Price, 2013; Sudarshan, 2017; Lede et al., 2019). Norms can also increase people's willingness to purchase or generate electricity from renewable sources (Wiser, 2007; Ek & Söderholm, 2008; Graziano & Gillingham, 2014; Korcaj et al., 2015; Kalkbrenner & Roosen, 2016; Wolske et al., 2017, 2018; Curtius et al., 2018; Parkins et al., 2018) and they shape many other environmentally relevant behaviours as well (for meta-analyses see Bamberg & Möser, 2007; Klöckner, 2013). However, as outlined below, normative influence is not necessarily uniform in strength across contexts and people: some people may be more responsive to norms and some contexts may make people more norm-compliant.

The impact of social norms on environmentally relevant behaviour can depend on the norm target's individual characteristics, including the target's baseline behaviour levels (Schultz et al., 2007, 2016; Allcott, 2011; Ferraro & Price, 2013), personal norms (Schultz et al., 2016; Wan et al., 2017), attitudes (Huffman et al., 2014; Wan et al., 2017), issue involvement (Göckeritz et al., 2010; Lapinski et al., 2017), self-identity (Lapinski et al., 2017), and identification with the norm source (Masson & Fritsche, 2014; Fritsche et al., 2018). People who identify themselves with the norm source, for example, are more likely to follow the norm in question (Terry et al., 1999; Fielding et al., 2008; White et al., 2009; Masson & Fritsche, 2014).

Similarly, the power of norms may depend on contextual factors such as behaviour costs (Andersson & von Borgstede, 2010; Sudarshan, 2017), perceived threat to the self (Fritsche et al., 2010), and decision observability (Ernest-Jones et al., 2011; Bateson et al., 2013; Vesely & Klöckner, 2018; see also Andreoni & Bernheim, 2009; Jones & Linardi, 2014; Schram & Charness, 2015 for related studies with a focus other than environmental behaviour). In their quasi-experimental study, Vesely and Klöckner (2018) found that when exposing participants to pro-environmental social norms, participants were more likely to follow the norms when their decisions (whether and how much to donate to an environmental organization) were observable to others, compared to when donation decisions were made privately and anonymously. In contrast, Ernest-Jones et al. (2011) and Bateson et al. (2013) found no evidence for an interaction between norms and observability in the context of littering behaviour. Other studies (e.g. Wallis & Klöckner, 2018; Geiger et al., 2019) also suggest an important role of decision observability for compliance with pro-environmental norms, their design, however, does not allow separating the effect of own decision observability from the effect of social norm salience.

While a number of the aforementioned individual-level moderators of normative influence have received considerable attention in environmental psychology, the role of contextual, situational moderators is so far largely unexplored in the discipline, despite many scholars stressing the importance of situational factors (Black et al., 1985; Guagnano et al., 1995; Goldstein et al., 2008; Steg & Vlek, 2009; Bugden & Stedman, 2019; Gatersleben et al., 2019). Among the main objectives of the present study is therefore to test the influence of social norms on people's monetary contributions to a renewable energy project, and also to test whether norms interact with decision observability – a key contextual moderator – in affecting participants' contributions (see hypotheses H1 and H3 below).

### Decision observability

The second main goal of the present investigation is testing whether decision observability can in itself motivate people to actively support renewable energy development. Is it for example possible that people would be more likely to purchase electricity generated from renewable sources if this can become a topic of conversation in their social circle (thus making their decision to some extent observable to others)?

There is some initial evidence showing that increasing decision observability, or perceptions thereof, can promote certain pro-environmental behaviours, such as donating money to environmental organizations (Vesely & Klöckner, 2018), conserving electricity (Delmas & Lessem, 2014), purchasing sustainable products (Griskevicius et al., 2010; Delgado et al., 2015; Naderi & Strutton, 2015; Agerup & Nilsson, 2016; Kim et al., 2018), and avoiding littering (Ernest-Jones et al., 2011; Bateson et al., 2015; but see Schultz et al., 2012; Bateson et al., 2013). Brick et al. (2017) report mixed findings: in some cases perceived observability could be linked to greater and in some cases to lesser performance of pro-environmental behaviour. Compared to control, d'Adda (2011) found no effect of decision observability on donations to a reforestation project, possibly due to a small sample size. Hanimann et al. (2015) touch upon the role of decision observability, but its effect on preferences for renewable electricity cannot be isolated in their experiment due to design issues (namely the presence of a confounding variable).

The broader literature on pro-social behaviour, focusing for example on donations to charities, volunteering and on generosity and fairness in economic exchanges, similarly indicates that observability (or perceptions thereof) can motivate people to behave more pro-socially, see for example Hoffman et al. (1996), Andreoni and Petrie (2004), Haley and Fessler (2005), Bateson et al. (2006), Ekström (2012); for meta-analyses see Northover et al. (2017) and Bradley et al. (2018). Observability effects are, however, not always robust (Dufwenberg & Muren, 2006; Fehr & Schneider, 2010; Ekström, 2012; Northover et al., 2017; Kim et al., 2018; see also Griskevicius et al., 2010; Bateson et al., 2013; Brick et al., 2017 cited in the previous paragraph).

A final stream of research that motivated our investigation of observability suggests that behaving pro-environmentally can in some cases serve as a signal of the actor's desirable qualities, such as social status (Brooks & Wilson, 2015; Puska et al., 2016; see also Griskevicius et al., 2010) and good personality (Skippon & Garwood, 2011; Skippon et al., 2016). The signaling value of pro-environmental behaviours should in turn make people more likely to engage in them as behaviour observability increases. Overall, the findings reported in this literature also appear to support our prediction that observability will increase people's willingness to financially contribute to renewable energy development (see hypothesis H2 below).

### Side effects on emotions

Normative and observability interventions exert pressure on people to behave in a certain way. Normative interventions force people to shift their behaviour in the direction of the norm. And increasing decision observability creates an opportunity for subsequent social sanctions (Gächter & Fehr, 1999; Dufwenberg & Muren, 2006). While direct evidence on this issue is limited, it seems plausible that these types of interventions can affect their targets' emotions (consistent with Lindbeck et al., 1997; Bruvold & Nyborg, 2004; López-Pérez, 2008).

Possible unintended side-effects of environmental policies and interventions on their targets' emotions have been, for the most part, overlooked in the literature. What evidence there is is mostly indirect or anecdotal (see below). To help close this gap, we have measured participants' post-decisional emotions and tested whether our treatments influenced emotions and whether any such influences were mediated by the decisions participants made.



Aronson and O’Leary (1982-83), Allcott (2011), Ayres et al. (2012) and Sussman and Gifford (2012) report that some people complained or in other ways expressed their displeasure about receiving normative interventions as part of field experiments on energy and water conservation. Delmas and Lessem (2014, p. 366), on the other hand, report receiving an “incredible amount of positive comments” from student participants assigned to the decision observability treatment in their field experiment on energy conservation. Even though emotions were not formally measured in these studies, the evidence suggests that social influence interventions do not leave their targets’ emotions unaffected (see also van Diepen et al., 2009; DellaVigna et al., 2012).

Importantly, it should be noted that if people feel good about an intervention (for example because a valued goal, such as environmental protection, becomes activated), they might be less likely to spontaneously let the researchers know about their positive experience, given that positive emotions are generally less likely to prompt concrete action than negative emotions (see e.g. Fredrickson, 2001). For this reason it is necessary to measure interventions’ positive and negative effects on emotions in a systematic way. In a hypothetical scenario, Bolderdijk et al. (2013) found that participants anticipated more pleasant feelings were they to comply with a biospheric appeal (“Want to protect the environment? Check your car’s tire pressure”) than with an economic appeal (“Want to save money? Check your car’s tire pressure”). A number of studies, however, suggest that social influence interventions may affect participants’ emotions negatively. In particular, Bergquist and Nilsson (2016) show that normative signs promoting energy conservation can be perceived negatively, while Reyniers and Bhalla (2013) and Wang and Tong (2015) report that donors felt less happy about their donations to charitable organizations when donations were publicly observable. In contrast, Leoniak and Cwalina (2019) report an almost complete absence of negative reactions to normative signs in terms of experiencing irritation and anger. Toner et al. (2014) similarly found no effect of providing feedback regarding one’s own and one’s group’s environmental impact on participants’ emotions of guilt, embarrassment, shame and remorse, but this was possibly due to a lack of power.

While the above studies provide initial evidence concerning possible emotional after-effects of interventions designed to promote pro-environmental behaviour, more research into this issue is clearly needed. Interventions’ downstream effects on their targets’ emotions ought to be considered not only because people’s emotional welfare should be a key objective in itself, but also because emotions can in turn influence subsequent intentions and behaviours (e.g., Ferguson & Branscombe, 2010; Harth et al., 2013; Rees et al., 2015; Bissing-Olson et al., 2016; Russell et al., 2017; Chatelain et al., 2018) possibly giving rise to spillover effects (see Truelove et al., 2014; Maki et al., 2019).

### Hypotheses

H1: Monetary contributions to renewable energy development will be higher when participants are presented with descriptive social norms indicating other people have made large donations.

H2: Monetary contributions to renewable energy development will be higher when contribution decisions are publicly observable.

H3: The effect of descriptive social norms on contributions will be moderated by the level of observability. The effect of descriptive norms will be strengthened when decisions are publicly observable.

These hypotheses build on the hypotheses proposed by Vesely and Klöckner (2018). Note, however, that our descriptive norm manipulation complements the injunctive norm manipulation employed in Vesely and Klöckner (2018). Following Cialdini et al. (1990), we understand descriptive norms as information on what other people do, whereas injunctive norms refer to information on what other people consider to be socially appropriate behaviour. Both of these types of social norms have been previously shown to be able to motivate sustainable energy-related decisions (e.g., Schultz et al., 2007; Korcaj et al., 2015; Wolske et al., 2017).

## **Method**

### Participants

Three hundred participants (155 women; mean age = 21.9 years, SD = 4.6) took part in a computerized experiment programmed in z-Tree (Fischbacher, 2007) across 12 sessions conducted in the LINEEX lab in València in May



and June 2019. Participants were compensated for their time. They earned 15.0 EUR on average (SD = 3.3), excluding any donations they made as part of the study (an additional 3.5 EUR on average, SD = 2.8). All participants provided informed consent prior to taking part in the study. Preliminary power calculations indicated that a sample of at least 191 participants was sufficient to detect a small to medium effect (partial  $R^2 = .04$ ) in a two-tailed test with alpha at .05 and statistical power at .80 (Faul et al., 2007). Given our financial constraints and in order to safely meet the study's expected power requirements, we aimed to recruit 300 participants.

### Design overview

The study was implemented as a 2 (descriptive social norm: No norm vs. High norm) \* 2 (decision observability: Anonymous vs. Observable) between-subjects experimental design. Sessions were randomly assigned to treatments within each block of four consecutive sessions. Thus, three sessions, with precisely 25 participants per session, were assigned to each of four conditions.

The dependent variable was the amount of money participants decided to donate out of their participation fee to a well-known Spanish renewable energy development initiative Som Energia after being exposed to the experimental manipulation. Participants were told that "Som Energia is an established cooperative that builds facilities for generating energy from renewable sources in Spain. Currently, Som Energia's facilities generate 11.80 GWh of renewable energy per year. Your donation will help further expand the use of renewable energy in Spain." Minimum possible donation was 0 EUR, maximum possible donation was 10 EUR.

We, in addition, recorded participants' (self-reported) post-decisional emotions, collected their basic socio-demographic information (gender, age and income), as well as additional measures not relevant for the present study.

### Descriptive social norm manipulation

Prior to making their own donation decision, participants in the High norm treatment received information on "how much money other participants in this experiment (participating in a previous session) donated", i.e. a situationally relevant descriptive social norm (Cialdini et al., 1990). Specifically, we presented to all participants in the High norm treatment the following information based on actual donation data from one session in a small pilot ( $n = 50$ ) conducted about a week before the main experiment in the LINEEX lab: "Most participants donated at least 4 EUR. Over 30 percent of participants donated 7 EUR or more." Participants in the No norm treatment received no information on others' previous donations.

The High norm treatment conveys information that was meant to discourage low donations ("most participants donated at least 4 EUR") and inspire participants to make high donations ("over 30 percent of participants donated 7 EUR or more"). Similar descriptive norm manipulations have been used for example in Goldstein et al. (2008) and Krupka and Weber (2009).

### Observability manipulation

In the Anonymous treatment, participants were informed that their decision will be "completely private and anonymous and it will not be revealed to others". In the Observable treatment, participants were informed that, at the conclusion of the session, their decision will be "revealed to other participants in this session" along with their first name and the place where they sit. This manipulation was adapted from Vesely and Klöckner (2018), for a similar approach see e.g. Andreoni and Petrie (2004).

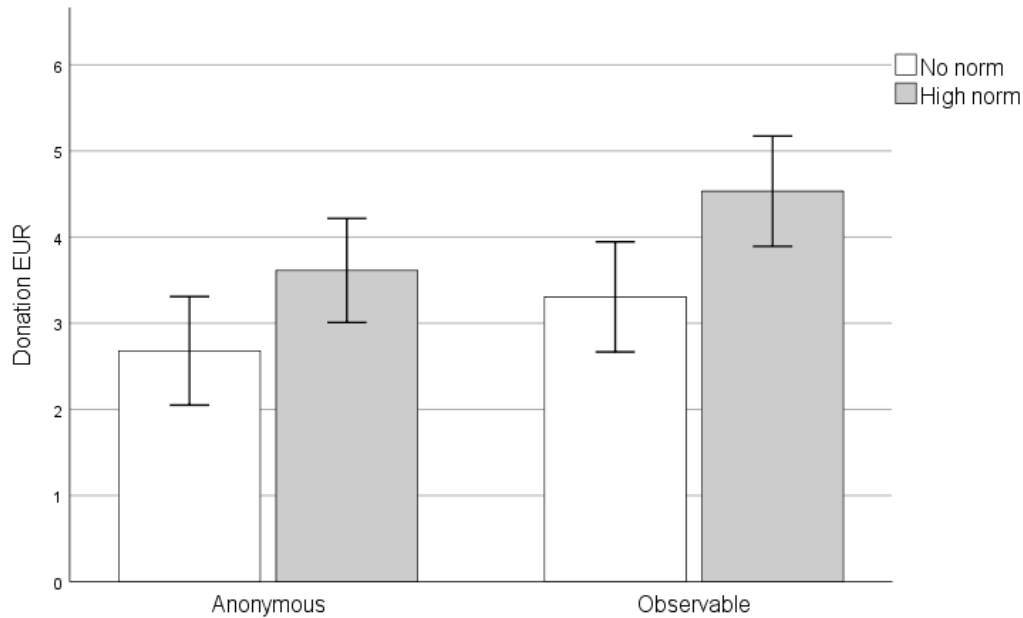
### Post-experimental questionnaire

We measured participants' post-decisional emotional evaluations of their donation decisions with five items (listed in Appendix A) assessing happiness, pride, guilt, irritation and regret. For example: "How do you feel about your donation decision?" with response options "extremely happy" (coded as 5), "very happy", "fairly happy", "a little bit happy", "not happy" (coded as 1), and "I do not know" (treated as missing in the analyses).

## Results

### Main findings

Figure 5 displays mean donations in the four conditions and the associated 95% confidence intervals. Inspecting the figure suggests that both observability and norms increased donations.



**Figure 5:** Mean donations (in EUR) in the four conditions with 95% CIs

Table 21 presents statistical tests of hypotheses H1-H3. In Model 1, we regress the amount donated by the participant on treatments and their interaction by means of an OLS regression. We in addition include socio-demographic controls in Model 2.

**Table 21:** Treatment effects on donations to a renewable energy project

	Model 1	Model 2
Norm treatment	0.54 (0.16)**	0.49 (0.16)**
Observable treatment	0.39 (0.16)*	0.39 (0.16)*
Norm * Observable	0.07 (0.16)	0.02 (0.16)
Income		-0.05 (0.21)
Age		-0.00 (0.04)
Female		1.25 (0.31)***
Number of observations	300	299
Adj. $R^2$	.048	.087

Notes: Unstandardized regression coefficients and the associated standard errors (in parentheses) are reported. We use effects coding of treatments: “No norm” is coded as -1, “High norm” is coded as 1, “Anonymous” is coded as -1, “Observable” is coded as 1. Income in EUR is divided by 1000 to obtain readable estimates. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$  (all tests are two-tailed).

Hypotheses H1 and H2 were supported: participants donated more money when presented with pro-environmental descriptive norms (H1) and when others could observe their decisions (H2). However, contrary to H3, the two treatments did not interact with each other: descriptive norms had an approximately equally strong effect on donations whether or not the donation decision was observable to others. These results are robust to inclusion of socio-demographic controls (see Model 2). Interestingly, on average women donated substantially more money than men.

#### Exploratory analyses

The focus of the planned exploratory analyses is on treatment effects on participants’ post-decisional emotions. To this end, we first subjected the five items measuring participants’ post-decisional emotions (reproduced in Table 25 at the end of this chapter) to a principal component analysis, using oblimin as the rotation method. By Kaiser’s criterion we extracted two factors which together explain 68.6% of variance in the five questionnaire items. Table 22 presents item loadings to the rotated factors (the pattern matrix).

**Table 22:** Two components of post-decisional emotions

Item	“Good feelings” component	“Bad feelings” component
Happy	.66	-.05
Proud	.70	.06
Guilty	-.22	.54
Irritated	-.03	.57
Regretful	.17	.61

Note:  $N = 247$ ; “I don’t know” responses were treated as missing data (list-wise deletion).

As can be seen in Table 22, items “happy” and “proud” load strongly on the first factor, which we refer to as “good feelings”. Items “guilty”, “irritated” and “regretful” load strongly on the second factor, called “bad feelings” henceforth. There are some weak cross-loadings and the two factors are weakly negatively correlated ( $r = -.16$ ).

To explore how the treatments affect post-decisional emotions we conduct, separately for each of the two emotion factors from Table 22, a moderated mediation analysis in STATA (Preacher et al., 2007; Hayes, 2013). The post-decisional emotion factor serves as the dependent variable, the amount donated to the renewable energy project is the mediator, while our two treatments and their interaction serve as independent variables. Table 23 presents the results for “good feelings” as the dependent variable and Table 24 presents the results for “bad feelings”.

**Table 23:** Treatment effects on post-decisional “good feelings”

	Direct effects: Prediction of donations	Direct effects: Prediction of “good feelings”	Indirect effects: Prediction of “good feelings”
Norm treatment	0.49 (0.17)**	0.00 (0.07)	0.13 (0.05)*
Observable treatment	0.39 (0.17)*	-0.07 (0.07)	0.11 (0.05)*
Norm * Observable	0.12 (0.17)	0.02 (0.07)	0.03 (0.05)
Donations		0.28 (0.03)***	

Notes:  $N = 247$  (since calculations are based on a subsample of participants for which emotions data was available, the coefficients in column 2 are slightly different from those reported in Model 1 in Table 1). Unstandardized regression coefficients and the associated bootstrapped standard errors (in parentheses, based on 5000 replications) are reported. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$  (all tests are two-tailed).

Table 23 shows direct effects of variables listed in column 1 on the mediator (see column 2) and on the dependent variable (see column 3). Most importantly, column 4 displays indirect effects of the treatments and their interaction mediated via donations on “good feelings”. The indirect main effects of both treatments are statistically significant and positive; the interaction between treatments is non-significant. This means that participants exposed to pro-environmental descriptive norms donate more (consistent with the test of H1 above) which in turn leads them to experience more “good feelings”, in particular more happiness and pride. Similarly, when others can observe their decisions, this leads participants to donate more (consistent with the test of H2 above) which again leads them to feel more “good”. Thus, both treatments have positive side effects on people’s post-decisional emotions.

**Table 24:** Treatment effects on post-decisional “bad feelings”

	Direct effects: Prediction of donations	Direct effects: Prediction of “bad feelings”	Indirect effects: Prediction of “bad feelings”
Norm treatment	0.49 (0.17)**	-0.12 (0.08)	-0.01 (0.02)
Observable treatment	0.39 (0.17)*	-0.08 (0.08)	-0.01 (0.01)
Norm * Observable	0.12 (0.17)	-0.09 (0.08)	-0.00 (0.00)
Donations		-0.02 (0.03)	

Notes:  $N = 247$  (since calculations are based on a subsample of participants for which emotions data was available, the coefficients in column 2 are slightly different from those reported in Model 1 in Table 1). Unstandardized regression coefficients and the associated bootstrapped standard errors (in parentheses, based on 5000 replications) are reported. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$  (all tests are two-tailed).

