Moderating Descriptive Norms: The Role of Group Identification and Descriptive Norms

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Abstract

The more people perceive other citizen to engage in climate actions (i.e. descriptive norms) the more themselves engage in these behaviours. In general, descriptive norms lead to more engagement in climate actions but the size and even direction of the effect varies strongly between studies. Recent studies found heterogeneity in the results, one possible reason for this is that the link between descriptive norms and climate action is moderated by group identification and biospheric values. To test these assumptions empirically, I conducted an analysis using linear regressions on a cross-national probabilistic sample comprising over 44,000 primarily European citizens. The results indicated that descriptive norms were largely and biospheric values fully positively associated with all outcome variables. Unexpectedly, some direct associations were found between group identification and certain outcome measures as well. The relationship between descriptive norm and pro-environmental behaviour and policy support did not seem to always depend on group identification or biospheric value. Findings suggest that for some behaviours group identification and biospheric values could potentially enhance the efficacy of descriptive norm interventions. These findings have implications for developing more effective strategies for promoting climate action through descriptive norm interventions. More detailed analyses of target groups are necessary to create more effective intervention strategies and to fully understand motivators of climate action.

Keywords: descriptive norms, group identification, biospheric values, climate action

Moderating Descriptive Norms: The Role of Group Identification and Descriptive Norms

Human-caused climate change is one of the biggest crises humanity faces in the 21st century (Klinenberg et al., 2020). Indeed, the expected consequences of climate change are severe, ranging from increased heatwaves to floodings to agricultural droughts (Lee et al., 2023). Individual behaviour change is needed to mitigate climate change (Ivanova et al., 2020; Nielsen et al., 2021). This includes both changes in (daily) consumption behaviours (pro-environmental behaviour [PEB]; Nielsen et al., 2021) as well as climate and environmental policy support (PS; Sharpe et al., 2021). PEB and PS can be summarized under the general term climate action, which will be used from here onward. To promote individual climate action, it is essential to understand the psychological factors that drive these changes.

The present study aims to explore the relationship between individual climate action and the perception of others' climate action, known as descriptive norms. Specifically, I argue that the influence of descriptive norms is stronger when people associate themselves more with a certain group (i.e. group identification) and when they endorse nature (i.e. biospheric values) less. Using a cross-national survey (i.e. European Social Survey, Round 8), I analyse how the group identification and biospheric values moderate the relation of descriptive norms with climate actions.

Descriptive norms

Descriptive norms reflect the perceived behaviour which is typically shown by other group members (Bergquist et al., 2019; Chung & Rimal, 2016). They function as commonly accepted guidelines and expectations within a group, which direct and/or limit social behaviour without the need for a law (Cialdini & Trost, 1998). Descriptive norms provide value-neutral information, that is there is no judgement about whether the action is good or bad (Legros & Cislaghi, 2020). Descriptive norms are moreover specific to certain situations (Cialdini et al., 1990).

Individuals are influenced by their perceptions of the behaviours of others. Descriptive norms, which are measured by asking individuals, are often subjective. I will therefore throughout this study use the term descriptive norms analogously to perceived descriptive norms. People may not always have accurate information about how others truly behave, leading them to make assumptions based on their perception (e.g. Ruggeri et al., 2021; Sparkman et al., 2022). There is moreover evidence in the environmental domain that there is a difference in actual rates of environmental behaviour and people's perception of these behaviours (Chen et al., 2022).

There are several explanations as to why descriptive norms affect individuals' behaviours and climate action. First, individuals adapt their behaviour to others because they wish to gain social approval (Bergquist et al., 2019; Cialdini & Trost, 1998; Deutsch & Gerard, 1955). Second, others' behaviours may function as examples of what behaviour is most appropriate in a specific context, which makes people likely to imitate the observed behaviour (Bergquist et al., 2019; Legros & Cislaghi, 2020).

The influence of descriptive norms on climate action has been shown in a multitude of situations such as energy conservation behaviour (Dwyer et al., 2015; Schneider & van der Linden, 2023), energy transition policy support (Chan et al., 2022), water conservation (Gössling et al., 2019) and transportation (Kormos et al., 2015). Several reviews point out the positive relationship between descriptive norms and pro-environmental behaviour (e.g. Bergquist et al., 2023; Gifford & Nilsson, 2014). Not only pro-environmental behaviour but also policy support is linked to descriptive norms (Alló & Loureiro, 2014). A recent study found, in a cross-national survey, a link between descriptive norms (i.e. a growing number of people supports energy-saving behaviour and energy transition policy support) and support for energy transition policies (Chan et al., 2022). I therefore, hypothesise that descriptive norms positively link to pro-environmental behaviour and policy support.