Table 24 repeats the same moderated mediation analysis for “bad feelings”. Once again, columns 2 and 3 report direct effects on the mediator and the dependent variable, respectively. Column 4 reports indirect effects of the treatments and their interaction mediated via donations on “bad feelings”, none of which is statistically significantly different from zero.

## Discussion and conclusions

Our findings demonstrate that social norms and decision observability motivate people to be more supportive of renewable energy. We show this in the context of monetary donations to a large, well-established renewable energy development initiative in Spain. While participants in the control condition donated on average 2.7 EUR from their earnings to the initiative, participants exposed to pro-environmental norms donated 3.6 EUR on average and participants whose decisions were observable to others donated 3.3 EUR on average. Participants whose decisions were observable and who in addition received information on norms donated 4.5 EUR on average (see also Figure 5 above).

Using Cohen’s (1988) measure of effect size, we see that compared to control the increase in donations was relatively modest in the “observable no norm” condition ( $d = 0.23$ ) and in the “anonymous high norm” condition ( $d = 0.35$ ), but large in the “observable high norm” condition” ( $d = 0.67$ ).<sup>10</sup> An intuitive metric of effect size is also to look at the percentage increase in donations compared to the control condition’s baseline: donations increased by 23 percent in “observable no norm”, by 35 percent in “anonymous high norm” and by 69 percent in “observable high norm”, on average. These are all substantial effects in economic terms (Allcott, 2011).

Norms and observability both had an additive effect on donations, but contrary to hypothesis H3 the two factors did not interact. In other words, the result obtained in Vesely and Klöckner (2018) of participants adhering to norms more strongly when their decisions were visible to others was not replicated here. A plausible explanation is that in the present study we manipulated descriptive norms (i.e., information on what other people do, see Cialdini et al., 1990), rather than injunctive norms (i.e., information on what other people consider to be socially appropriate behaviour) as Vesely and Klöckner (2018) did. Descriptive norms are thought to operate primarily through pinpointing feasible and adaptive courses of action and deviating from them is less strongly tied to subsequent social sanctions than disregarding injunctive norms (Deutsch & Gerard, 1955; Cialdini et al., 1990). It may have been for this reason that when sanctioning opportunities were introduced by making behaviour observable this

<sup>10</sup> The  $d$  values are computed by dividing the difference in mean donations in the compared conditions by the mean of the donations’ standard deviations in the compared conditions. An alternative formula only using the standard deviation of the control condition in the denominator leads to virtually identical results in the present case.

boosted compliance with injunctive norms in Vesely and Klöckner (2018) but left compliance with descriptive norms unaffected in the present study.

We note that on average women donated substantially more money than men. This seems to be at odds with findings from previous questionnaire studies indicating greater interest in and support for renewable energy among men than among women (Kalkbrenner & Roosen, 2016; Wolske et al., 2017). Ek and Söderholm (2008) and Curtius et al. (2018) report non-significant effects of gender on preferences for green electricity and on intention to install solar panels, respectively. Wiser (2007) reports mixed findings with respect to gender differences in support for renewable energy development. More research based, like the present study, on actual behavioural data is therefore necessary to determine gender effects in this context more conclusively.

Besides treatment effects on donations, we also found that both social norms and increased observability had a positive effect on participants' post-decisional emotions of happiness and pride. This finding, while preliminary in nature, seems to partly dispel the worry that social influence interventions similar to those studied here may have unintended adverse side-effects on participants' well-being, as suggested by previous anecdotal evidence (e.g., Aronson & O'Leary, 1982-83; Allcott, 2011; Sussman & Gifford, 2012). An important agenda for future research is to identify specific aspects of interventions that trigger positive versus negative emotions. Making feelings of connection to nature salient could be one aspect of an intervention that leads to positive emotions (Capaldi et al., 2014). In contrast, perceptions of coercion may be associated with negative emotions, motivation crowding-out and reactance (cf. Brehm, 1966; Gneezy & Rustichini, 2000; de Groot & Schuitema, 2012; Sussman & Gifford, 2012; Bergquist and Nilsson, 2016; Conway & Repke, 2019).

In conclusion, social norms and decision observability represent promising means of generating public support for renewable energy development. Subsequent studies should focus on testing scalable interventions derived from the present experiment in field settings. Whereas social norm interventions have been repeatedly successfully employed in the field (Allcott, 2011; Ferraro & Price, 2013), the scope of observability interventions tested in field settings is so far limited (Bateson et al., 2006, 2013, 2015; Ekström, 2012; Delmas & Lessem, 2014). We suggest that in the context of generating support for renewable energy, properly designed and regulated electronic social media may offer a suitable channel for voluntarily sharing information about one's own behaviour and for accessing shared information about the behaviour of others (see e.g. Glogovac et al., 2016). This is where policy makers may step in. They, as well as environmental organizations and other stakeholders, can make such information sharing easier and more efficient through design and regulation, for example by creating attractive and safe electronic social media platforms. Naturally, before large-scale roll-out, the most suitable method of information sharing should be pre-tested in subsequent applied field studies (for related research see e.g. Mack et al., 2019).

There is evidence that people are often willing to broadcast information about their pro-social actions (Andreoni & Petrie, 2004; Wang & Tong, 2015; Schitter et al., 2019), which is routinely utilized by charitable organizations presenting benefactors with opportunities for such pro-social displays (Harbaugh, 1998). We believe that policy makers and other stakeholders can similarly harness people's propensity to share their pro-social and pro-environmental behaviours with others, through electronic social media platforms and other fora. In line with previous theorizing (e.g. Krupka & Weber, 2009), making people's pro-social and pro-environmental actions more visible can in turn serve to further cultivate pro-social and pro-environmental normative perceptions in the public and thus further strengthen the motivations to act in a socially and environmentally beneficial manner.

**Table 25:** Items measuring post-decisional emotions

Item	Item wording and response options (and their coding, not shown to participants)
Happy	How do you feel about your donation decision? (5=extremely happy, 4=very happy, 3=fairly happy, 2=a little bit happy, 1=not happy, -999=I do not know)
Proud	How do you feel about your donation decision? (5=extremely proud, 4=very proud, 3=fairly proud, 2=a little bit proud, 1=not proud, -999=I do not know)



Guilty	How do you feel about your donation decision? (5=extremely guilty, 4=very guilty, 3=fairly guilty, 2=a little bit guilty, 1=not guilty, -999=I do not know)
Irritated	How do you feel about your donation decision? (5=extremely irritated, 4=very irritated, 3=fairly irritated, 2=a little bit irritated, 1=not irritated, -999=I do not know)
Regretful	How do you feel about your donation decision? (5=extremely regretful, 4=very regretful, 3=fairly regretful, 2=a little bit regretful, 1=not regretful, -999=I do not know)

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## 2.5 Report on the WP4 field study: The case study in an Italian energy provider

### Introduction

As part of the WP4 task 4.2 (Assessing individual and group determinants through psychological experiments), we conducted an empirical investigation on the individual and collective factors at the basis of pro-environmental and energy saving choices in the workplace. We recruited a sample of employees of a major energy provider in Italy whose headquarter is based in Rome. Below we report a summary of the method and main results of this empirical study.

### Method

#### Participants and Procedure

One hundred and sixty participants were recruited among the employees of the energy provider through an on-line questionnaire ( $M_{age} = 33.97$  years;  $SD = 4.34$ ; range 26 to 48 years). The questionnaire was implemented for this purpose in “Limesurvey”, which is an online survey platform. The participants completed the questionnaire between February 2019 and April 2019. The questionnaire took about 15-20 minutes to be completed. Participants individually filled in the questionnaire at a PC. They were assured anonymity about their responses and were not given any financial compensation. As the study aimed to investigate a wide range of attitudes and behaviour related to climate change as well as other ecological domains, we measured some constructs with abbreviated scales. Participants had a mean length of service spent in the company of 6.66 years ( $SD = 4.48$ ). Socio-demographic characteristics of the sample are displayed in Table 26. The on-line survey included demographic information as well as the following questionnaires.

**Table 26:** Sample of socio-demographic characteristics.

Variables	%	N
Gender		
Men	61.3	111
Women	22.1	40
Educational level		
High school	3.9	7
University degree	64.6	117
Post-lauream	14.9	27
Civil Status		
Living together	9.9	18
Divorced/Separated	1.7	3
Married	21	38
Single	50.8	92
Full-time Employment	83.4	151

Note: Missing values determine some values as smaller than the whole sample.

## Measures

### Mindfulness

The Cognitive and Affective Mindfulness Scale-Revised (CAMS-R) is a 12 item self-reported questionnaire developed by Feldman, Hayes, Kumar, Greeson, and Laurenceau (2007). CAMS-R is a refined version of an earlier scale which consisted of 18 items (Kumar, 2005; Kumar, Feldman, & Hayes, 2008). We used 8 items of the Italian adaptation of this scale (CAMS-R; Feldman et al., 2007), which consists of 12 items aimed to identify a comprehensive conceptualization of mindfulness in daily life experience. All the items focused on the degree to which people experience their thoughts and feelings, without any mention to a particular type of meditation training in order to be administrable to the general population. An example of one of these items used in the research is: "It is easy for me to concentrate on what I am doing". Items were rated on a 5-point Likert scale from 1 (completely disagree) to 5 (completely agree). Higher scores of this measure reflected greater mindfulness.

### Job Satisfaction

Job satisfaction was measured with the short form of the Job Satisfaction Scale (Brayfield and Rothe, 1951), which has been used by Judge et al. (1998) in their research investigating the relationship between core self-evaluations and job satisfaction. The scale consists of five items. An example of one of these items is "I feel fairly well satisfied with my present job". Items were rated on a 5-point Likert scale from 1 (completely disagree) to 5 (completely agree). Higher scores of this measure revealed high job satisfaction.

### Emotion Regulation Questionnaire

The Emotion Regulation Questionnaire (ERQ) is a 10-item self-reported questionnaire which consists of two scales corresponding to two different emotion regulation strategies: cognitive reappraisal (6 items, e.g. "When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking") and emotional suppression (4 items, e.g. "I keep my emotions to myself"). Instructions asked the participants "some questions about their emotional life, in particular, how they control (that is, regulate and manage) their emotions." The items were rated on a 5-point-Likert scale from 1 (completely disagree) to 5 (completely agree). We used four items for each emotion regulation strategy of the Italian translation of the ERQ (Balzarotti et al., 2010). Higher scores of these measures revealed greater emotional suppression and greater cognitive reappraisal respectively.

### Perceived Organizational Support

We used the scale of the Perceived Organizational Support (POS) developed by Eisenberger et al. (1986). Researchers rarely use the entire scale, which includes 35 items, and they often prefer to choose a shorter version. Thus, participants' perceived organizational support has been assessed using a short version (see Paillé & Boiral, 2013, for more details) of the scale developed by Eisenberger, Huntington, Hutchison, and Sowa (1986). As in the Paillé et al.'s study, the scale used in this report includes the following four items: (1) My organization really cares about my well-being; (2) My organization appreciates my contribution; (3) My organization considers my aspirations and values; and (4) My organization is prepared to help me when I need a special favour. The 4 items were rated on a 5-point-Likert scale from 1 (completely disagree) to 5 (completely agree). Higher scores of this measure indicated greater perceived organizational support.

### Empathy

We used two items borrowed from the TEIQue short form (i.e., "I often find it difficult to see things from another person's viewpoint" and "I'm normally able to 'get into someone's shoes' and experience their emotions") (Petrides and Furnham, 2006). It is a 30-item questionnaire designed to measure global trait emotional intelligence (trait EI). It is based on the full form of the TEIQue that comprises 153 items (Petrides, 2009; Italian translation by Chirumbolo et al., 2019). Respondents were asked to rate items on a 5-point-Likert scale from 1 (completely disagree) to 5 (completely agree). Higher scores of this measure indicated greater empathy.

### Social Dominance Orientation

We used the Italian version of the Short Social Dominance Orientation scale (SSDO) that includes 4 items to assess people's SDO (Pratto et al., 2013). This measure taps individual orientation toward group inequality. An example

of one of these items is: "In setting priorities we must consider all groups" (Reverse scored). Ratings were made on a 5-point scale, with the response anchored at the ends, ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores of this measure indicated greater social dominance.

#### Ecological Behaviour outside the Workplace

We used 13 items reflecting different domains of ecological behaviour (e.g., mobility, building, smart energy technologies, managing food, engaging in eco-friendly activities and recycling). Some examples of these items are: "Attend environmental rallies", "I usually prefer to eat rather vegetables than meat", "Avoid using public transportation" (Reverse scored), "Recycle at the best that I can", "Leave my computer on when I am not using it" (Reverse scored), "I think smart energy technologies are helpful tools in my house". We specified that these behaviours have to reflect the participants' habits outside the workplace. A composite score of these items indicated participants' pro-environmental behaviour. Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated more ecological behaviour patterns of participants outside the workplace.

#### Ecological Behaviour at the Workplace

We used 14 items reflecting different ecological behaviours at the workplace. Some examples of these items are: "Attend environmental rallies of my company", "Prepare my lunch at work with leftovers of the dinner", "Avoid using public transportation to go to workplace" (Reverse scored), "Recycle at the best that I can at workplace", "Leave my computer on when I am not using it" (Reverse scored), "Use recycled paper to take notes". We specified that these behaviours have to reflect participants' habits at the workplace. A composite score of these items indicated participants' pro-environmental behaviour at the workplace. Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater ecological behaviour of participants at the workplace.

#### Willingness to Pay

We assessed the participants' willingness to donate money for an organization that counteracts global climate change with the following item: "If my company gives me the opportunity to donate a monthly contribution to an association aimed at counteracting climate change, I would donate the following money amount ...". Participants reported the amount of money that they would donate beside the question. Higher scores of this measure indicated a greater willingness to donate money for an organization that counteracts global climate change.

#### Guilt

We assessed feelings of guilt to not act in an eco-friendly way with the following item: "I feel guilty if I don't act ecologically at work". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated greater feelings of guilt to not act in an eco-friendly way.

#### Pride

We assessed feelings of pride to act in an eco-friendly way with the following item: "I am proud if I act ecologically at work". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated greater feelings of proud to act in an eco-friendly way.

#### Moral Anger

We assessed the participants' moral anger with the following item: "I get angry if my colleagues don't take care of the nature". A similar measure has been used in the Reese and Jacob's (2015) study. Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater moral anger.

### Collective Pride

We assessed the participants' collective pride with the following item: "I feel proud if my colleagues take care of the nature". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater collective emotion of proud.

### Collective Guilt

We assessed the participants' collective guilt with the following item: "I feel guilty if my colleagues don't take care of the nature". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater collective emotion of guilt.

### Collective Happiness

We assessed the participants' collective happiness with the following item: "I am happy if my colleagues take care of the nature". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater collective emotion of happy.

### Connectedness to Nature

We assessed the participants' connectedness to nature using an adapted version of the scale by Mayer and Frantz (2004). An example of item used in this study is: "I often feel distant from nature". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater connectedness to nature.

### Identification with the Company

We assessed the participants' identification with the company using an adapted version of the scales previously used for the WP4 ECHOES psychological experiments (see previous sections of this report). An example of item used in this report is: "Being a member of *company X* is an important part of how I see myself". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater identification with the company.

### Intention to Act as Company Members

We assessed the participants' intention to act as a company members using an adapted version of the scales previously used for the WP4 ECHOES psychological experiments (see previous sections of this report). An example of item used in this report is: "I would be willing to take collective action with other employees of *company X* against climate change". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater intention to act towards the nature as a company employee.

### Group Norms

We assessed the participants' group norms using an adapted version of the scales previously used for the WP4 ECHOES psychological experiments (see previous sections of this report). An example of item used in this report is: "Most *company X* employees consider climate concerns in their everyday lives". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated stronger group norms among the employees.

### Collective Self Efficacy as Company Members

We assessed the participants' Collective Self Efficacy as employees of *company X* using an adapted version of the scales previously used for the WP4 ECHOES psychological experiments (see previous sections of this report). An example of item used in this report is: "Employees of *company X* can, with combined forces, successfully act against climate change". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater collective self-efficacy among the employees.

## Environmental Identity

We assessed the participants' environmental identity using an adapted version of the scales previously used for the WP4 ECHOES psychological experiments (see previous sections of this report). An example of item used in this report is: "Acting with respect for the environment is an important part of myself". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater environmental identity.

## Helplessness to Counteract Global Climate Change

We assessed the participants' Helplessness to counteract Global Climate Change using an adapted version of the scales previously used for the WP4 ECHOES psychological experiments (see previous sections of this report). An example of item used in this report is: "When I think about climate change, I become aware that a single person can only do little against it". Ratings were made on a 5-point Likert type scale, with the response anchored at the ends with 1 (strongly disagree) and 5 (strongly agree). Higher scores of this measure indicated a greater individual helplessness to counteract Global Climate Change.

## Results

### *Bivariate correlations*

We computed zero-order correlations among the variables investigated (see table 6). Feelings of guilt to not act in an eco-friendly way were significantly and positively related to following variables: feelings of pride, moral anger, collective pride, collective guilt, collective happiness, ecological behaviour, perceived organizational support, environmental identity, collective self-efficacy as an employee and group norms at the company. Feelings of guilt were also marginally significant and positively associated with ecological behaviour at the workplace ( $p = .05$ ). Finally, such a variable was significantly and negatively related to the following variables: emotional suppression and cognitive reappraisal. In other words, employees who feel more personally guilty not to act, also feel more pride if they do act for the environment, are morally outraged if their colleagues do not join, feel both happy and guilty also on behalf of their colleagues, feel able to achieve more in as a group of colleagues, perceive the group norms at the work place as more in favour of environmental action, but also have a stronger personal environmental identity. This seems to be reflected in a higher tendency to perform environmental behaviour at the workplace. These people have a lower tendency to suppress their emotions or to redirect their attention from negative emotions.

Feelings of pride to act in an eco-friendly way were significantly and positively related to following variables: moral anger, collective proud, collective guilt, collective happiness, perceived organizational support, environmental identity and collective self-efficacy as a company member. Finally, such a variable was significantly and negatively related to the following variables: emotional suppression and cognitive reappraisal. Again, this shows that individual emotional reactions are intertwined with group related emotional reactions and personal environmental identity.

Feelings of moral anger were significantly and positively related to following variables: collective pride, collective guilt, collective happiness, and company identity. Moral anger was also marginally significant and positively associated with ecological behaviour at the workplace ( $p = .05$ ). Finally, such a variable was significantly and negatively related to the following variables: emotional suppression and cognitive reappraisal.

Feelings of collective pride were significantly and positively related to following variables: collective guilt, collective happiness, ecological behaviour at the workplace, environmental identity and collective self-efficacy as a company member. Finally, such a variable was significantly and negatively related to the following variables: emotional suppression, cognitive reappraisal and social dominance orientation.

Feelings of collective guilt were significantly and positively related to collective happiness. Finally, such a variable was significantly and negatively related to the following variables: emotional suppression, cognitive reappraisal, mindfulness and social dominance orientation.

Feelings of collective happiness were significantly and positively related to the following variables: perceived organizational support, environmental identity, collective self-efficacy as a company member. Finally, such a



variable was significantly and negatively related to the following variables: emotional suppression and cognitive reappraisal.

The participants' willingness to donate money (willingness to pay) for an organization that counteracts global climate change was significantly and positively related to the following variables: empathy and job satisfaction. By contrast, it was significantly and negatively related to an individual's helplessness to counteract global climate change.

The participants' empathy was significantly and positively related to job satisfaction. Moreover, this variable was significantly and negatively associated with social dominance orientation.

The participants' connected to nature was significantly and negatively associated with cognitive reappraisal. Participants' connectedness to nature was also marginally significant and positively associated with helplessness to counteract global climate change ( $p = .05$ ). The participants' social dominance was significantly and negatively related to environmental identity.

The participants' ecological behaviour outside the workplace was significantly and positively associated with the following variables: ecological behaviour at the workplace, perceived organizational support, environmental identity, collective self-efficacy as a company member, group norms at the company, and intention to act in an eco-friendly way as a company member.

The participants' ecological behaviour at the workplace was significantly and positively associated with the following variables: job satisfaction, identification with the company, environmental identity and collective self-efficacy as a company member.

The participants' mindfulness was significantly and positively related to perceived organizational support. The participants' job satisfaction was significantly and positively related to the following variables: perceived organizational support, identification with the company, and environmental identity. By contrast, it was significantly and negatively associated with helplessness.

The participants' emotional suppression was significantly and positively related to cognitive reappraisal. The participants' cognitive reappraisal was significantly and positively related to group norms among company members, whereas it was significantly and negatively related to identification with the company.

The participants' perceived organizational support was significantly and positively related to the following variables: environmental identity, group norms among company members, collective self-efficacy as a company member, and intention to act in an eco-friendly way as a company member.

The participants' environmental identity was significantly and positively related to the following variables: group norms among company members, collective self-efficacy as a company member, and intention to act as a company member. The participants' collective self-efficacy as a company member was significantly and positively related to the following variables: group norms among company members and intention to act as a company member.

The participants' group norms were significantly and positively related to the intention to act as a company member.

The effect sizes of these relationships range from small/null to very large effects ( $r = .00$  to  $r = .75$ ). Note that the significant correlations have been reported once when describing the relationships among variables. For example, whether emotional suppression is related to cognitive reappraisal and such a relationship has been reported when describing the correlations of emotional suppression, then it has been not reported when describing the correlations of cognitive reappraisal.

### *Interaction effects*

Based on the relationships pointed out from correlations' analyses we tested two moderation models. First, an individual-level model involving the combined interaction effect of mindfulness and job satisfaction as a key predictor, and the willingness to pay as the outcome of the model. Second, a collective-level model involving the combined interaction effect of intention to act as a company member to counteract climate change and collective proud as a key predictor, and ecological behaviour at the workplace as the outcome of the model.

In a first model, we were interested into looking at effects of variables at a more individual level. Let us describe the first model in more details. We first tested the notion that the employees job satisfaction would be positively associated with willingness to pay for solving environmental issues (i.e., to donate money for an organization that counteracts global climate change). Moreover, we expected that the effect of job satisfaction on willingness to pay would be moderated by individual mindfulness. To test this model we used the PROCESS macro (model #1; see Hayes, 2013 for more details) that runs under the SPSS software and we specified a moderated regression model including, along with main effects for job satisfaction and mindfulness, the crucial job satisfaction X mindfulness interaction parameter. Furthermore, this model included age and gender as covariates. Variables of interest were mean centered prior to analysis.

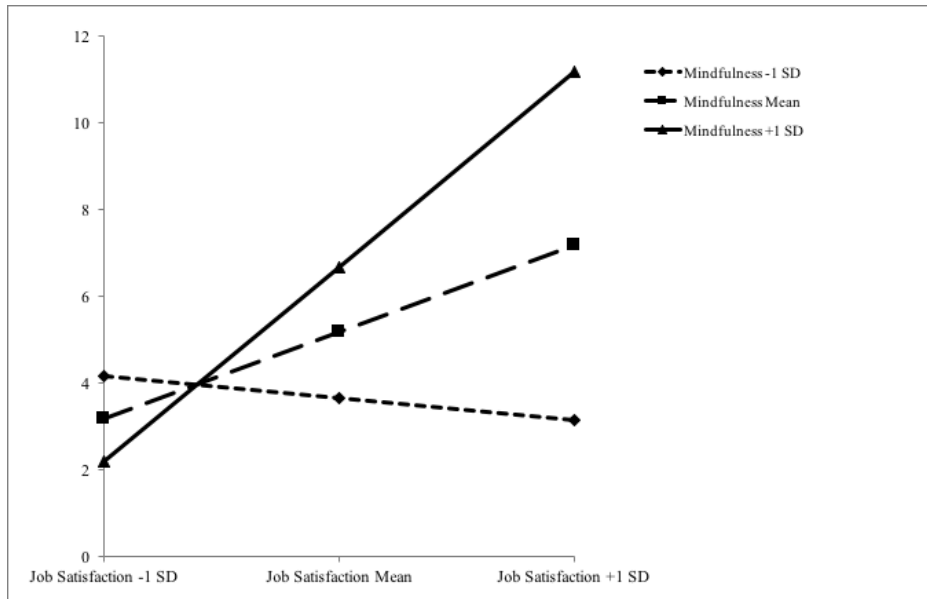
The model accounted for 10% of the variance in the criterion ( $F(5,145) = 3.23, p < .01$ ). The covariates of age and gender were not significantly connected with the criterion variable (all  $ps > .10$ ). Once these covariates were taken into account, the job satisfaction scores provided a unique contribution in accounting for willingness to pay ( $b = .70, se = .32, p < .05$ ). Individuals' mindfulness was not significantly related to such a dependent variable ( $b = .35, se = .20, p = .09$ ). More germane to our interaction hypothesis, the job satisfaction X mindfulness interaction was significant ( $b = .20, se = .07, p < .01$ ). Simple slope effects revealed that at low levels of mindfulness (1 sd below the mean) there was no a significant association between job satisfaction and willingness to pay ( $b = -.18, se = .44, p = .687$ ), but as mindfulness increased and reached its mean value the association became stronger ( $b = .70, se = .32, p = .027$ ), and for those showing higher levels of mindfulness (1 sd above the mean) the association increased again compared with those observed at low and medium levels of mindfulness ( $b = 1.58, se = .47, p = .001$ ).

In a second model, we were interested into looking at effects of variables at a more collective level. Let us describe the second model in more details. We first tested the notion that the intention to act as a company member to counteract climate change would be positively associated with employees' ecological behaviour at the workplace. Moreover, we expected that the effect of intention to act on ecological behaviour at the workplace would be moderated by feelings of collective pride. As for the previous model, we used the PROCESS macro (model #1; see Hayes, 2013 for more details) that runs under the SPSS software and we specified a moderated regression model including, along with main effects for intention to act and collective proud, the crucial intention to act X collective proud interaction parameter. Furthermore, this model included age and gender as covariates. Variables of interest were mean centered prior to analysis.

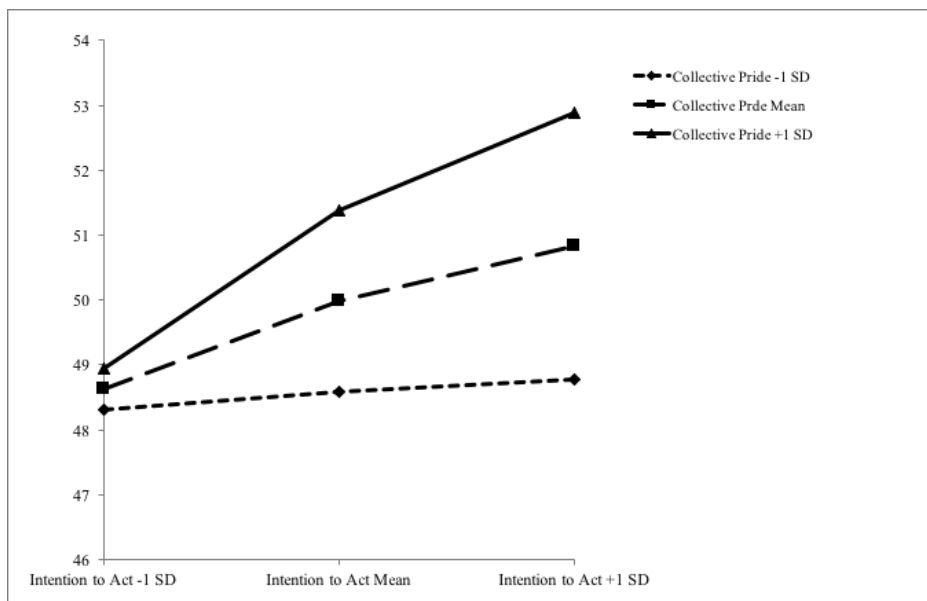
The model accounted for 11% of the variance in the criterion ( $F(5,145) = 3.44, p < .01$ ). The covariates of age and gender were not significantly connected with the criterion variable (all  $p > .10$ ). Once these covariates were taken into account, the intention to act scores provided a unique contribution in accounting for ecological behaviour at the workplace ( $b = 1.06, se = .44, p < .05$ ). Feelings of collective pride was also significantly related to this dependent variable ( $b = 1.20, se = .46, p = .01$ ). More germane to the interaction hypothesis, the intention to act X collective pride interaction was also significant ( $b = .72, se = .30, p < .05$ ). Simple slope effects revealed that at low levels of collective pride (1 sd below the mean) there was no significant association between intention to act and ecological behaviour at the workplace ( $b = .23, se = .51, p = .651$ ), but as collective pride increased to a mean level, the association became stronger ( $b = 1.06, se = .44, p = .016$ ), and for those showing higher levels of collective pride (1 sd above the mean) the association was the strongest, compared to those observed at low and medium levels of collective pride ( $b = 1.89, se = .60, p = .002$ ).

These interaction effects and simple slopes analyses are described in figures 6 and 7

**Figure 6:** Interaction effects of job satisfaction and mindfulness on willingness to donate money for climate change



**Figure 7:** Interaction effects of intention to act and collective pride on ecological behaviour at the workplace



## Summary and conclusions

On the whole, the results of our survey study conducted among employees of large energy company in Italy showed some interesting patterns.

On the one hand, we found how both individual-level and collective-level psychological affective factors (e.g., guilt, pride, moral anger, collective guilt, collective pride, collective happiness) could be strictly interconnected each other, and also related to other important factors such as emotion regulation, mindfulness and job satisfaction, which were shown by previous research to be important factors in shaping people's beliefs in global climate change and pro-environmental behaviour (see, for example, Panno et al., 2015; 2018).

More interestingly, however, our analysis also showed important energy-related psychological outcomes such as pro-environmental behaviors at work and willingness to donate money to organizations that work to contrast global climate change could be predicted by synergic combinations of these kind of factors such as job satisfaction, mindfulness, intentions and collective pride. The interesting aspect of our study is that these kind of mechanisms, were both individual and collective drivers of sustainable energy choices seem to simultaneously occur do emerge in a particular life contexts represented by a large energy company in Italy. Indeed, being chronically exposed to an organizational culture that by definition puts an extreme value on issues related to energy conservation and sustainability represents an interesting aspect which might taken into account in order to promote a higher sensitivity towards energy issue among the entire European population. If energy-related and sustainable energy issues could become part of the daily life culture and discourse of European society at large, than it could be easier for National and European policy makers to plan and implement policies that make use of both individual and collective psychological factors fostering people's lifestyle change in the direction of environmental sustainability and sustainable energy transition.

**Table 6:** Bivariate correlations in the energy company field study

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1 Guilt	1																					
2 Pride	.75**	1																				
3 MA	.31**	.41**	1																			
4 CP	.52**	.65**	.61**	1																		
5 CG	.47**	.39**	.61**	.52**	1																	
6 CH	.43**	.52**	.43**	.72**	.35**	1																
7 WtP	.03	.06	.04	.12	-.00	.03	1															
8 Emp	.02	.01	.05	.12	.12	.10	.19*	1														
9 CNS	.03	.03	.05	.03	.01	.03	.02	-.02	1													
10 SDO	-.13	-.14	-.15	-.20*	-.22**	-.14	-.12	-.22**	.12	1												
11 EB	.18*	.125	-.02	.05	.09	.07	.10	.04	.05	-.05	1											
12 EbatW	.16	.123	.16	.22**	.13	.12	.02	.08	-.05	-.11	.28**	1										
13 MFN	-.01	-.001	-.11	-.08	-.18*	-.09	.13	.03	.15	.02	-.05	-.05	1									
14 JS	.01	.023	.07	.11	-.01	.09	.18*	.19*	.05	-.15	.16	.19*	.13	1								

15 ES	-.27**	-.25**	-.40**	-.36**	-.37**	-.26**	-.10	-.14	-.13	.14	-.10	-.10	.08	.04	1							
16 CR	-.24**	-.16*	-.28**	-.21**	-.25**	-.19*	-.05	-.03	-.18*	.11	.01	-.04	.09	-.02	.74**	1						
17 POS	.20**	.22**	-.00	.10	.06	.18*	-.08	.10	-.02	-.13	.25**	.09	.26**	.30**	.04	.05	1					
18 lwe	.08	-.01	.17*	.13	.15	.07	.139	.08	.03	-.10	.05	.24**	-.10	.26**	-.10	-.20*	-.02	1				
19 EI	.27**	-.21**	.01	.16*	.10	.17*	-.04	.01	-.02	-.17*	.33**	.29**	-.03	.23**	-.08	.03	.28**	-.05	1			
20 CSE	.23**	.22**	.12	.21**	.09	.17*	-.06	-.03	-.05	-.09	.27**	.21*	-.03	.22**	.02	.13	.28**	-.10	.56**	1		
21 GN	.16*	.12	.04	.13	.09	.11	-.06	-.03	-.06	-.10	.28**	.15	-.01	.13	.05	.17*	.26**	-.03	.57**	.64**	1	
22 HLPL	-.06	-.15	.08	.02	.07	.14	-.23**	-.10	.16*	.15	-.14	-.02	-.08	-.18*	.08	.05	-.02	-.06	-.08	-.01	.07	1
23 IA	.11	.14	.07	.12	.06	.08	-.08	-.01	.01	-.05	.27**	.15	.11	.15	.06	.12	.38**	-.08	.45**	.55**	.56**	-.08
M (SD)	3.73 (1.28)	3.78 (1.17)	2.87 (1.23)	3.49 (1.16)	3.09 (1.41)	3.86 (1.2)	5.50 (11.22)	3.44 (.85)	3.4 (.64)	2.67 (.81)	3.83 (.59)	3.58 (.47)	3.66 (.54)	3.98 (.56)	3.93 (.91)	3.91 (.77)	4.58 (.60)	4.28 (.58)	4.52 (.67)	4.71 (.48)	4.63 (.57)	2.72 (1.26)

**Note.** MA (Moral Anger); CP (Collective Pride); CG (Collective Guilt); CH (Collective Happiness); WtP (Willingness to Pay); Emp (Empathy); CNS (Connectedness to Nature Scale); SDO (Social Dominance Orientation); EB (Ecological Behaviour outside the workplace); EBatW (Ecological Behaviour at Workplace); MFN (Mindfulness); JS (Job Satisfaction); ES (Emotional Suppression); CR (Cognitive Reappraisal); POS (Perceived Organizational Support); lwe (Identification with ENEL); EI (Environmental Identity); CSE (Collective Self Efficacy as ENEL member); GN (Group Norms among ENEL members); HLPL (Helplessness); IA (Intention to Act as ENEL member). \*p < .05; \*\* p < .001.



### 3 GENERAL DISCUSSION AND CONCLUSIONS

The purpose of the research activities conducted in ECHOES WP4 and summarized in this deliverable report was to investigate how individual energy choices made in group contexts, in order to provide insights and advance our knowledge on the individual and collective psychological drivers of pro-environmental behaviours and energy-saving choices. This was made by applying a social identity perspective on sustainable energy transitions, and also pursued the goal of identifying the potential of an approach based on collective processes for advising public policies and decision making in the energy and environmental domain. The main idea was that policies that take into account the social-cognitive mechanisms involved in energy-related human decision making and action are more likely to be accepted and endorsed by the general public and might thus be more effective in the long run. From a general point of view, WP4 activities were implemented by conducting an in-depth analyses of individual decision-making processes in collective decision frames, taking also into account the three technology foci of the ECHOES project. In particular, we focused on the distinctive role of collective thinking as a central determinant of human attitudes and behaviours concerning collective (European, national, local) energy transitions.

Within this general frame, the key areas of activities of WP4 have been:

- Reviewing and assessing the main social psychological mechanisms for energy choices of individuals in groups;
- Performing a meta-analytical study shedding light on identity processes, psychological and energy-related and pro-environmental behaviours;
- Combining data from the large-scale ECHOES multinational survey with laboratory experiments and a small-scale field survey.

The mixed-methods approach employed in the WP4 activities represents a powerful methodological tool for several reasons: 1) It is based on rigorous statistical criteria which allows for generalization of research findings. 2) It allowed for the collection of precise and relevant information for the design and implementation of effective campaigns fostering a sustainable energy transition. 3) It allowed to estimate the strength of relations between social psychological processes (such as identity, social norms, self efficacy, attitudes, emotions) and energy choices, by explaining heterogeneity across social groups and categories (for example gender or age differences) through moderator analysis, and thus providing a well-defined picture of the interactions between individual, situational and collective factors that determine sustainable energy choices. Indeed, a number of studies in this domain has suggested how gender and age should be considered as a key moderators explaining the mechanisms underlying the relationship between group identity, social norms, individual and collective self-efficacy, self-regulation, emotions, and sustainable energy use.

Through the systematic review of the literature on pro-environmental behaviours and sustainable energy choices, the ECHOES WP4 work confirmed the idea that as single individuals, people could neither be capable to effectively target large-scale environmental crises, such as climate change or air-pollution, nor would individual action be rational, given that others may not contribute as well (Fritzsche et al., 2018). Thus, perceiving pro-environmental attitudes, intentions, and actions to be shared among members of large ingroups, could be a powerful driver and motivator of a sustainable energy transition and lifestyle change. Of course, people do not always consider their ingroups to be primarily associated with shared pro-environmental goals. This probably explains why the overall effect of social identity emerged as only of small to medium size from our meta-analytical studies in WP4, and also why our WP4 experiments did not show a direct, robust and systematic effect of social identification upon individuals' choices to undertake sustainable energy actions.

From this point of view, in line with a novel Social Identity Model of Pro-Environmental Action (Fritzsche et al., 2018), developed within ECHOES, it seemed also important within the WP4 studies, to better understand the facilitating and inhibiting conditions of positive social identity effects on pro-environmental action, and on sustainable energy

use in particular, such as ingroup norms and collective efficacy beliefs. This kind of approach was seen as helpful also to uncover the policy potential of social identity effects and to inform about which intra- and intergroup dynamics (e.g., a sense of collective coordination, intergroup competition) might be more important for efficacious pro-environmental collective identities to emerge.

The experiment conducted in Spain had indeed this purpose, and allowed to shed more light on this issue. In this case, our findings demonstrated for example that social norms and decision observability can motivate people to be more supportive of renewable energy options. We have shown through this experiment that participants who think that a larger proportion of other people is acting pro-environmentally and whose choices are made observable to others are more willing to give monetary donations to a large, well-established renewable energy development initiative in Spain. In addition to that, we found in this experiment that both social norms and increased observability had a positive effect on participants' post-decisional emotions of happiness and pride.

This findings could partly dispel the worry that social influence interventions may have unintended adverse side-effects on citizens' well-being, as suggested by previous anecdotal evidence (e.g., Aronson & O'Leary, 1982-83; Allcott, 2011; Sussman & Gifford, 2012). An important agenda for future research is thus to define interventions that trigger positive instead that negative emotions. Making feelings of connection to nature salient could be one aspect of an intervention that leads to positive emotions (Capaldi et al., 2014). In contrast, perceptions of being subject to excessively coercive and top-down policies may be associated with negative emotions, motivation crowding-out and reactance (cf. Brehm, 1966; Carrus et al., 2005; Gneezy & Rustichini, 2000; de Groot & Schuitema, 2012; Sussman & Gifford, 2012; Bergquist and Nilsson, 2016; Conway & Repke, 2019).

The two sets of meta-analyses connected within ECHOES WP4 represented a significant advance for both the explanation of private sustainable energy action and for extending general psychological models of pro-environmental action. That is, we not just considered traditional attitude and personal belief predictors of pro-environmental action and intentions, as they have been included in already validated general models, such as those by Klöckner (2014) or Bamberg and Möser (2005). Instead, we extended earlier taxonomies by the concepts of identity and emotion and provide the first systematic meta-analytical tests of the effects of identity-related variables and emotions on pro-environmental action in general and energy-saving behaviour in particular. We find positive effects of most identity-related and individual level variables (including emotions) on people's pro-environmental and energy-saving behaviour, respectively. These novel results suggest the opportunity to extend intervention programs and policy decisions to foster the self-relevance of environmental issues for individuals and collectives, and to associate pro-environmental action with supportive emotional experiences.

Interesting group differences emerged from the moderator analyses performed in the two sets of meta-analyses conducted. For example, place identity and pro-environmental values turned out to be more strongly related in samples of younger (than older) people. Generations may differ with regard to environmental problem perception and the degree to which they link pro-environmental values with specific pro-environmental behaviour options. That is, whereas younger generations may have learned in the course of their (political) socialization that personally valued places in nature are inherently threatened and potential object of care, this might not be true to the same degree for older generations. This aspect is important for policy advice as well, stressing, for instance, the necessity of providing formal and informal learning opportunities but also about communicating pro-environmental social norms. These should highlight the connection between valued places and the need to preserve their natural aspects (not just "think global, act local", but also "think local, act local"). Furthermore, it should be worthwhile to pronounce the innate relation between general environmental values and concrete opportunities to express these values by means of specific pro-environmental action, for instance, in the area of energy saving behaviour. As a further aspect, the moderation of place identity and value effects by age suggests that the latter interventions should not just take place in childhood education but should also address older generations.

Likewise, interesting differences emerged across gender from our meta-analyses. A gender-related variation of the relationship between emotions, considered as a fundamental motivational driver of human behaviour, and energy friendly choices was in fact detected as a robust effect. In particular, the role of emotions in energy saving seem to be stronger among men than women. These findings, combined to the findings of stronger links between identity and pro-environmental behaviours among women compared to men, might have interesting implications for public

campaigns and intervention in the energy domain. For example, we might expect men to be more successfully addressed by persuasive appeals or interventions based on behaviour-specific emotional factors, and women to be more sensitive to appeals or interventions based on an overarching social identity focus.

Because social identity and social norms are strongly interrelated and interdependent mechanisms at a social psychological level, in analysing the answers to some of the WP4-based multinational survey conducted in ECHOES we decided in this report to present the results of these two classes of factors in an aggregated way. Our analyses suggest how different identity typologies (such as individually-, group-, and place-focused identity types) predict energy intention, and energy policy acceptance via social and personal norms, and this idea was formalized in a model proposed as the Identity-Norm-Action Model (INAM). We also focused on the effects of framing energy choices on different policy levels, reflective of potential policy – framing choices, as follows: Municipality, Country, or European Union (EU), and on effects of these policy framing on different Pro-Environmental Energy Behaviour (PEB) types: i.e., buildings, mobility, or smart technology.

Results revealed that, irrespective of the policy reference frame (EU, Country, Municipality), and PEB type (buildings, mobility, smart technology), the main consistent drivers of energy policy acceptance are pro-environmental behavioural intentions and an individually-focused environmental identity (individualistic perspective). We concluded with a suggestion that policy acceptance could be promoted by framing policies as more personally relevant to the targeted public, and that policies supporting consumer-driven sustainable energy choices from a psychological and social influence perspective are needed, rather than relying only on economic incentives and technological innovations.

Finally, the analysis of the individual-level psychological factors assessed in the ECHOES survey, and the results of the survey conducted among employees of a large energy provider point out the importance of specific personal factors in the promotion of sustainable energy choices and pro-environmental lifestyles, such as emotions (guilt, pride and moral anger), emotion regulation, and mindfulness (as well as job satisfaction, company identification, perceived organization support and collective self-efficacy in the case of sustainable behaviours at the workplace). Coherently with previous studies in this field, all these factors can in fact represent important antecedents and preconditions for people perception of climate change (and its attribution to human causes), which in turn might be a factor mobilising action in favour of a sustainable transition.

## 4 ECHOES WP4 GLOSSARY

This glossary briefly defines key terms used in this deliverable. References cited in the entries are listed at the end of this section.

### Anticipated emotions

Anticipated emotions are emotions that one expects to experience in the future if certain conditions obtain (for example emotions one expects to feel following the purchase of an electric car). Anticipated emotions can guide behaviour and judgment. For example, anticipating guilt may motivate people to avoid performing guilt-inducing actions.

### Anticipated guilt

See “Anticipated emotions”, “Guilt”

### Anticipated pride

See “Anticipated emotions”, “Pride”

### Ascribed responsibility

Perceived personal responsibility for a problem (e.g., environmental degradation) and/or for its mitigation. A factor that is important for the activation of “personal norms” (see entry). Personal norms become activated when people are aware that their behaviour has negative consequences for something they value (e.g., the environment), and when they ascribe responsibility to themselves for these negative effects and/or their mitigation.

### Attitude

Attitudes toward a behaviour refer to evaluative beliefs of how beneficial it would be to perform the behaviour. Attitudes can range from very negative to very positive.

### Awareness of consequences

See “Environmental problem awareness”

### Behavioural intention

Behavioural intention is defined as a person’s perceived likelihood of engaging in a given behaviour.

### Collective efficacy

A group’s shared belief in their ability to execute actions required to produce specific outcomes (Bandura, 1997).

### Curtailed behaviour

Curtailed behaviour refers to behaviour that reduces one’s energy consumption within one’s current structural setting (e.g. one’s home or office). Curtailed behaviour typically involves simple actions, such as unplugging unused electric devices or cooking with lids on pots.

### Descriptive norms

See “Social norms”

### Environmental consequences awareness

See “Environmental problem awareness”

### Environmental problem awareness (or Environmental consequences awareness)

Being aware of an environmental problem, respectively being aware that one’s behaviour contributes to an environmental problem. A factor that is important for the activation of “personal norms” (see entry). Personal norms become activated when people are aware that their behaviour has negative consequences for something they value (e.g., the environment), and when they “ascribe responsibility” (see entry) to themselves for these negative effects and/or their mitigation.

### Fairness in economic exchanges

A widely studied topic in economics (e.g. Cappelen, Hole, Sørensen, & Tungodden, 2007; Fehr & Schmidt, 1999). There are several notions of what constitutes fairness, including most notably equity (division of economic surplus, such as profit, according to the effort provided by the parties involved) and equality (equal division of surplus among the parties involved).

### Guilt

Guilt is a negative emotion that can arise as a result of one's transgressions of "social norms" (see entry) or "personal norms" (see entry).

### Habit

Habit can be defined as a learned, automatic behavioural response to a situational cue. The association between the situational cue and the behavioural response triggered by the cue is learned by repeating the same behaviour under the same (or similar) set of situational cues. When we say that habitual behaviour is "automatic", this means that the behaviour in question is enacted largely without conscious deliberation (Klöckner & Matthies, 2004).

### Identification with the norm source

See "Social identity"

### Ingroup identification

See "Social identity"

### Ingroup norms

"Social norms" (see entry) held within a specific group. For example social norms shared within a group of classmates.

### Injunctive norms

See "Social norms"

### Intention

See "Behavioural intention"

### Issue involvement

People are personally involved with an issue to the extent that they care about that issue and perceive it as important to themselves (Thomsen, Borgida, & Lavine, 1995, p. 191).

### Meta-analysis

Meta-analysis is a statistical procedure for aggregating data from multiple studies (see e.g. Klöckner, 2013).

### Moderator

Moderator is a variable that affects the strength of the relationship between an independent variable and a dependent variable. For example, the correlation between an independent variable and a dependent variable may become stronger (weaker) at high (low) levels of the moderator (see Aiken, West, & Reno, 1991; Hayes, 2013; Preacher & Hayes, 2008). As an example, gender might moderate the relation between education and income if the effect of more education on income is not equal for men and women.

### Moral norms

A term often used interchangeably with "personal norms" (see entry).

### New Environmental Paradigm

A questionnaire instrument used to measure general environmental attitudes, i.e. one's favourable or unfavourable evaluations of the natural environment (Hawcroft & Milfont, 2010).

### Perceived behavioural control

Perceived behavioural control refers to people's perceptions of their ability to perform a given behaviour. Perceived behavioural control is determined by a set of accessible "control beliefs", i.e., beliefs about the presence of factors that may facilitate or impede performance of the behaviour in question.

#### Personal norms

Personal norm can be defined as a feeling of moral obligation to act in accordance with one's values or in accordance with social norms (Schwartz & Howard, 1981; Thøgersen, 2006); see also entries "Values" and "Social norms". This feeling of moral obligation needs to be activated in a decision situation in order to influence intention to act (see also entries "Ascribed responsibility" and "Awareness of consequences").

#### Post-decisional emotions

Emotions experienced as a result of performing an action (i.e., implementing a decision). For example being glad about purchasing an electric car.

#### Pride

Pride is a positive emotion associated with feelings of accomplishment and satisfaction. Pride is similarly associated with the positive self-evaluation of being a socially valued person.

#### Problem awareness

See "Environmental problem awareness"

#### Role identity

That part of an individual's self-concept that derives from the meanings that people attach to roles they play in contemporary societies, e.g. the role of a parent, the role of an employee, the role of a consumer.

#### Sanctions

See "Social sanctions"

#### Self-categorization

Self-categorization as a group member – see "Social identity".

#### Self-efficacy

Self-efficacy is the extent to which people believe they are capable of performing specific behaviours in order to attain specific goals (Bandura, 1997, 2001).

#### Self-identity

A comparatively stable conception an individual has of him- or herself. For example seeing oneself as an environmentally friendly person (e.g., Sparks & Shepherd, 1992; Whitmarsh & O'Neill, 2010).

#### Social identity

That part of an individual's self-concept which derives from their knowledge of their membership in a social group (or groups) together with the value or emotional significance attached to that membership (Tajfel, 1978).

#### Social norms

Two main types of social norms can be distinguished: injunctive norms and descriptive norms. Injunctive norms are perceptions of what most people approve or disapprove of in a given situation. Descriptive norms are perceptions of what most people do in a given situation (Cialdini, Kallgren, & Reno, 1990).

#### Social sanctions

Social sanctions can be both positive (e.g., praise, expressions of approval and acceptance) and negative (e.g., criticism, expressions of disapproval). Social sanctions are commonly invoked as a means of enforcing social norm compliance (see "Social norms").

#### Spillover effects

In the context of environmentally relevant behaviours, spillover can be understood as a change in the performance of one pro-environmental behaviour (for example, purchasing electricity generated from renewable sources) as a result of prior performance of another pro-environmental behaviour (for example, purchasing organic food). The performance of the initial ("trigger") behaviour can either increase or decrease the likelihood



of performing the second (“target”) behaviour, which is referred to as positive and negative spillover, respectively (see e.g. Thøgersen, 1999).

### Subjective norms

Subjective norm refers to perceived social pressure to perform or not to perform some behaviour (Ajzen, 1991). Put differently, subjective norm is an individual's perception of "what important others believe the individual should do" in a specific situation (Finlay, Trafimow, & Moroi, 1999, p. 2015). See also "Social norms".

### Values

Values can be defined as desirable trans-situational goals that serve as guiding principles in one's life (Schwartz, 1992). "Trans-situational" means that values are not specific to a single situation, but rather pertain to many situations – for example, if one values positive interpersonal relationships, this value will likely be relevant for many such relationships.

### **References cited in this glossary**

- Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage.
- Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179-211.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1-26.
- Cappelen, A. W., Hole, A. D., Sørensen, E. Ø., & Tungodden, B. (2007). The pluralism of fairness ideals: An experimental approach. *American Economic Review*, 97, 818-827.
- Cialdini, R. B., Reno, R., & Kallgren, C. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58, 1015-1026.
- Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics*, 114, 817-868.
- Finlay, K. A., Trafimow, D., & Moroi, E. (1999). The importance of subjective norms on intentions to perform health behaviours. *Journal of Applied Social Psychology*, 29, 2381-2393.
- Hawcroft, L. J., & Milfont, T. L. (2010). The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis. *Journal of Environmental Psychology*, 30, 143-158.
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis*. New York: Guilford Press.
- Klöckner, C. A. (2013). A comprehensive model of the psychology of environmental behaviour: A meta-analysis. *Global Environmental Change*, 23, 1028-1038.
- Klöckner, C. A., & Matthies, E. (2004). How habits interfere with norm directed behaviour: A normative decision-making model for travel mode choice. *Journal of Environmental Psychology*, 24, 319-327.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behaviour Research Methods*, 40, 879-891.
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna & M. P. Zanna (Eds.), *Advances in experimental social psychology* (pp. 1-65). San Diego, CA US: Academic Press.
- Schwartz, S. H., & Howard, J. A. (1981). A normative decision-making model of altruism. In J. P. Rushton & R. M. Sorrentino, (Eds.), *Altruism and helping behaviour* (pp. 189-211). Hillsdale: Lawrence Erlbaum.
- Sparks, P., & Shepherd, R. (1992). Self-identity and the theory of planned behaviour: Assessing the role of self-identification with "green consumerism". *Social Psychology Quarterly*, 55, 388-399.
- Tajfel, H. (1978). *Differentiation between social groups: Studies in the social psychology of intergroup relations*. London: Academic Press.
- Thøgersen, J. (1999). Spillover processes in the development of a sustainable consumption pattern. *Journal of Economic Psychology*, 20, 53-81.

- Thøgersen, J. (2006). Norms for environmentally responsible behaviour: An extended taxonomy. *Journal of Environmental Psychology*, 26, 247-261.
- Thomsen, C. J., Borgida, E., & Lavine, H. (1995). The causes and consequences of personal involvement. In R. E. Petty, & J. A. Krosnick (Eds.), *Attitude strength: Antecedents and consequences* (pp. 191-214). Mahwah, NJ: Erlbaum.
- Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology*, 30, 305-314.

## 5 APPENDIX

Items of the questionnaire used for the WP4 experiments

Constructs	Items
Social Identification	I often think about the fact that I am a member of the “generation under 30”. <sup>a</sup>
	The fact that I am a member of the younger generation is an important part of my identity. <sup>a</sup>
	Being a member of the “generation under 30” is an important part of how I see myself. <sup>a</sup>
	I feel a bond with other under-30year-olds.
	I feel solidarity with other under-30year-olds.
	I feel committed to the “generation under 30”.
	I am glad to belong to the “generation under 30”. <sup>a</sup>
	It is pleasant to belong to the younger generation. <sup>a</sup>
Collective efficacy	Being a member of the “generation under 30” gives me a good feeling. <sup>a</sup>
	The members of the younger generation (“generation under 30”) can collectively do something to reduce the negative effects of climate change.
	The members of the younger generation (“generation under 30”) can collectively contribute to the goal of fighting the negative effects of climate change. <sup>a</sup>
	The members of the younger generation (“generation under 30”) can , with combined forces, successfully act against climate change.
Social norms	The members of the younger generation (“generation under 30”) can collectively act against climate change, even if unexpected challenges and problems occur in the process.
	Most younger people (“generation under 30”) think that everybody should contribute to fighting climate change.
	It is important to members of the younger generation to act against climate change. <sup>a</sup>
	Most younger people consider climate concerns in their everyday lives.
Moral obligation	The majority of younger people act against climate change themselves. <sup>a</sup>
	I feel morally obliged to take action against climate change.
	It is my duty to act as environmentally friendly as possible. <sup>a</sup>

	The so-called “environmental crisis” is very exaggerated. <sup>b</sup>
	The balance of nature is stable enough to cope with the human impact. <sup>b</sup>
Environmental identity	To act environmentally friendly is an important part of myself.
	I am someone who strongly cares about environmental problems.
	If I weren't able to act environmentally friendly, it would matter to me a lot.
Helplessness	When I think about climate change, I feel helpless.
	When I think about climate change, I notice that my scope of action is limited.
	When I think about climate change, I feel like I can't do anything against it.
	When I think about climate change, I become aware that a single person can only do little against it. <sup>a</sup>
Personal costs	It is very costly for me to take action against climate change.
	Environmentally friendly behaviour is associated with great personal sacrifices for me. <sup>b</sup>
Perceived threat	Climate change and its effects threaten me personally.
Perceived threat (group)	Climate change and its effects threaten the younger generation as a whole. <sup>c</sup>
	Climate change and its effects threaten humanity as a whole. <sup>b</sup>
Cause	Climate change, as it is expected by many scientists, has mainly natural causes.
Personal action intention	I would be willing to no longer buy products from companies, which burden the environment, even if it was uncomfortable for me.
	In the future, I would like to use more car sharing and public transport.
	When flights are avoidable, I will try to find other means of transport to reduce my CO <sup>2</sup> -emissions.
	In the future, I will recycle as many products as possible in order to reduce the amount of energy and material that is needed for their production.
	For ecological reasons, I will try to use less water.
	I will try to buy more energy-saving devices, when I need new ones. <sup>a</sup>
	I am planning to preferably eat vegetarian or to reduce my meat consumption in the future because of climate concerns. <sup>a</sup>
	To bicycle and walk more is one of my goals for the coming period. <sup>a</sup>
	For environmental reasons, I will take measures to save energy.
	In the future, I will turn off the light when I leave a room in order to save energy. <sup>a</sup>

	From now on, I will buy more local instead of imported products. <sup>a</sup>
	I will use green electricity in the future.
Willingness to pay	I would be willing to pay 20 % more for electricity from renewable sources.
	I would be willing to pay 20 % more for a product from controlled organic cultivation (vs. conventional product). <sup>a</sup>
	I would be willing to pay 20 % more for a flight with emission compensation.
	I would be willing to pay 20 % more account maintenance fees for an account with a “green” bank. <sup>a</sup>
	I would be willing to pay 20 % more for a piece of clothing which was manufactured ecologically safe.
	I would be willing to pay 20 % more for public transport which is operated with climate friendly energy. <sup>a</sup>
Policy acceptance	I would be willing to pay higher excise taxes (e.g. value added tax).
	I would be willing to pay higher taxes for petrol and electricity from fossil energy sources (mineral oil, natural gas, etc.). <sup>a</sup>
	I would be willing to accept stricter laws, which tax private car traffic.
	I would be willing to accept stricter environmental requirements which raise the prices of goods.
	I would be willing to accept higher subsidies for environmentally friendly technologies, even if these are financed through taxes. <sup>a</sup>
	I would be willing to pay an “energy solidarity tax” that is used to finance the transition to renewable energy. <sup>a</sup>
Collective action intention	I would be willing to take collective action with others against climate change.
	I would be willing to sign petitions which support climate protection.
	I would be willing to vote for a party which advocates fighting the negative consequences of climate change.
	I would be willing to join a group which stands up for the environment.
	I would be willing to participate in collective actions by the “generation under 30” to protect nature, e.g. in demonstrations. <sup>c</sup>

Notes. Perceived threat = perceived threat against myself. Perceived threat (group) = perceived threat against a group (e.g. the younger generation). <sup>a</sup>only Italy, Germany 1, Germany 2. <sup>b</sup>only Italy, Germany 2. <sup>c</sup>without Germany 1.



## t-Test and Correlational Tables for the Country Specific Experimental Results

Table A1

### *Contrast of Personal Condition With Collective Condition Regarding the Single Scales (Germany 1)*

Variable	Personal condition		Collective condition		<i>t</i> (138)	<i>p</i>	BCa 95 % CI	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>
Social identification	4.69	1.77	4.89	1.66	-0.78	.435	-.78	.33
Collective efficacy	6.94	1.73	7.00	1.42	-0.24	.808	-.58	.41
Social norms	5.20	1.69	5.36	1.51	-0.49	.625	-.65	.42
Perceived helplessness	5.31	1.80	5.27	1.75	0.11	.912	-.56	.60
Personal action intentions	6.55	1.39	6.62	1.37	-0.25	.801	-.54	.39
Willingness to pay	5.92	1.93	5.86	1.76	0.11	.911	-.58	.61
Policy acceptance	6.24	1.85	6.31	1.75	-0.20	.839	-.62	.45
Collective action intentions	6.66	1.97	6.88	1.45	-0.77 <sup>a</sup>	.442	-.79	.29

*Note.* <sup>a</sup> *df* = 125.10. <sup>b</sup> *df* = 122.97. BCa = bias corrected and accelerated. CI = confidence interval. *LL* = lower limit. *UL* = upper limit. Bootstrap results are based von 1.000 bootstrap re-samples (Preacher & Hayes, 2008).

Table A2

*Contrast of Personal Condition With Collective Condition Regarding the Single Scales (Germany 2)*

Variable	Personal condition		Collective condition		$t(125)$	$p$	BCa 95 % CI	
	$M$	$SD$	$M$	$SD$			$LL$	$UL$
Social identification	3.83	1.41	4.12	1.23	-1.24	.217	-.67	.15
Collective efficacy	5.11	1.26	5.20	1.26	-0.41	.683	-.52	.36
Social norms	3.38	1.33	3.79	1.22	-1.78	.077	-.83	.01
Perceived helplessness	4.59	1.43	4.35	1.57	0.88	.379	-.26	.76
Personal action intentions	4.52	0.88	4.56	0.92	-0.26	.797	-.35	.27
Willingness to pay	3.99	1.37	4.06	1.33	-0.28	.778	-.51	.37
Policy acceptance	3.85	1.44	3.70	1.47	0.58	.564	-.32	.66
Collective action intentions	4.35	1.45	4.52	1.45	-0.68	.496	-.66	.31

Note.  $N = 130$ . <sup>a</sup> $df = 116.86$ . BCa = bias corrected and accelerated. CI = confidence interval. LL = lower limit. UL = upper limit. Bootstrap results are based von 1.000 bootstrap re-samples (Preacher & Hayes, 2008).

Table A3

*Contrast of Personal Condition With Collective Condition (Italy)*

Variable	Personal condition		Collective condition		<i>t</i> (136)	<i>p</i>	BCa 95 % CI	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>
Social identification	5.05	1.53	5.79	1.68	-2.68	<b>.008</b>	-1.275	-1.191
Collective efficacy	6.79	1.56	7.18	1.42	-1.55	.123	-0.864	0.125
Social norms	4.47	1.34	4.62	1.36	-0.55	.583	-0.570	0.281
Perceived helplessness	5.35	1.78	5.72	1.75	-1.17	.244	-0.938	0.233
Personal action intentions	6.15	1.31	6.41	1.28	-1.12	.265	-0.684	0.190
Willingness to pay	5.86	1.58	6.29	1.67	-1.43	.154	-0.948	0.177
Policy acceptance	4.98	1.67	5.17	1.75	-0.53	.596	-0.667	0.371
Collective action intentions	6.16	1.75	6.86	1.73	-2.23	<b>.027</b>	-1.225	-0.117

*Note.* *N* = 139. <sup>a</sup>*df* = 121.05. BCa = bias corrected and accelerated. CI = confidence interval. *LL* = lower limit. *UL* = upper limit. Bootstrap results are based on 1.000 bootstrap re-samples (Preacher & Hayes, 2008).

Table A4

*Contrast of Personal Condition With Collective Condition (Finland)*

Variable	Personal condition		Collective condition		<i>t</i> (125)	<i>p</i>	BCa 95 % CI	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>
Social identification	5.36	1.77	5.25	1.83	0.456	.649	-.38	.60
Collective efficacy	5.99	1.85	6.46	1.81	-1.78	.076	-1.00	.04
Social norms	5.30	1.68	4.88	2.10	1.56 <sup>a</sup>	.121	-.16	1.02
Perceived helplessness	5.47	1.71	5.41	1.89	0.21	.837	-.46	.62
Personal action intentions	5.90	1.62	5.90	1.71	-0.01	.995	-.49	.47
Willingness to pay	5.35	2.10	5.38	2.19	-0.11	.912	-.66	.56
Policy acceptance	4.81	2.14	5.00	2.28	-0.62	.533	-.84	.47
Collective action intentions	5.60	1.96	5.68	1.74	-0.27	.787	-.64	.46

*Note.* *N* = 196 <sup>a</sup> *df* = 185.16. BCa = bias corrected and accelerated. CI = confidence interval. *LL* = lower limit. *UL* = upper limit. Bootstrap results are based von 1.000 bootstrap re-samples (Preacher & Hayes, 2008).

Table A5

*Contrast of Personal Condition With Collective Condition (Bulgaria)*

Variable	Personal condition		Collective condition		<i>t</i> (125)	<i>p</i>	BCa 95 % CI	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>
Social identification	6.31	1.87	7.10	1.74	-2.36	<b>.020</b>	-1.32	-1.35
Collective efficacy	6.69	1.91	7.24	1.79	-1.48	.142	-1.06	0.05
Social norms	5.26	1.81	5.73	2.18	-1.05	.297	-1.07	0.35
Perceived helplessness	6.08	1.58	6.28	1.65	0.81	.935	-0.61	0.65
Personal action intentions	6.05	1.55	6.25	1.40	-0.72	.472	-0.64	0.32
Willingness to pay	5.43	2.05	5.09	2.33	1.00	.317	-0.36	1.06
Policy acceptance	4.67	2.23	4.68	2.33	0.05	.964	-0.73	0.80
Collective action intentions	6.02	1.91	6.38	1.72	-0.67	.502	-0.79	0.37

*Note.* *N* = 147. BCa = bias corrected and accelerated. CI = confidence interval. *LL* = lower limit. *UL* = upper limit. Bootstrap results are based von 1.000 bootstrap re-samples (Preacher & Hayes, 2008).

Table A6

*Contrast of Personal Condition With Collective Condition (Turkey)*

Variable	Personal condition		Collective condition		<i>t</i> (125)	<i>p</i>	BCa 95 % CI	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>
Social identification	5.84	1.93	5.83	1.95	-0.36	.721	-.65	.55
Collective efficacy	6.36	1.91	6.21	1.97	0.24	.808	-.47	.61
Social norms	5.86	1.92	5.69	2.13	0.17	.865	-.55	.68
Perceived helplessness	5.57	1.94	5.46	1.97	0.18	.856	-.48	.62
Personal action intentions	6.17	1.75	6.20	1.86	-0.40	.690	-.62	.40
Willingness to pay	5.50	1.94	5.74	2.18	-0.98	.326	-.94	.30
Policy acceptance	4.87	2.23	5.04	2.25	-0.54	.589	-.80	.51
Collective action intentions	6.07	1.71	6.33	1.91	-1.18 <sup>a</sup>	.241	-.80	.21

*Note.* *N* = 211. <sup>a</sup> *df* = 196.18. BCa = bias corrected and accelerated. CI = confidence interval. *LL* = lower limit. *UL* = upper limit. Bootstrap results are based von 1.000 bootstrap re-samples (Preacher & Hayes, 2008).



Table A7

*Contrast of Personal Condition With Collective Condition (Norway)*

Variable	Personal condition		Collective condition		<i>t</i> (125)	<i>p</i>	BCa 95 % CI	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>
Collective efficacy	5.23	1.90	5.18	1.96	0.24	.814	-.38	.51
Social norms	5.19	1.74	5.31	2.00	-0.49	.625	-.55	.37
Perceived helplessness	5.11	1.89	5.09	1.95	0.08	.935	-.46	.48
Personal action intentions	5.24	1.69	5.03	1.80	0.92	.359	-.24	.64
Collective action intentions	5.21	1.82	5.25	1.96	-0.15	.879	-.52	.42

*Note.* *N* = 250. <sup>a</sup> *df* = 233.81. BCa = bias corrected and accelerated. CI = confidence interval. *LL* = lower limit. *UL* = upper limit. Bootstrap results are based von 1.000 bootstrap re-samples (Preacher & Hayes, 2008).

Table A8

*Mean Values, Standard Deviations, Sample Size and Intercorrelations Between Social and Individual Predictors as Well as Dependent Variables for both Conditions (Germany 1)*

Variable	1	2	3	4	5	6	7	8	9	10
1. Social identification	-									
2. Collective efficacy	.31**	-								
3. Social norms	.27**	.23**	-							
4. Moral obligation	.19*	.42**	.14	-						
5. Environmental identity	.20*	.48**	.11	.73**	-					
6. Perceived helplessness	-.09	-.16	-.06	.18*	.03	-				
7. Personal action intentions	.14	.51**	.10	.72**	.78**	.03	-			
8. Willingness to pay	.16	.44**	.10	.64**	.73**	.03	.78**	-		
9. Policy acceptance	.09	.42**	.03	.57**	.62**	.09	.66**	.71**	-	
10. Collective action intentions	.16	.45**	.12	.55**	.62**	.22**	.62**	.58**	.58**	-
<i>M</i>	6.70	6.96	5.49	6.26	6.18	5.22	6,15	5,26	4,67	6,20
<i>SD</i>	1.84	1.87	2.01	2.19	1.61	2.36	1.48	2.19	2.27	1.83
<i>N</i>	147	147	147	147	141	147	146	146	147	147

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

Table A9

Mean Values, Standard Deviations, Sample Size and Intercorrelations Between Social and Individual Predictors as Well as Dependent Variables for both Conditions (Germany 2)

Variable	1	2	3	4	5	6	7	8	9	10
1. Social identification	-									
2. Collective efficacy	.29**	-								
3. Social norms	.37**	.20*	-							
4. Moral obligation	.22*	.59**	.26**	-						
5. Environmental identity	.30**	.44**	.23**	.66**	-					
6. Perceived helplessness	-.12	-.19*	-.08	-.04	-.04	-				
7. Personal action intentions	.13	.50**	.12	.62**	.58**	.01	-			
8. Willingness to pay	.30**	.49**	.20*	.57**	.57**	-.02	.67**	-		
9. Policy acceptance	.25**	.47**	.17	.51**	.40**	-.08	.50**	.70**	-	
10. Collective action intentions	.18*	.52**	.19*	.56**	.61**	-.03	.63**	.55**	.50**	-
<i>M</i>	3.97	5.16	3.58	5.01	4.56	4.47	4.54	4.03	3.78	4.43
<i>SD</i>	1.33	1.25	1.29	1.44	1.35	1.50	0.89	1.35	1.45	1.45
<i>N</i>	127	127	127	127	127	127	127	127	127	127

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

Table A10

*Mean Values, Standard Deviations, Sample Size and Intercorrelations Between Social and Individual Predictors as Well as Dependent Variables for both Conditions (Italy)*

Variable	1	2	3	4	5	6	7	8	9	10
1. Social identification	-									
2. Collective efficacy	.39**	-								
3. Social norms	.28**	.35**	-							
4. Moral obligation	.32**	.54**	.42**	-						
5. Environmental identity	.39**	.56**	.49**	.60**	-					
6. Perceived helplessness	-.10	-.14	-.001	-.14	-.16	-				
7. Personal action intentions	.27**	.60**	.40**	.60**	.61**	-.23**	-			
8. Willingness to pay	.27**	.52**	.48**	.48**	.48**	-.14	.72**	-		
9. Policy acceptance	.27**	.46**	.41**	.49**	.48**	-.15	.59**	.69**	-	
10. Collective action intentions	.32**	.60**	.43**	.54**	.57**	-.14	.74**	.74**	.66*	-
<i>M</i>	5.39	6.97	4.54	6.79	5.56	5.52	6.27	6.05	5.06	6.49
<i>SD</i>	1.63	1.50	1.35	1.68	1.67	1.77	1.30	1.63	1.70	1.77
<i>N</i>	139	138	139	138	139	139	139	139	139	139

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

Table A11



*Mean Values, Standard Deviations, Sample Size and Intercorrelations Between Social and Individual Predictors as Well as Dependent Variables for the both Conditions (Finland)*

Variable	1	2	3	4	5	6	7	8	9	10
1. Social identification	-									
2. Collective efficacy	.53**	-								
3. Social norms	.52**	.45**	-							
4. Moral obligation	.51**	.67**	.52**	-						
5. Environmental identity	.41**	.55**	.51**	.60**	-					
6. Perceived helplessness	.17*	.16*	.21**	.14*	-.01	-				
7. Personal action intentions	.50**	.64**	.50**	.68**	.71**	.13	-			
8. Willingness to pay	.41**	.55**	.51**	.66**	.60**	.10	.72**	-		
9. Policy acceptance	.43**	.56**	.47**	.56**	.54**	.16*	.60**	.68**	-	
10. Collective action intentions	.51**	.75**	.51**	.68**	.64**	.11	.72**	.66**	.63**	-
<i>M</i>	5.31	6.22	5.09	6.21	5.75	5.44	5.90	5.37	4.90	5.64
<i>SD</i>	1.80	1.84	1.91	2.23	1.74	1.84	1.66	2.14	2.21	1.85
<i>N</i>	196	196	196	196	196	196	196	196	196	196

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

Table A12

*Mean Values, Standard Deviations, Sample Size and Intercorrelations Between Social and Individual Predictors as Well as Dependent Variables for the both Conditions (Bulgaria)*

Variable	1	2	3	4	5	6	7	8	9	10
1. Social identification	-									
2. Collective efficacy	.23**	-								
3. Social norms	.27**	.29**	-							
4. Moral obligation	.30**	.41**	.13	-						
5. Environmental identity	.23**	.48**	.13	.49**	-					
6. Perceived helplessness	.23**	.19*	.05	.17*	.21*	-				
7. Personal action intentions	.24**	.51**	.15	.47**	.48**	.15	.			
8. Willingness to pay	.22**	.40**	.15	.38**	.29**	.21*	.57**	-		
9. Policy acceptance	.10	.32**	.11	.54**	.43**	-.01	.43**	.56**	-	
10. Collective action intentions	.32**	.68**	.16	.52**	.53**	.24**	.61**	.56**	.48**	-
<i>M</i>	6.70	6.96	5.50	6.25	6.18	5.30	6.15	5.26	4.67	6.20
<i>SD</i>	1.84	1.87	2.01	2.20	1.61	2.09	1.48	2.19	2.27	1.83
<i>N</i>	147	147	147	147	141	147	146	146	147	147

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



Table A13

*Mean Values, Standard Deviations, Sample Size and Intercorrelations Between Social and Individual Predictors as Well as Dependent Variables for the Collective Condition (Turkey)*

Variable	1	2	3	4	5	6	7	8	9	10
1. Social identification	-									
2. Collective efficacy	.61**	-								
3. Social norms	.70**	.56**	-							
4. Moral obligation	.58**	.70**	.57**	-						
5. Environmental identity	.48**	.60**	.59**	.63**	-					
6. Perceived helplessness	.62**	.59**	.60**	.59**	.43**	-				
7. Personal action intentions	.53**	.79**	.64**	.73**	.65**	.56**	-			
8. Willingness to pay	.53**	.53**	.62**	.58**	.50**	.51**	.69**	-		
9. Policy acceptance	.43**	.32**	.49**	.36**	.33**	.44**	.44**	.66**	-	
10. Collective action intentions	.60**	.83**	.65**	.75**	.61**	.60**	.78**	.64**	.43**	-
<i>M</i>	5.83	6.28	5.77	6.16	6.35	5.51	6.19	5.63	4.96	6.20
<i>SD</i>	1.93	1.94	2.03	2.11	1.95	1.95	1.80	2.07	2.24	1.82
<i>N</i>	210	211	205	211	211	209	211	211	208	211

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

Table A14

*Mean Values, Standard Deviations, Sample Size and Intercorrelations Between Social and Individual Predictors as Well as Dependent Variables for both Conditions (Norway)*

Variable	1	2	3	4	5	6	7
1. Collective efficacy	-						
2. Social norms	.63**	-					
3. Moral obligation	.65**	.66**	-				
4. Environmental identity	.64**	.51**	.54**	-			
5. Perceived helplessness	.55**	.50**	.58**	.41**	-		
6. Personal action intentions	.69**	.61**	.64**	.54**	.56**	-	
7. Collective action intentions	.75**	.66**	.71**	.67**	.58**	.77**	-
<i>M</i>	5.21	5.25	5.41	5.28	5.10	5.14	5.23
<i>SD</i>	1.92	1.87	2.16	1.83	1.92	1.74	1.88
<i>N</i>	250	250	250	250	250	250	250

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

## 6 GENERAL REFERENCES

- Agerup, U., & Nilsson, J. (2016). Green consumer behaviour: Being good or seeming good? *Journal of Product & Brand Management*, 25, 274-284.
- Abrahamse, W., & Steg, L. (2009). How do socio-demographic and psychological factors relate to households' direct and indirect energy use and savings? *Journal of Economic Psychology*, 30(5), 711-720.
- Abrahamse, W., & Steg, L. (2011) Factors related to household energy use and intention to reduce it: The role of psychological and socio-demographic variables. *Human Ecology Review*, 18, 30-40.
- Ahn, S. J. G., Bostick, J., Ogle, E., Nowak, K. L., McGillicuddy, K. T., & Bailenson, J. N. (2016). Experiencing nature: Embodying animals in immersive virtual environments increases inclusion of nature in self and involvement with nature. *Journal of Computer-Mediated Communication*, 21, 399-419.
- Ajzen I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice Hall.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behaviour. In J. Kuhl & J. Beckmann (Eds.), *Action-control: From cognition to behaviour* (pp. 11-39). Heidelberg: Springer.
- Ajzen, I. (1988). *Attitudes, personality, and behaviour*. Chicago: Dorsey
- Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50(2), 179-211.
- Ajzen, I. (1996). The direct influence of attitudes on behaviour. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behaviour* (pp. 385-403). New York: Guilford Press.
- Ajzen, I. (2002). Perceived behavioural control, self-efficacy, locus of control, and the theory of planned behaviour. *Journal of applied social psychology*, 32(4), 665-683.
- Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behaviour. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), *The handbook of attitudes* (pp. 173-221). Mahwah, NJ, US: Lawrence Erlbaum.
- Ajzen, I., Joyce, N., Sheikh, S., & Cote, N. G. (2011). Knowledge and the prediction of behaviour: The role of information accuracy in the theory of planned behaviour. *Basic and Applied Social Psychology*, 33(2), 101-117.
- Alam, S.S. & Rashid, M. (2012) Intention to use renewable energy: mediating role of attitude, *Energy Res. J.* 3 37-44.
- Alex Thornton (2009). *Public attitudes and behaviours towards the environment - tracker survey: A report to the Department for Environment, Food and Rural Affairs*. TNS. Defra, London.
- Allcott, H. (2011). Social norms and energy conservation. *Journal of Public Economics*, 95, 1082-1095.
- Andersson, M., & von Borgstede, C. (2010). Differentiation of determinants of low-cost and high-cost recycling. *Journal of Environmental Psychology*, 30, 402-408.
- Andreoni, J., & Bernheim, D. (2009). Social image and the 50-50 norm: A theoretical and experimental analysis of audience effects. *Econometrica*, 77, 1607-1636.
- Andreoni, J., & Petrie, R. (2004). Public goods experiments without confidentiality: A glimpse into fund-raising. *Journal of Public Economics*, 88, 1605-1623.
- Arendt, F., & Matthes, J. (2016). Nature documentaries, connectedness to nature, and pro-environmental behaviour. *Environmental Communication*, 10, 453-472.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40(4), 471-499.
- Aronson, E., & O'Leary, M. (1982-83). The relative effectiveness of models and prompts on energy conservation: A field experiment in a shower room. *Journal of Environmental Systems*, 12, 219-224.
- Ayres, I., Raseman, S., & Shih, A. (2012). Evidence from two large field experiments that peer comparison feedback can reduce residential energy usage. *Journal of Law, Economics and Organization*, 29, 992-1022.
- Baca-Motes, K., Brown, A., Gneezy, A., Keenan, E. A., & Nelson, L. D. (2013). Commitment and behaviour change: Evidence from the field. *Journal of Consumer Research*, 39, 1070-1084.

- Balzarotti, S., John, O. P., & Gross, J. J. (2010). An Italian Adaptation of the Emotion Regulation Questionnaire. *European Journal of Psychological Assessment*, 26, 61-67. DOI: 10.1027/1015-5759/a000009
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*. <https://doi.org/10.1016/j.jenvp.2006.12.002>
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, 27, 14-25.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman
- Barbarossa, C., & De Pelsmacker, P. (2016). Positive and negative antecedents of purchasing eco-friendly products: A comparison between green and non-green consumers. *Journal of Business Ethics*, 134, 229-247.
- Barth, M., Jugert, P., & Fritsche, I. (2016). Still underdetected: Social norms and collective efficacy predict the acceptance of electric vehicles in Germany. *Transportation Research Part F: Traffic Psychology and Behaviour*, 37, 64-77.
- Bateson, M., Callow, L., Holmes, J. R., Redmond Roche, M. L., & Nettle, D. (2013). Do images of "watching eyes" induce behaviour that is more pro-social or more normative? A field experiment on littering. *PLoS ONE*, 8, e82055.
- Bateson, M., Nettle, D., & Roberts, G. (2006). Cues of being watched enhance cooperation in a real world setting. *Biology Letters*, 2, 412-414.
- Bateson, M., Robinson, R., Abayomi-Cole, T., Greenlees, J., O'Connor, A., & Nettle D. (2015). Watching eyes on potential litter can reduce littering: Evidence from two field experiments. *PeerJ*, 3, e1443.
- Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, 74(5), 1252-1265.
- Bem, D. J. (1972). Self-perception theory. In: L. Berkowitz (Ed.), *Advances in Experimental Social Psychology*, Volume 6 (pp. 1-62). New York. Academic Press.
- Bergquist, M., & Nilsson, A. (2016). I saw the sign: Promoting energy conservation via normative prompts. *Journal of Environmental Psychology*, 46, 23-31.
- Bissing-Olson, M. J., Fielding, K. S., & Iyer, A. (2016). Experiences of pride, not guilt, predict pro-environmental behaviour when pro-environmental descriptive norms are more positive. *Journal of Environmental Psychology*, 45, 145-153.
- Black, J. S., Stern, P. C., & Elworth, J. T. (1985). Personal and Contextual Influences on Household Energy Adaptations. *Journal of Applied Psychology*. <https://doi.org/10.1037/0021-9010.70.1.3>
- Bloodhart, B., & Swim, J. K. (2010). Equality, harmony, and the environment: An ecofeminist approach to understanding the role of cultural values on the treatment of women and nature. *Ecopsychology*, 2(3), 187-194.
- Bockarjova, M., & Steg, L. (2014). Can Protection Motivation Theory predict pro-environmental behaviour? Explaining the adoption of electric vehicles in the Netherlands. *Global Environmental Change*, 28, 276-288.
- Bolderdijk, J. W., Steg, L., Geller, E. S., Lehman, P. K., & Postmes, T. (2013). Comparing the effectiveness of monetary versus moral motives in environmental campaigning. *Nature Climate Change*, 3, 413-416.
- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to Meta-Analysis*: John Wiley and Sons.
- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2010). A Basic Introduction to Fixed-effect and Random-effects Models for Meta-analysis. *Research Synthesis Methods*, 1(2), 97-111. doi:10.1002/jrsm.12
- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2014). *Comprehensive Meta Analysis Version 3.0* [Computer Software]. Englewood, NJ: Biostat.
- Boulstridge, E., & Carrigan, M. (2000). Do consumers really care about corporate responsibility? Highlighting the attitude—behaviour gap. *Journal of communication management*, 4(4), 355-368.
- Bradley, A., Lawrence, C., & Ferguson, E. (2018). Does observability affect prosociality? *Proceedings of the Royal Society B: Biological Sciences*, 285, 20180116.
- Brayfield, A. H., & Rothe, H. F. (1951). An index of job satisfaction. *Journal of Applied Psychology*, 35, 307-311. DOI: 10.1037/h0055617

- Brehm, J. W. (1966). A theory of psychological reactance. Oxford, UK: Academic Press.
- Brick, C., Sherman, D. K., & Kim, H. S. (2017). "Green to be seen" and "brown to keep down": Visibility moderates the effect of identity on pro-environmental behaviour. *Journal of Environmental Psychology*, 51, 226-238.
- Brooks, J. S., & Wilson, C. (2015). The influence of contextual cues on the perceived status of consumption-reducing behaviour. *Ecological Economics*, 117, 108-117.
- Bruvoll, A., & Nyborg, K. (2004). The cold shiver of not giving enough: On the social cost of recycling campaigns. *Land Economics*, 80, 539-549.
- Bugden, D., & Stedman, R. (2019). Place and behaviour: The role of accessibility. *Journal of Environmental Psychology*, 63, 109-117.
- Capaldi, C. A., Dopko, R. L., & Zelenski, J. M. (2014). The relationship between nature connectedness and happiness: A meta-analysis. *Frontiers in Psychology*, 5, article 976.
- Carrus, G., Bonaiuto, M., & Bonnes, M. (2005). Environmental concern, regional identity, and support for protected areas in Italy. *Environment and Behaviour*, 37(2), 237-257.
- Carrus G, Passafaro P, Bonnes M. (2008). Emotions, habits and rational choices in ecological behaviours: The case of recycling and use of public transportation. *Journal of Environmental Psychology*, 28(1), 51-62.
- Carrus, G., Scopelliti, M., Fornara, F., Bonnes, M., & Bonaiuto, M. (2014). Place attachment, community identification, and pro-environmental engagement. In L. C. Manzo, & P. Devine-Wright (Eds.), *Place attachment: Advances in theory, methods, and applications* (pp. 154-164). New York, NY, USA: Routledge.
- Cavanaugh, L. A., Bettman, J. R., & Frances Luce, M. (2015). Feeling love and doing more for distant others: Specific positive emotions differentially affect prosocial consumption. *Journal of Marketing Research*, 52(5), 657-673.
- Chan, R. Y. (2001). Determinants of Chinese consumers' green purchase behaviour. *Psychology & Marketing*, 18(4), 389-413.
- Chan, R.Y.K., Lau, L.B.Y., (2000). Antecedents of green purchases: a survey in China. *J. Consum. Mark.* 17 (4), 338-357
- Chatelain, G., Hille, S. L., Sander, D., Patel, M., Hahnel, U. J. J., & Brosch, T. (2018). Feel good, stay green: Positive affect promotes pro-environmental behaviours and mitigates compensatory "mental bookkeeping" effects. *Journal of Environmental Psychology*, 56, 3-11.
- Chirumbolo, A., Picconi, L., Morelli, M., & Petrides, K. (2018). The assessment of trait emotional intelligence: Psychometric characteristics of the TEIQue-Full Form in an large Italian adult sample. *Frontiers in Psychology*, 9, 2786. DOI: 10.3389/fpsyg.2018.02786
- Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A Focus Theory of Normative Conduct: Recycling the Concept of Norms to Reduce Littering in Public Places. *Journal of Personality and Social Psychology*. <https://doi.org/10.1037/0022-3514.58.6.1015>
- Clayton, S. (2003). Environmental identity: A conceptual and an operational definition. In S. Clayton & S. Opatow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 45-66). Cambridge, MA: MIT Press.
- Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd edition). Hillsdale, NJ: Erlbaum.
- Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd edition). Hillsdale, NJ: Erlbaum.
- Collado, S., Staats, H., & Corraliza, J. A. (2013). Experiencing nature in children's summer camps: Affective, cognitive and behavioural consequences. *Journal of Environmental Psychology*, 33, 37-44.
- Collins, C. M., Steg, L., & Koning, M. A. (2007). Customers' values, beliefs on sustainable corporate performance, and buying behaviour. *Psychology & Marketing*, 24(6), 555-577.
- Conner, M., & Godin, G. (2007). Temporal stability of behavioural intention as a moderator of intention-health behaviour relationships. *Psychology & Health*, 22(8), 875-897.
- Conner, M., Sheeran, P., Norman, P., & Armitage, C. J. (2000). Temporal stability as a moderator of relationships in the Theory of Planned Behaviour. *British Journal of Social Psychology*, 39(4), 469-493.
- Conway, L. G., III, & Repke, M. A. (2019). The psychological contamination of pro-environmental consensus: Political pressure for environmental belief agreement undermines its long-term power. *Journal of Environmental Psychology*, 62, 12-21.

- Cooper, H. (1998). *Synthesizing research: A guide for literature reviews* (3rd edition). Thousand Oaks, CA: Sage.
- Curtius, H. C., Hille, S. L., Berger, C., Hahnel, U. J. J., & Wüstenhagen, R. (2018). Shotgun or snowball approach? Accelerating the diffusion of rooftop solar photovoltaics through peer effects and social norms. *Energy Policy*, 118, 596-602.
- d'Adda, G. (2011). Motivation crowding in environmental protection: Evidence from an artefactual field experiment. *Ecological Economics*, 70, 2083-2097.
- Damasio, A. R. (1994). *Descartes' error: Emotion, reason, and the human brain*. New York: Grosset/Putnam
- De Cremer, D., & van Vugt, M. (2002). Intergroup and intragroup aspects of leadership in social dilemmas: A relational model of cooperation. *Journal of Experimental Social Psychology*, 38, 126-136.
- de Groot, J. I. M. & Steg, L. (2008). Value Orientations to Explain Beliefs Related to Environmental Significant Behaviour. *Environment and Behaviour*, 40, 330-354
- de Groot, J. I. M., & Schuitema, G. (2012). How to make the unpopular popular? Policy characteristics, social norms and the acceptability of environmental policies. *Environmental Science and Policy*. <https://doi.org/10.1016/j.envsci.2012.03.004>
- Dean, M., Raats, M. M., & Shepherd, R. (2012). The Role of Self-Identity, Past Behaviour, and Their Interaction in Predicting Intention to Purchase Fresh and Processed Organic Food. *Journal of Applied Social Psychology*. <https://doi.org/10.1111/j.1559-1816.2011.00796.x>
- Delgado, M. S., Harringer, J. L., & Khanna, N. (2015). The value of environmental status signaling. *Ecological Economics*, 111, 1-11.
- DellaVigna, S., List, J., & Malmendier, U. (2012). Testing for altruism and social pressure in charitable giving. *The Quarterly Journal of Economics*, 127, 1-56.
- Delmas, M. A., & Lessem, N. (2014). Saving power to conserve your reputation? The effectiveness of private versus public information. *Journal of Environmental Economics and Management*, 67, 353-370.
- Deng, J., Walker, G. J., & Swinnerton, G. (2006). A comparison of environmental values and attitudes between Chinese in Canada and Anglo-Canadians. *Environment and Behaviour*, 38(1), 22-47.
- Der Simonian, R., & Laird, N. (1986). Meta-analysis in clinical trials. *Controlled Clinical Trials*, 7, 177-188.
- Deutsch, M., & Gerard, H. (1955). A study of normative and informational social influences upon individual judgment. *Journal of Abnormal and Social Psychology*, 51, 629-636.
- Devinney, T., Auger, P., Eckhardt, G., 2010. *The Myth of the Ethical Consumer*. Cambridge University Press, Cambridge.
- DeWall, C. N., Baumeister, R. F., Chester, D. S., & Bushman, B. J. (2016). How often does currently felt emotion predict social behaviour and judgment? A meta-analytic test of two theories. *Emotion Review*, 8(2), 136-143.
- Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental values. *Annu. Rev. Environ. Resour.*, 30, 335-372.
- Dixon, G. N., Deline, M. B., McComas, K., Chambliss, L., & Hoffmann, M. (2015). Saving energy at the workplace: The salience of behavioural antecedents and sense of community. *Energy Research & Social Science*, 6, 121-127.
- Droseltis, O., & Vignoles, V. L. (2010). Towards an integrative model of place identification: Dimensionality and predictors of intrapersonal-level place preferences. *Journal of Environmental Psychology*, 30, 23-34.
- Dufwenberg, M., & Muren, A. (2006). Generosity, anonymity, gender. *Journal of Economic Behaviour & Organization*, 61, 42-49.
- Dunlap, R. E., & Jones, R. E. (2002). Environmental concern: Conceptual and measurement issues. In R. E. Dunlap & W. Michelson (Eds.), *Handbook of environmental sociology* (pp. 482 - 524). Westport, CT: Greenwood Press.
- Dutcher, D. D., Finley, J. C., Luloff, A. E., & Johnson, J. B. (2007). Connectivity with nature as a measure of environmental values. *Environment and Behaviour*, 39, 474-493.
- Eagly, A. H., & Wood, W. (1994). Using research synthesis to plan future research. In H. Cooper & L. V. Hedges (Eds.), *The handbook of research synthesis* (pp. 485-500). New York: Russell Sage Foundation.
- Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organizational support. *Journal of Applied Psychology*, 71, 500-507. DOI: 10.1037/0021-9010.71.3.500



- Ek, K., & Söderholm, P. (2008). Norms and economic motivation in the Swedish green electricity market. *Ecological Economics*, 58, 169-182.
- Ekström, M. (2012). Do watching eyes affect charitable giving? Evidence from a field experiment. *Experimental Economics*, 15, 530-546.
- Elgaai L. (2012). Exploring the role of anticipated guilt on pro-environmental behaviour—a suggested typology of residents in France based on their recycling patterns. *Journal of Consumer Marketing*, 29(5), 369–377.
- Ernest-Jones, M., Nettle, D., & Bateson, M. (2011). Effects of eye images on everyday cooperative behaviour: A field experiment. *Evolution and Human Behaviour*, 32, 172-178.
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioural, and biomedical sciences. *Behaviour Research Methods*, 39, 175-191.
- Federico, C. M., Ergun, D., & Hunt, C. (2014). Opposition to equality and support for tradition as mediators of the relationship between epistemic motivation and system-justifying identifications. *Group Processes & Intergroup Relations*, 17, 524-541. DOI: 10.1177/1368430213517273
- Fehr, E., & Schneider, F. (2010). Eyes are on us, but nobody cares: Are eye cues relevant for strong reciprocity? *Proceedings of the Royal Society B: Biological Sciences*, 277, 1315-1323.
- Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J. P. (2007). Mindfulness and emotion regulation: The development and initial validation of the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R). *Journal of Psychopathology and Behavioural Assessment*, 29, 177-190. DOI:10.1007/s10862-006-9035-8
- Ferguson, M. A., & Branscombe, N. R. (2010). Collective guilt mediates the effect of beliefs about global warming on willingness to engage in mitigation behaviour. *Journal of Environmental Psychology*, 30, 135-142.
- Ferraro, P. J., & Price, M. K. (2013). Using nonpecuniary strategies to influence behaviour: Evidence from a large-scale field experiment. *The Review of Economics and Statistics*, 95, 64-73.
- Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.
- Field, A. P. (2001). Meta-analysis of Correlation Coefficients: A Monte Carlo Comparison of Fixed- and Random-effects Methods. *Psychological Methods*, 6(2), 161-180. doi:10.1037//1082-989x.6.2.161
- Fielding, K. S., & Hornsey, M. J. (2016). A social identity analysis of climate change and environmental attitudes and behaviours: Insights and opportunities. *Frontiers in Psychology*, 7, 121.
- Fielding, K. S., Terry, D. J., Masser, B. M., & Hogg, M. A. (2008). Integrating social identity theory and the theory of planned behaviour to explain decisions to engage in sustainable agricultural practices. *British Journal of Social Psychology*, 47, 23-48.
- Fischbacher, U. (2007). z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, 10, 171-178.
- Fishbein M, Ajzen I. (1975) *Belief, attitude, intention, and behaviour*. Reading, MA: Addison-Wesley
- Fishbein, M., and Ajzen, I. (1974). Attitudes towards objects as predictors of single and multiple behavioural criteria. *Psychological Review*, 81, 59–74.
- Flynn, R., Bellaby, P., & Ricci, M. (2009). The 'value-action gap' in public attitudes towards sustainable energy: The case of hydrogen energy. *The Sociological Review*, 57(2suppl), 159-180.
- Fransson, N., & Gärling, T. (1999). Environmental concern: Conceptual definitions, measurement methods, and research findings. *Journal of Environmental Psychology*, 19(4), 369-382.
- Frederiks, E., Stenner, K., Hobman, E., (2015). Household energy use: applying behavioural economics to understand consumer decisionmaking and behaviour. *Renew. Sustain. Energy Rev.* 41, 1385–1394.
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, 56, 218-226.
- Fritsche, I., Barth, M., Jugert, P., Masson, T., & Reese, G. (2018). A social identity model of pro-environmental action (SIMPEA). *Psychological Review*, 125, 245-269. <https://doi.org/10.1037/rev0000090>
- Fritsche, I., Jonas, E., & Kessler, T. (2011). Collective Reactions to Threat: Implications for Intergroup Conflict and for Solving Societal Crises. *Social Issues and Policy Review*, 5(1), 101–136. <https://doi.org/10.1111/j.1751-2409.2011.01027.x>



- Fritsche, I., Jonas, E., Kayser, D. N., & Koranyi, N. (2010). Existential threat and compliance with pro-environmental norms. *Journal of Environmental Psychology*, 30, 67-79.
- Fritsche, I., Moya, M., Bukowski, M., Jugert, P., de Lemus, S., Decker, O., ... Navarro-Carrillo, G. (2017). The Great Recession and Group-Based Control: Converting Personal Helplessness into Social Class In-Group Trust and Collective Action. *Journal of Social Issues*, 73(1), 117–137. <https://doi.org/10.1111/josi.12207>
- Gächter, S., & Fehr, E. (1999). Collective action as a social exchange. *Journal of Economic Behaviour & Organization*, 39, 341-369.
- Gardner, B., & Abraham, C. (2008). Psychological correlates of car use: A meta-analysis. *Transportation Research Part F*, 11, 300-311.
- Gatersleben, B., Murtagh, N., & Abrahamse, W. (2014). Values, identity and pro-environmental behaviour. *Contemporary Social Science Contemporary Social Science*, 9, 374-392. <https://doi.org/10.1080/21582041.2012.682086>
- Gatersleben, B., Murtagh, N., Cherry, M., & Watkins, M. (2019). Moral, wasteful, frugal, or thrifty? Identifying consumer identities to understand and manage pro-environmental behaviour. *Environment and Behaviour*, 51, 24-49.
- Geiger, N., Swim, J. K., & Glenna, L. (2019). Spread the green word: A social community perspective into environmentally sustainable behaviour. *Environment and Behaviour*, 51, 561-589.
- Gifford, R., & Sussman, R. (2012). Environmental attitudes. *The Oxford handbook of environmental and conservation psychology*: 65-80.
- Giuliani, M. V. (2003). Theory of attachment and place attachment. In M. Bonnes, T. Lee, & M. Bonaiuto (Eds.), *Psychological theories for environmental issues* (pp. 137-170). Ashgate: Hants.
- Glogovac, B., Simonsen, M., Solberg, S. S., Löfström, E., & Ahlers, D. (2016). Ducky: An online engagement platform for climate communication. *Proceedings of the 9th Nordic Conference on Human-Computer Interaction* (October 2016, Gothenburg, Sweden).
- Gneezy, U., & Rustichini, A. (2000). A fine is a price. *Journal of Legal Studies*, 29, 1-17.
- Göckeritz, S., Schultz, P. W., Rendon, T., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2010). Descriptive normative beliefs and conservation behaviour: The moderating roles of personal involvement and injunctive normative beliefs. *European Journal of Social Psychology*, 40, 514-523.
- Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research*, 35, 472-482.
- Graziano, M., & Gillingham, K. (2014). Spatial patterns of solar photovoltaic system adoption: The influence of neighbors and the built environment. *Journal of Economic Geography*, 15, 815-839.
- Griskevicius, V., Tybur, J. M., & Van den Bergh, B. (2010). Going green to be seen: Status, reputation, and conspicuous conservation. *Journal of Personality and Social Psychology*, 98, 392-404.
- Grob, A. (1995) A structural model of environmental attitudes and behaviour. *Journal of Environmental Psychology*, 15, 209-220.
- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85, 348–362. DOI: 10.1037/0022-3514.85.2.348
- Guagnano, G. A., Stern, P. C., & Dietz, T. (1995). Influences on attitude-behaviour relationships: A natural experiment with curbside recycling. *Environment and Behaviour*, 27, 699-718.
- Hai, M. A., Moula, M. M. E., & Seppälä, U. (2017). Results of intention-behaviour gap for solar energy in regular residential buildings in Finland. *International Journal of Sustainable Built Environment*.
- Haley, K. J., & Fessler, D. M. T. (2005). Nobody's watching? Subtle cues affect generosity in an anonymous economic game. *Evolution and Human Behaviour*, 26, 245-256.
- Halpenny, E. A. (2010). Pro-environmental behaviours and park visitors: The effect of place attachment. *Journal of Environmental Psychology*, 30(4), 409-421.

- Hanimann, R., Vinterbäck, J., & Mark-Herbert, C. (2015). Consumer behaviour in renewable electricity: Can branding in accordance with identity signaling increase demand for renewable electricity and strengthen supplier brands? *Energy Policy*, 78, 11-21.
- Hansla A, Gamble A, Juliusson A, Gärling T. (2008). The relationships between awareness of consequences, environmental concern, and value orientations. *Journal of Environmental Psychology*, 28(1):1–9.
- Harbaugh, W. (1998). What do donations buy? A model of philanthropy based on prestige and warm glow. *Journal of Public Economics*, 67, 269-284.
- Hardin, G. J. (1968). The tragedy of the commons. *Science*, 162, 1243–1248.
- Harju-Autti, P., & Kokkinen, E. (2014). A Novel Environmental Awareness Index Measured Cross-Nationally For Fifty Seven Countries. *Universal Journal of Environmental Research & Technology*, 4(4).
- Hart, P. S., & Nisbet, E. C. (2012). Boomerang effects in science communication: How motivated reasoning and identity cues amplify opinion polarization about climate mitigation policies. *Communication Research*, 39, 701-723.
- Harth, N. S., Leach, C. W., & Kessler, T. (2013). Guilt, anger, and pride about in-group environmental behaviour: different emotions predict distinct intentions. *Journal of Environmental Psychology*, 34, 18-26.
- Haslam, S. A., Oakes, P. J., Reynolds, K. J., & Turner, J. C. (1999). Social identity salience and the emergence of stereotype consensus. In *Personality and Social Psychology Bulletin*. <https://doi.org/10.1177/0146167299025007004>
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.
- Hedges, L. V., & Olkin, I. (1985). *Statistical Methods for Meta-analysis*. Orlando, FL: Academic Press.
- Hedges, L. V., & Vevea, J. L. (1998). Fixed- and random-effects models in meta-analysis. *Psychological Methods*, 3, 486-504.
- Hidalgo, M. C., & Hernandez, B. (2001). Place attachment: conceptual and empirical questions. *Journal of Environmental Psychology*, 21, 273-281.
- Higgins, J. P. T., & Thompson, S. G. (2002). Quantifying Heterogeneity in a Meta-analysis. *Statistics in Medicine*, 21(11), 1539-1558. doi:10.1002/sim.1186
- Hine, D. W., Marks, A. D. G., Nachreiner, M., Gifford, R., & Heath, Y. (2007). Keeping the home fires burning: The affect heuristic and wood smoke pollution. *Journal of Environmental Psychology*, 27(1), 26-32.
- Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behaviour: A meta-analysis. *Journal of Environmental Education*. <https://doi.org/10.1080/00958964.1987.9943482>
- Hoffman, E., McCabe, K., & Smith, V. L. (1996). Social distance and other-regarding behaviour in dictator games. *American Economic Review*, 86, 653-660.
- Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software of the mind* (3rd edition). New York: McGraw-Hill.
- Hogg, M. A. & Turner, J. C. (1987). Intergroup behaviour, self-stereotyping and the salience of social categories. *British Journal of Social Psychology*, 26, 325-340.
- Hogg, M., & Vaughan, G. (2005). *Social Psychology* (4th edition). London: Prentice-Hall.
- Homburg A, Stolberg A. (2006) Explaining pro-environmental behaviour with a cognitive theory of stress. *Journal of Environmental Psychology*, 26: 1-14.
- Howell, A. J., Dopko, R. L., Passmore, H.-A., & Buro, K. (2011). Nature connectedness: Associations with well-being and mindfulness. *Personality and Individual Differences*, 51, 166-171.
- Huddart-Kennedy, E., Beckley, T. M., McFarlane, B. L., & Nadeau, S. (2009a). Rural-urban differences in environmental concern in Canada. *Rural sociology*, 74(3), 309 - 329.
- Huddart-Kennedy, E.; Beckley, T.M.; McFarlane, B.L.; Nadeau, S. (2009b) Why we don't "walk the talk": Understanding the environmental values/behaviour gap in Canada. *Hum. Ecology Rev.* 2009, 16, 151–160.

- Huffman, A. H., Van Der Werff, B. R., Henning, J. B., & Watrous-Rodriguez, K. (2014). When do recycling attitudes predict recycling? An investigation of self-reported versus observed behaviour. *Journal of Environmental Psychology*, 38, 262-270.
- Hunecke, M., Blöbaum, A., Matthies, E., & Höger, R. (2001). Responsibility and environment: Ecological norm orientation and external factors in the domain of travel mode choice behaviour. *Environment and Behaviour*. <https://doi.org/10.1177/00139160121973269>
- Hunter, J. E., & Schmidt, E. L. (1990). *Methods of meta-analysis: Correcting error and bias in research findings*. Newbury Park, CA: Sage.
- Jackson, T. (2005). *Motivating Sustainable Consumption: A Review of Evidence on Consumer Behaviour and Behavioural Change*. Guildford, Surrey, UK: Centre for Environmental Strategy, University of Surrey.
- Jones, D., & Linardi, S. (2014). Wallflowers: Experimental evidence of an aversion to standing out. *Management Science*, 60, 1757-1771.
- Joshi, Y., & Rahman, Z. (2015). Factors affecting green purchase behaviour and future research directions. *International Strategic Management Review*, 3(1), 128-143.
- Judge, T. A., Locke, E. A., Durham, C. C., & Kluger, A. N. (1998). Dispositional effects on job and life satisfaction: the role of core evaluations. *Journal of Applied Psychology*, 83, 17-34.
- Jugert, P., Greenaway, K. H., Barth, M., Büchner, R., Eisentraut, S., & Fritsche, I. (2016). Collective efficacy increases pro-environmental intentions through increasing self-efficacy. *Journal of Environmental Psychology*, 48, 12-23. <https://doi.org/10.1016/j.jenvp.2016.08.003>
- Kaiser FG. (2006) A moral extension of the theory of planned behaviour: Norms and anticipated feelings of regret in conservationism. *Personality and Individual Differences*, 41(1), 71–81.
- Kalkbrenner, B. J., & Roosen, J. (2016). Citizens' willingness to participate in local renewable energy projects: The role of community and trust in Germany. *Energy Research & Social Science*, 13, 60-70.
- Kals, E., Schumacher, D., & Montada, L. (1999). Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behaviour*, 31, 178-202.
- Kano, C. (2013) *Behavioural Change for Energy Conservation Case Study of Post- Fukushima Experience in Japan*, Master thesis in Sustainable Development at Uppsala University, 121, pp. 1-45.
- Kantola, S. J., Syme, G. J., & Campbell, N. A. (1984). Cognitive dissonance and energy conservation. *Journal of Applied Psychology*, 69, 416-421.
- Karlin, B., Zinger, J. F., & Ford, R. (2015). The effects of feedback on energy conservation: A meta-analysis. *Psychological Bulletin*, 141, 1205-1227.
- Kashima, Y., Paladino, A., & Margetts, E. A. (2014). Environmentalist identity and environmental striving. *Journal of Environmental Psychology*, 38, 64-75.
- Kim, S.-W., Lusk, J. L., & Brorsen, B. W. (2018). "Look at me, I'm buying organic": The effects of social pressure on organic food purchases. *Journal of Agricultural and Resource Economics*, 43, 364-387.
- Klandermans, B. (1984). Mobilization and participation: social-psychological expansions of resource mobilization theory. *American Sociological Review*, 49, 583–600. Retrieved from <http://10.0.9.3/2095417>
- Klöckner, C. A. (2013). A comprehensive model of the psychology of environmental behaviour-A meta-analysis. . *Global Environmental Change*, 23, 1028-1038 <https://doi.org/10.1016/j.gloenvcha.2013.05.014>
- Koenig-Lewis, N., Palmer, A., Dermody, J., & Urbye, A. (2014). Consumers' evaluations of ecological packaging – Rational and emotional approaches. *Journal of Environmental Psychology*, 37(March), 94-105
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research*, 8(3), 239-260).
- Korcaj, L., Hahnel, U. J., & Spada, H. (2015). Intentions to adopt photovoltaic systems depend on homeowners' expected personal gains and behaviour of peers. *Renewable Energy*, 75, 407-415.

- Kormos, C., & Gifford, R. (2014). The validity of self-report measures of proenvironmental behaviour: A meta-analytic review. *Journal of Environmental Psychology*, 40, 359-371.
- Kramer, R. M., & Brewer, M. B. (1986). Choice behaviour in social dilemmas: effects of social identity, group size, and decision framing. *Journal of Personality and Social Psychology*, 50, 543-549.
- Kranz, J. & Picot, A. (2011). Why are consumers going green? The role of environmental concerns in private Green-IS adoption. ECIS 2011 Proceedings, Paper 104.
- Krupka, E., & Weber, R. A. (2009). The focusing and informational effects of norms on pro-social behaviour. *Journal of Economic Psychology*, 30, 307-320.
- Kumar, S. M. (2005). *Grieving mindfully: A compassionate and spiritual guide to coping with loss*. Oakland, CA: New Harbinger.
- Kumar, S., Feldman, G., & Hayes, A. (2008). Changes in mindfulness and emotion regulation in an exposure-based cognitive therapy for depression. *Cognitive Therapy and Research*, 32, 734-744. DOI:10.1007/s10608-008-9190-1
- Lacasse, K. (2016). Don't be satisfied, identify! Strengthening positive spillover by connecting pro-environmental behaviours to an "environmentalist" label. *Journal of Environmental Psychology*, 48, 149-158.
- Lange, F., & Dewitte, S. (2019). Measuring pro-environmental behaviour: Review and recommendations. *Journal of Environmental Psychology*, 63, 92-100.
- Lapinski, M. K., Zhuang, J., Koh, H., & Shi, J. (2017). Descriptive norms and involvement in health and environmental behaviours. *Communication Research*, 44, 367-387.
- Lauren, N., Fielding, K. S., Smith, L., & Louis, W. R. (2016). You did, so you can and you will: Self-efficacy as a mediator of spillover from easy to more difficult pro-environmental behaviour. *Journal of Environmental Psychology*. <https://doi.org/10.1016/j.jenvp.2016.10.004>
- Leach, C. W., van Zomeren, M., Zebel, S., Vliek, M. L. W., Pennekamp, S. F., Doosje, B., Ouwerkerk, J. W., & Spears, R. (2008). Group-level self-definition and selfinvestment: a hierarchical (multicomponent) model of ingroup identification. *Journal of Personality and Social Psychology*, 95, 144-165.
- Leary, M. R., Tipsord, J. M., & Tate, E. B. (2008). Allo-inclusive identity: Incorporating the social and natural worlds into one's sense of self. In H. Wayment & J. Bauer (Eds.), *Transcending self-interest: Psychological explorations of the quiet ego* (pp. 137-147). Washington, D.C.: American Psychological Association.
- Lede, E., Meleady, R., & Seger, C. R. (2019). Optimizing the influence of social norms interventions: Applying social identity insights to motivate residential water conservation. *Journal of Environmental Psychology*, 62, 105-114.
- LeDoux, J. (2012). Rethinking the emotional brain. *Neuron*, 73(4), 653-676.
- Lee TH, Jan FH, Yang, CC. (2013) Conceptualizing and measuring environmentally responsible behaviours from the perspective of community-based tourists. *Tourism Management*, 6: 454-468.
- Lee, C.-Y., Hochman, G., Prince, S. E., & Ariely, D. (2016). Past actions as self-signals: How acting in a self-interested way influences environmental decision making. *PLoS ONE*, 11, e0158456.
- Leoniak, K. J., & Cwalina, W. (2019). The role of normative prompts and norm support cues in promoting light-switching behaviour: A field study. *Journal of Environmental Psychology*, 64, 1-11.
- Levine, D. S., & Leven, S. J. (2014). *Motivation, emotion, and goal direction in neural networks* (2nd Ed.). New York: Psychology Press
- Lewicka, M. (2011). Place attachment: How far have we come in the last 40 years? *Journal of Environmental Psychology*, 31, 207-230.
- Liefänder, A. K., Fröhlich, G., Bogner, F. X., & Schultz, P. W. (2013). Promoting connectedness with nature through environmental education. *Environmental Education Research*, 19, 370-384.
- Lindbeck, A., Nyberg, S., & Weibull, J. (1999). Social norms and economic incentives in the welfare state. *The Quarterly Journal of Economics*, 114, 1-35.
- Lois, D., Moriano, J. A., & Rondinella, G. (2015). Cycle commuting intention: A model based on theory of planned behaviour and social identity. *Transportation Research Part F: Traffic Psychology and Behaviour*. <https://doi.org/10.1016/j.trf.2015.05.003>

- Lokhorst, A. M., Hoon, C., le Rutte, R., & de Snoo, G. (2014). There is an I in nature: The crucial role of the self in nature conservation. *Land Use Policy*. <https://doi.org/10.1016/j.landusepol.2014.03.005>
- López-Pérez, R. (2008). Aversion to norm-breaking: A model. *Games and Economic Behaviour*, 64, 237-267.
- Low, S. M. (1992). Symbolic ties that bind. Place attachment in the plaza. In I. Altman, & S. M. Low (Eds.), *Place attachment* (pp. 165-185). New York and London: Plenum Press.
- Lu H, Schuldt JP. (2015) Exploring the role of incidental emotions in support for climate change policy. *Climatic Change*, 131(4), 719–726.
- Mack, B., Tampe-Mai, K., Kouros, J., Roth, F., Taube, O., & Diesch, E. (2019). Bridging the electricity saving intention-behaviour gap: A German field experiment with a smart meter website. *Energy Research & Social Science*, 53, 34-46.
- Maki, A., Carrico, A. R., Raimi, K. T., Truelove, H. B., Araujo, B., & Yeung, K. L. (2019). Meta-analysis of pro-environmental behaviour spillover. *Nature Sustainability*, 2, 307-315.
- Maniadis, Z., Tufano, F., & List, J. A. (2014). One swallow doesn't make a summer: New evidence on anchoring effects. *American Economic Review*, 104, 277-290.
- Manning, M. (2009). The effects of subjective norms on behaviour in the theory of planned behaviour: A meta-analysis. *British Journal of Social Psychology*, 48, 649-705.
- Manstead, A. S. R. (1996). Attitudes and behaviour. In G. R. Semin, & K. Fiedler (Eds.), *Applied social psychology* (pp. 3–29). London: Sage.
- Manzo, L. C. (2005). For better or worse: exploring multiple dimensions of place meaning. *Journal of Environmental Psychology*, 25, 67-86.
- Masson, T., & Fritsche, I. (2014). Adherence to climate change-related ingroup norms: Do dimensions of group identification matter? *European Journal of Social Psychology*, 44, 455-465.
- Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of environmental psychology*, 24(4), 503-515.
- Mayer, F. S., Frantz, C. M., Bruehlman-Senecal, E., & Dolliver, K. (2009). Why is nature beneficial? The role of connectedness to nature. *Environment and Behaviour*, 41, 607-643.
- McCright, A. M., & Dunlap, R. E. (2011). The politicization of climate change and polarization in the American public's views of global warming, 2001-2010. *The Sociological Quarterly*, 52, 155-194.
- McFarland, S., Webb, M., & Brown, D. (2012). All humanity is my ingroup: A measure and studies of identification with all humanity. *Journal of Personality and Social Psychology*, 103, 830-853.
- Mellers, B. A., & McGraw, A. P. (2001). Anticipated emotions as guides to choice. *Current Directions in Psychological Science*, 6, 210–214.
- Milfont, T. L. (2007). *Psychology of environmental attitudes: A cross-cultural study of their content and structure* (Doctoral dissertation). The University of Auckland, Auckland, NZ.
- Milfont, T. L., & Duckitt, J. (2010). The environmental attitudes inventory: A valid and reliable measure to assess the structure of environmental attitudes. *Journal of environmental psychology*, 30, 80 - 94.
- Milfont, T. L., Duckitt, J., & Cameron, L. D. (2006). A cross-cultural study of environmental motive concerns and their implications for proenvironmental behaviour. *Environment and Behaviour*, 38(6), 745-767.
- Morren, M., & Grinstein, A. (2016). Explaining environmental behaviour across borders: A meta-analysis. *Journal of Environmental Psychology*, 47, 91-106.
- Naderi, I., & Strutton, D. (2015). I support sustainability but only when doing so reflects fabulously on me: Can green narcissists be cultivated? *Journal of Macromarketing*, 35, 70-83.
- Naess, A. (2003). The deep ecological movement: Some philosophical aspects. In A. Light & H. Rolstone III (Eds.), *Environmental ethics: An anthology* (pp. 262-275). Malden, MA: Blackwell Publishers Ltd
- Nelissen R, Leliveld MC, van Dijk E, Zeelenberg M. Fear and guilt in proposers: using emotions to explain offers in ultimatum bargaining. *European Journal of Social Psychology*, 2011, 41(1), 78–85.



- Nigbur, D., Lyons, E., & Uzzell, D. (2010). Attitudes, norms, identity and environmental behaviour: Using an expanded theory of planned behaviour to predict participation in a kerbside recycling programme. *British Journal of Social Psychology*. <https://doi.org/10.1348/014466609X449395>
- Nisbet, E., & Zelenski, J. (2011). Underestimating nearby nature: Affective forecasting errors obscure the happy path to sustainability. *Psychological Science*, 22, 1101-1106.
- Nolan, J. M., Schultz, P. W., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2008). Normative social influence is underdetected. *Personality and Social Psychology Bulletin*, 34, 913-923.
- Nordlund, A. M., & Garvill, J. (2002). Value structures behind proenvironmental behaviour. *Environment and behaviour*, 34(6), 740-756.
- Northover, S. B., Pedersen, W. C., Cohen, A. B., & Andrews, P. W. (2017). Artificial surveillance cues do not increase generosity: Two meta-analyses. *Evolution and Human Behaviour*, 38, 144-153.
- Notani, A. S. (1998). Moderators of perceived behavioural control's predictiveness in the theory of planned behaviour: A meta-analysis. *Journal of Consumer Psychology*, 7, 247-271.
- Nurse, G. A., Benfield, J., & Bell, P. A. (2010). Women engaging the natural world: Motivation for sensory pleasure may account for gender differences. *Ecopsychology*, 2(3), 171-178.
- Ockwell, D., Whitmarsh, L., & O'Neill, S. (2009). Reorienting climate change communication for effective mitigation: forcing people to be green or fostering grass-roots engagement?. *Science Communication*, 30(3), 305-327.
- Ojala, M. (2008). Recycling and ambivalence: Quantitative and qualitative analyses of household recycling among young adults. *Environment and Behaviour*, 40(6), 777-797.
- Onwezen MC, Antonides G, Bartels J. (2013). The Norm Activation Model: An exploration of the functions of anticipated pride and guilt in pro-environmental behaviour. *Journal of Economic Psychology*, 39, 141-153.
- Onwezen MC, Bartels J, Antonides G. (2014). The self-regulatory function of anticipated pride and guilt in a sustainable and healthy consumption context. *European Journal of Social Psychology*, 44(1), 53-68.
- Paillé, P., & Boiral, O. (2013). Pro-environmental behaviour at work: Construct validity and determinants. *Journal of Environmental Psychology*, 36, 118-128. DOI: 10.1016/j.jenvp.2013.07.014
- Paillé, P., Bourdeau, L., & Galois, I. (2010). Support, trust, satisfaction, intent to leave and citizenship at organizational level: A social exchange approach. *International Journal of Organizational Analysis*, 18, 41-58. DOI: 10.1108/19348831011033203
- Panno, A., Carrus, G., Maricchiolo, F., & Mannetti, L. (2015). Cognitive reappraisal and pro-environmental behavior: The role of global climate change perception. *European Journal of Social Psychology*, 45(7), 858-867.
- Panno, A., Donati, M. A., Chiesi, F., & Primi, C. (2015). Trait emotional intelligence is related to risk-taking through negative mood and anticipated fear. *Social Psychology*, 46, 361-367.
- Panno, A., Giacomantonio, M., Carrus, G., Maricchiolo, F., Pirchio, S., & Mannetti, L. (2018). Mindfulness, pro-environmental behavior, and belief in climate change: the mediating role of social dominance. *Environment and Behavior*, 50(8), 864-888.
- Parkins, J. R., Rollins, C., Anders, S., & Comeau, L. (2018). Predicting intention to adopt solar technology in Canada: The role of knowledge, public engagement, and visibility. *Energy Policy*, 114, 114-122.
- Parkinson, B., & Totterdell, P. (1999). Classifying affect-regulation strategies. *Cognition & Emotion*, 13(3), 277-303.
- Partanen-Hertell, M., Harju-Autti, P., Kreft-Burman, K., & Pemberton, D. (1999). Raising environmental awareness in the Baltic Sea area.
- Passafaro, P., Rimano, A., Piccini, M. P., Metastasio, R., Gambardella, V., Gullace, G., & Lettieri, C. (2014). The bicycle and the city: Desires and emotions versus attitudes, habits and norms. *Journal of Environmental Psychology*, 38(June), 76-83.
- Perkins, H. E. (2010). Measuring love and care for nature. *Journal of Environmental Psychology*, 30, 455-463.

- Perri, C., & Corvello, V. (2015). Smart Energy Consumers: An Empirical Investigation on the Intention to Adopt Innovative Consumption Behaviour. *World Academy of Science, Engineering and Technology, International Journal of Social, Behavioural, Educational, Economic, Business and Industrial Engineering*, 9(9), 3014-3026.
- Peterson, R. A., & Brown, S. P. (2005). On the Use of Beta Coefficients in Meta-analysis. *Journal of Applied Psychology*, 90(1), 175-181. doi:10.1037/0021-9010.90.1.175
- Petrides K. V. (2009). *Technical manual for the Trait Emotional Intelligence Questionnaires (TEIQue)*: Routledge.
- Petrides, K. V. & Furnham, A. (2006). The role of trait emotional intelligence in a gender-specific model of organizational variables. *Journal of Applied Social Psychology*, 36, 552-569. DOI: 10.1111/j.0021-9029.2006.00019.x
- Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern, and environmental behaviour: A study into household energy use. *Environment and behaviour*, 36(1), 70-93.
- Postmes, T., Haslam, S. A., & Jans, L. (2013). A single-item measure of social identification: Reliability, validity, and utility. *British Journal of Social Psychology*. <https://doi.org/10.1111/bjso.12006>
- Postmes, T., Rabinovich, A., Morton, T., & Van Zomeren, M. (2014). Towards sustainable social identities: Including our collective future into the self-concept. In H. C. M. Van Trijp (Ed.), *Encouraging sustainable behaviour: Psychology and the environment* (pp. 185–202). New York, NY: Psychology Press.
- Pratto, F., Cidam, A., Stewart, A. L., Zeineddine, F. B., Aranda, M., Aiello, A., ... & Eicher, V. (2013). Social dominance in context and in individuals: Contextual moderation of robust effects of social dominance orientation in 15 languages and 20 countries. *Social Psychological and Personality Science*, 4, 587-599. DOI: 10.1177/1948550612473663
- Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioural Research*, 42, 185-227.
- Priolo, D., Milhabet, I., Codou, O., Fointiat, V., Lebarbenchon, E., & Gabarrot, F. (2016). Encouraging ecological behaviour through induced hypocrisy and inconsistency. *Journal of Environmental Psychology*, 47, 166-180.
- Proshansky, H. M., Fabian, A. K., & Kaminoff, R. (1983). Place-identity: Physical world socialization of the self. *Journal of Environmental Psychology*, 3, 57-83.
- Puska, P., Kurki, S., Lähdesmäki, M., Siltaoja, M., & Luomala, H. (2016). Male-male status signaling through favouring organic foods: Is the signaler perceived and treated as a friend or a foe? *Psychology & Marketing*, 33, 843-855.
- Rabinovich, A., & Morton, T. A. (2012). Sizing fish and ponds: The joint effects of individual- and group-based feedback. *Journal of Experimental Social Psychology*, 48, 244-249.
- Ramayah, T., Lee, J. W. C., & Mohamad, O. (2010). Green product purchase intention: Some insights from a developing country. *Resources, Conservation and Recycling*, 54(12), 1419-1427.
- Rees, J. H., Klug, S., & Bamberg, S. (2015). Guilty conscience: Motivating pro-environmental behaviour by inducing negative moral emotions. *Climatic Change*, 130, 439-452.
- Reese, G., & Jacob, L. (2015). Principles of environmental justice and pro-environmental action: A two-step process model of moral anger and responsibility to act. *Environmental Science & Policy*, 51, 88-94. DOI: 10.1016/j.envsci.2015.03.011
- Reicher, S. D., Spears, R., & Haslam, S. A. (2010). The social identity approach in social psychology. In M. S. Wetherell & C. T. Mohanty (Eds.), *Sage Identities Handbook* (pp.45-62). London: Sage.
- Restall, B., & Conrad, E. (2015). A literature review of connectedness to nature and its potential for environmental management. *Journal of Environmental Management*, 159, 264-278.
- Reyniers, D., & Bhalla, R. (2013). Reluctant altruism and peer pressure in charitable giving. *Judgment and Decision Making*, 8, 7-15.
- Richetin, J., Conner, M., & Perugini, M. (2011). Not doing is not the opposite of doing: Implications for attitudinal models of behavioural prediction. *Personality & Social Psychology Bulletin*, 37(1), 40-54.
- Riger, S., & Lavrakas, P. J. (1981). Community ties: patterns of attachment and social interaction in urban neighborhoods. *American Journal of Community Psychology*, 9, 55-66.
- Rodgers, W. M., Conner, M., & Murray, T. C. (2008). Distinguishing among perceived control, perceived difficulty, and self-efficacy as determinants of intentions and behaviours. *The British Journal of Social Psychology*, 47(4), 607-630.



- Rosenberg, M. J., & Hovland, C. I. (1960). Cognitive, Affective and Behavioural Components of Attitudes. In M. J. Rosenberg & C. I. Hovland (Eds.), *Attitude Organization and Change: An Analysis of Consistency Among Attitude Components*. New Haven: Yale University Press.
- Rosenthal, R. (1979). The file drawer problem and tolerance for null results. *Psychological Bulletin*, 86, 638-64.
- Roth, J., & Mazziotto, A. (2015). Adaptation and validation of a German multidimensional and multicomponent measure of social identification. *Social Psychology*. <https://doi.org/10.1027/1864-9335/a000243>
- Russell, S. V., Young, C. W., Unsworth, K. L., & Robinson, C. (2017). Bringing habits and emotions into food waste behaviour. *Resources, Conservation & Recycling*, 125, 107-114.
- Salomon, E., Preston, J. L., & Tannenbaum, M. B. (2017). Climate change helplessness and the (De)moralization of individual energy behaviour. *Journal of Experimental Psychology: Applied*. <https://doi.org/10.1037/xap0000105>
- Sandberg, T., & Conner, M. (2008). Anticipated regret as an additional predictor in the theory of planned behaviour: A meta-analysis. *British Journal of Social Psychology*, 47, 589-606.
- Scannell, L., & Gifford, R. (2010a). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology*, 30, 1-10.
- Schitter, C., Fleiß, J., & Palan, S. (2019). To claim or not to claim: Anonymity, symmetric externalities and honesty. *Journal of Economic Psychology*, 71, 13-36.
- Schneider, C. R., Zaval, L., Weber, E. U., & Markowitz, E. M. (2017). The influence of anticipated pride and guilt on pro-environmental decision making. *PloS one*, 12(11), e0188781.
- Schram, A., & Charness, G. (2015). Inducing social norms in laboratory allocation choices. *Management Science*, 61, 1531-1546.
- Schultz, P. W. (2001). Assessing the structure of environmental concern: Concern for the self, other people, and the biosphere. *Journal of Environmental Psychology*, 21, 327-339.
- Schultz, P. W., & Tabanico, J. (2007). Self, identity, and the natural environment: Exploring implicit connections with nature. *Journal of Applied Social Psychology*, 37, 1219-1247.
- Schultz, P. W., Bator, R. J., Large, L. B., Bruni, C. M., Tabanico, J. J. (2011). Littering in context: Personal and environmental predictors of littering behaviour. *Environment and Behaviour*, 45, 35-59.
- Schultz, P. W., Gouveia, V. V., Cameron, L. D., Tankha, G., Schmuck, P., & Franěk, M. (2005). Values and their relationship to environmental concern and conservation behaviour. *Journal of Cross-cultural Psychology*, 36(4), 457-475.
- Schultz, P. W., Messina, A., Tronu, G., Limas, E. F., Gupta, R., & Estrada, M. (2016). Personalized normative feedback and the moderating role of personal norms: A field experiment to reduce residential water consumption. *Environment and Behaviour*, 48, 686-710.
- Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological Science*, 18, 429-434.
- Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of environmental psychology*, 24, 31 – 42
- Schultz, P.W. (2000) New environmental theories: Empathizing with nature: The effects of perspective taking on concern for environmental issues. *Journal of Social Issues*, 56, 391–406.
- Schultz, P.W.; Zelezny, L.C. Reframing environmental messages to be congruent with America values. *Hum. Ecol. Rev.* 2003, 10, 126–136.
- Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 221–279). New York: Academic Press. [https://doi.org/10.1016/S0065-2601\(08\)60358-5](https://doi.org/10.1016/S0065-2601(08)60358-5)
- Schwartz, S. H. (1992). Universals in the content and structure of values: theory and empirical tests in 20 countries. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 25, pp. 1e65). New York: Academic Press.
- Sheeran, P. (2002). Intention—behaviour relations: A conceptual and empirical review. *European review of social psychology*, 12(1), 1-36.

- Sheeran, P., & Abraham, C. (2003). Mediator of moderators: Temporal stability of intention and the intention-behaviour relation. *Personality & Social Psychology Bulletin*, 29(2), 205-215.
- Simon, B., Loewy, M., Stürmer, S., Weber, U., Freytag, P., Habig, C., ... Spahlinger, P. (1998). Collective identification and social movement participation TT - Kollektive Identifikation und die Teilnahme an gesellschaftlichen Bewegungen. *Journal of Personality and Social Psychology*, 74(3), 646-658. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=pdx&AN=0120977&site=ehost-live>
- Skippon, S. M., Kinnear, N., Lloyd, L., & Stannard, J. (2016). How experience of use influences mass-market drivers' willingness to consider a battery electric vehicle: A randomised controlled trial. *Transportation Research Part A*, 92, 26-42.
- Skippon, S., & Garwood, M. (2011). Responses to battery electric vehicles: UK consumer attitudes and attributions of symbolic meaning following direct experience to reduce psychological distance. *Transportation Research Part D*, 16, 525-531.
- Sopha, B. M., & Klöckner, C. A. (2011). Psychological factors in the diffusion of sustainable technology: A study of Norwegian households' adoption of wood pellet heating. *Renewable and Sustainable Energy Reviews*, 15(6), 2756-2765.
- Sparks, P., & Shepherd, R. (1992). Self-Identity and the Theory of Planned Behaviour: Assessing the Role of Identification with 'Green Consumerism'. *Social Psychology Quarterly*. <https://doi.org/10.2307/2786955>
- Staats, H. (2003). Understanding attitudes and behaviour: An analysis and review of research based on the theory of planned behaviour. In M. Bonnes, T. Lee, & M. Bonaiuto (Eds.), *Psychological theories and environmental issues* (pp. 171-201). Aldershot, England: Ashgate.
- Steenhaut S, Van Kenhove P. The mediating role of anticipated guilt in consumers' ethical decision making. *Journal of Business Ethics*, 2006, 69(3), 269-288.
- Steffen, W., Rockström, J., Richardson, K., Lenton, T. M., Folke, C., Liverman, D., ... Schellnhuber, H. J. (2018). Trajectories of the Earth System in the Anthropocene. *Proceedings of the National Academy of Sciences*, 115(33), 8252 LP – 8259. <https://doi.org/10.1073/pnas.1810141115>
- Steg, L. (2008). Promoting household energy conservation. *Energy policy*, 36(12), 4449-4453.
- Steg, L., & de Groot, J. I. (2012). Environmental values. In *The Oxford handbook of environmental and conservation psychology*.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29, 309-317.
- Steg, L., Bolderdijk, J. W., Keizer, K., & Perlaviciute, G. (2014). An Integrated framework for encouraging pro-environmental behaviour: the role of values, situational factors and goals. *Journal of Environmental Psychology* 38(0), 104-115.
- Stern, P. (1992). What psychology knows about energy conservation. *American Psychologist*, 47(10), 1224-1232.
- Stern, P. C. (1999a). Information, incentives, and proenvironmental consumer behaviour. *Journal of Consumer Policy*, 22(4), 461-478.
- Stern, P. C. (2000). Toward a coherent theory of environmentally significant behaviour. *Journal of Social Issues*, 56, 407-424.
- Stern, P. C.; Dietz, T.; Abel, T. D.; Guagnano, G. A.; Kalof, L. (1999) A value-belief-norm theory of support for social movements: The case of environmentalism. *Hum. Ecol. Rev.* 6, 81-98.
- Sterne, A. C. J., & Egger, M. (2001). Funnel plots for detecting bias in meta-analysis: Guidelines on choice of axis. *Journal of Clinical Epidemiology*, 54, 1046-1055.
- Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behaviour. *Journal of Personality and Social Psychology*, 66, 742-752. DOI: 10.1037/0022-3514.66.4.742
- Sudarshan, A. (2017). Nudges in the marketplace: The response of household electricity consumption to information and monetary incentives. *Journal of Economic Behaviour & Organization*, 134, 320-335.
- Sussman, R., & Gifford, R. (2012). Please turn off the lights: The effectiveness of visual prompts. *Applied Ergonomics*, 43, 596-603.

- Swim, J. K., Markowitz, E. M., & Bloodhart, B. (2012). Psychology and climate change: Beliefs, impacts, and human contributions. In S.D. Clayton (Ed.), *The Oxford handbook of environmental and conservation psychology*, Oxford University Press, New York.
- Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin, & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33-48). Monterey, CA: Brooks/Cole.
- Terry, D. J., Hogg, M. A., & White, K. M. (1999). The theory of planned behaviour: Self-identity, social identity and group norms. *British Journal of Social Psychology*, 38, 225-244.
- Thøgersen, J. (1999). Is a sustainable consumption pattern gradually emerging in Germany. In *Social and economic research with consumer panel data. Proceedings of the first ZUMA symposium on consumer panel data*, 5 and 6 October 1999.
- Thøgersen, J. (2004). A cognitive dissonance interpretation of consistencies and inconsistencies in environmentally responsible behaviour. *Journal of Environmental Psychology*, 24, 93-103.
- Thøgersen, J., & Ölander, F. (2003). Spillover of environment-friendly consumer behaviour. *Journal of environmental psychology*, 23(3), 225-236.
- Thomas, E. F., Mavor, K. I., & McGarty, C. (2011). Social identities facilitate and encapsulate action-relevant constructs: A test of the social identity model of collective action. *Group Processes and Intergroup Relations*, 15, 75-88.
- Thomas, E. F., McGarty, C., & Mavor, K. (2016). Group interaction as the crucible of social identity formation: A glimpse at the foundations of social identities for collective action. *Group Processes and Intergroup Relations*, 19, 137-151.
- Toner, K., Gan, M., & Leary, M. R. (2014). The impact of individual and group feedback on environmental intentions and self-beliefs. *Environment and Behaviour*, 46, 24-45.
- Trivedi, R. H., Patel, J. D., & Savalia, J. R. (2015). Pro-environmental behaviour, locus of control and willingness to pay for environmental friendly products. *Marketing Intelligence and Planning*. <https://doi.org/10.1108/MIP-03-2012-0028>
- Truelove, H. B., Carrico, A. R., Weber, E. U., Raimi, K. T., & Vandenberg, M. P. (2014). Positive and negative spillover of pro-environmental behaviour: An integrative review and theoretical framework. *Global Environmental Change*, 29, 127-138.
- Truelove, H. B., Yeung, K. L., Carrico, A. R., Gillis, A. J., & Raimi, K. T. (2016). From plastic bottle recycling to policy support: An experimental test of pro-environmental spillover. *Journal of Environmental Psychology*, 46, 55-66.
- Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987). *Rediscovering the social group: A self – categorization theory*. Basil Blackwell.
- Turuga, R.M.; Howarth, R.B.; Borsuk, M.E. (2010) Pro-environmental behaviour Rational choice meets moral motivation. *Ann. NY Acad. Sci.* 1185, 211–224.
- Ujang, N., & Zakariya, K. (2015). The notion of place, place meaning and identity in urban regeneration. *Procedia – Social and Behavioural Sciences*, 170, 709-717.
- Uzzell, D., Pol, E., & Badenas, D. (2002). Place identification, social cohesion, and environmental sustainability. *Environment and Behaviour*, 34, 26-53.
- Valera, S., & Guàrdia, J. (2002). Urban social identity and sustainability: Barcelona's Olympic Village. *Environment and Behaviour*, 34, 54-66.
- van der Werff, E., & Steg, L. (2015). One model to predict them all: predicting energy behaviours with the norm activation model. *Energy Research & Social Science*, 6, 8-14.
- van der Werff, E., & Steg, L. (2016). The psychology of participation and interest in smart energy systems: Comparing the value-belief-norm theory and the value-identity-personal norm model. *Energy Research & Social Science*, 22, 107-114.
- Van der Werff, E., Steg, L., & Keizer, K. (2013). The value of environmental self-identity: The relationship between biospheric values, environmental self-identity and environmental preferences, intentions and behaviour. *Journal of Environmental Psychology*, 34, 55-63. <https://doi.org/10.1016/j.jenvp.2012.12.006>
- van der Werff, E., Steg, L., & Keizer, K. (2014a). Follow the signal: When past pro-environmental actions signal who you are. *Journal of Environmental Psychology*, 40, 273-282.

- van Diepen, M., Donkers, B., & Franses, P. H. (2009). Does irritation induced by charitable direct mailings reduce donations? *International Journal of Research in Marketing*, 26, 180-188.
- Van Vugt, M. (2001). Community identification moderating the impact of financial incentives in a natural social dilemma: Water conservation. *Personality and Social Psychology Bulletin*, 27, 1440-1449.
- Van Zomeren, M., Postmes, T., & Spears, R. (2008). Toward an integrative social identity model of collective action: A quantitative research synthesis of three socio-psychological perspectives. *Psychological Bulletin*, 134, 504–535. doi: 10.1037/0033-2909.134.4.504
- Veneziani, C. A. & Voci, A. (2015b). The Italian adaptation of the Cognitive and Affective Mindfulness Scale-Revised. *TPM – Testing, Psychometrics, Methodology in Applied Psychology*, 22, 43-52. DOI:10.4473/TPM22.1.4
- Vermeir, I., & Verbeke, W. (2006). Sustainable food consumption: Exploring the consumer “attitude–behavioural intention” gap. *Journal of Agricultural and Environmental Ethics*, 19(2), 169-194.
- Vesely, S., & Klöckner, C. A. (2017). How anonymity and norms influence costly support for environmental causes. Manuscript under review.
- Vesely, S., & Klöckner, C. A. (2018). How anonymity and norms influence costly support for environmental causes. *Journal of Environmental Psychology*, 58, 27-30.
- Vining J, Ebreo A. (2003). Emerging theoretical and methodological perspective on conservation behaviour. In Bechtel R., & Churchman A. (Eds.), *Handbook of Environmental Psychology* (pp. 541–558). New York: Wiley.
- Wall, R., Devine-Wright, P., & Mill, G. A. (2007). Comparing and combining theories to explain proenvironmental intentions: The case of commuting-mode choice. *Environment and behaviour*, 39(6), 731-753.
- Wallis, H., & Klöckner, C. (2018). The transmission of energy-saving behaviours in the family: A multilevel approach to the assessment of aggregated and single energy-saving actions of parents and adolescents. *Environment and Behaviour*. Advance online publication.
- Wan, C., Shen, G. Q., & Choi, S. (2017). Experiential and instrumental attitudes: Interaction effect of attitude and subjective norm on recycling intention. *Journal of Environmental Psychology*, 50, 69-79.
- Wang, X., & Tong, L. (2015). Hide the light or let it shine? Examining the factors influencing the effect of publicizing donations on donors' happiness. *International Journal of Research in Marketing*, 32, 418-424.
- Wang, Z., Zhang, B., Yin, J., Zhang, Y. (2011) Determinants and policy implications for household electricity-saving behaviour: evidence from Beijing, China, *Energy Policy* 39, 3550-3557.
- Webb, T. L., & Sheeran, P. (2006). Does changing behavioural intentions engender behaviour change? A meta-analysis of the experimental evidence. *Psychological bulletin*, 132(2), 249.
- Weinstein, N., Przybylski, A. K., & Ryan, R. M. (2009). Can nature make us more caring? Effects of immersion in nature on intrinsic aspirations and generosity. *Personality and Social Psychology Bulletin*, 35, 1315-1329.
- Wenzel, M. (2004). An analysis of norm processes in tax compliance. *Journal of Economic Psychology*, 25, 213-228.
- Wheale, P., & Hinton, D. (2007). Ethical consumers in search of markets. *Business Strategy and the Environment*, 16(4), 302-315
- White, K. M., & Hyde, M. K. (2012). The Role of Self-Perceptions in the Prediction of Household Recycling Behaviour in Australia. *Environment and Behaviour*. <https://doi.org/10.1177/0013916511408069>
- White, K. M., Smith, J. R., Terry, D. J., Greenslade, J. H., & McKimmie, B. M. (2009). Social influence in the theory of planned behaviour: The role of descriptive, injunctive, and in-group norms. *British Journal of Social Psychology*, 48, 135-158.
- Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology*, 30, 305-314. <https://doi.org/10.1016/j.jenvp.2010.01.003>
- Wiser, R. H. (2007). Using contingent valuation to explore willingness to pay for renewable energy: A comparison of collective and voluntary payment vehicles. *Ecological Economics*, 62, 419-432.
- Wolske, K. S., Stern, P. C., & Dietz, T. (2017). Explaining interest in adopting residential solar photovoltaic systems in the United States: Toward an integration of behavioural theories. *Energy Research & Social Science*, 25, 134-151.

- Wolske, K. S., Todd, A., Rossol, M., McCall, J., & Sigrin, B. (2018). Accelerating demand for residential solar photovoltaics: Can simple framing strategies increase consumer interest? *Global Environmental Change*, 53, 68-77.
- Yun, D., & Silk, K. J. (2011). Social norms, self-identity, and attention to social comparison information in the context of exercise and health diet behaviour. *Health Communication*, 26, 275-285.
- Zelenski, J. M., Dopko, R. L., & Capaldi, C. A. (2015). Cooperation is in our nature: Nature exposure may promote cooperative and environmentally sustainable behaviour. *Journal of Environmental Psychology*, 42, 24-31.