Although the relationship between descriptive norms and climate action is generally positive, the strength of this relation varies (Bergquist et al., 2019; Culiberg & Elgaaied-Gambier, 2016; Rinscheid et al., 2021; Unsworth & Fielding, 2014). Identifying the factors that might cause these varying effects can help to provide well-informed, targeted, and effective interventions for strengthening pro-environmental behaviour and environmental policy support.

The relation of descriptive norms and climate actions is described in the theory of normative social behaviour (TNSB; Lapinski & Rimal, 2005; Rimal et al., 2005). I want to investigate two more factors which might influence this relationship as well. Firstly originating from social identity theory (Tajfel & Turner, 2004b) and the self-categorization theory (Turner et al., 1987) the amount of group identification an individual has, and secondly the endorsement of biospheric values (Taso et al., 2020). I will discuss these two factors in more detail below.

Group Identification

The social identity theory (SIT; Tajfel & Turner, 2004b) differentiates between two types of identity: a personal vs. a social identity. Whereas the personal identity is the part of a self-concept which is based upon one's individual characteristics the social identity is the part of the self concept which is based on their membership in or identification with a group (Tajfel & Turner, 2004a).

The longing for approval is a basic motivation in human lives. Social identity theory assumes that individuals define themselves as parts of and in relation to groups. If the descriptive norms are within a group someone belongs to, this norm, according to SIT, may be internalized. Individuals tend to strive for the prototypical behaviour of their ingroup to maximize influence (Hornsey, 2008). Individuals, moreover, assimilate to the norms of their ingroup to have a stronger connection to their perceived ingroup (Fielding & Hornsey, 2016).

Both social identity theory (Tajfel & Turner, 2004b) and self-categorization theory (Turner et al., 1987) suggest that the link between perceived descriptive norms and climate action is stronger when people strongly identify with their group. This might be because the stronger the group identification is, the stronger the influence of the group's norms on (pro-environmental) behaviour, as the group’s importance and centrality to the identity increase. Moreover, the stronger the group identification, the more important and central the group might be to their self-concept (Abrams & Hogg, 1990). This could, in turn, motivate individuals to act in line with what they perceive their group members doing.

This assumption holds in the environmental domain as well, a recent study indicated that group identification indeed strengthened the influence of biospheric values (Bouman, Steg, & Zawadzki, 2020). Arguably the more important and central a group is to one’s identity, the stronger the motivation to act according to the group norms (Hogg & Reid, 2006). I, therefore, hypothesise that people are more likely to act in line with a descriptive norm when their group identification is stronger.

Values and Biospheric Values

A factor which influences us on the individual level about what is important to us in life are values (Schwartz, 2012). Values are universal, transcend situations, are stable over time, and offer guidance on which actions are evaluated on (Bouman, Steg, & Perlaviciute, 2021). And while all people endorse values to some extent, the endorsement of different values varies between individuals (Schwartz, 1994, 2012).

Values provide guidance in social interactions and group welfare (Schwartz & Bilsky, 1987). And while there is a large set of values, one value is of particular importance in relation with climate action, it has consequently been shown to positively relate to climate actions (Bouman, Steg, & Perlaviciute, 2021). These, compared with descriptive norms, less situation-specific predictors for pro-environmental behaviour and policy support are biospheric values.

Biospheric Values

Biospheric Values describe the extent to which one cares for nature and the environment (Bouman et al. 2021; Bouman, Steg, & Zawadzki, 2020; Bergquist et al. 2022; Drews & van den Bergh, 2016). They are a distinct concept, set apart from other values and other constructs such as biospheric concern (de Groot & Steg, 2008; Schultz, 2001).

Stronger endorsement of biospheric values links to climate action (e.g. Bouman, Steg, & Perlaviciute, 2021; Bouman, Steg, & Zawadzki, 2020; Bouman, van der Werff, et al., 2021; Bouman, Verschoor, et al., 2020; Steg & de Groot, 2018). This relation of values and PEB is thoroughly discussed in theories such as the value-belief-norm theory (Stern, 2000). Values hereby function as an underlying, central, and stable factor influencing the subsequent steps until a behaviour occurs. The value-belief-norm theory has been successfully applied for pro-environmental behaviour (Fornara et al., 2016) but also for policy support (Kim & Shin, 2017; Liu et al., 2018).

Moderation Effect of Values on Norms

The link of descriptive norms on climate action may be smaller among individuals who stronger endorse biospheric values. These individuals might exhibit a central care for the environment that transcends external influences, thus lowering the influence of descriptive norms. Therefore, if an individual endorses biospheric values highly, they are likely to be less influenced by descriptive norms, due to their overall stronger intention to act pro-environmental (Bouman, Steg, & Perlaviciute, 2021; de Groot & Steg, 2008). But also, what others do might be more influential if an individual does not endorse the environment that much, which is likely reflected in a moderate endorsement of biospheric values. For instance, even individuals who do not actively support environmental causes may still engage in climate action if they observe their peers doing so. Conformity to the behaviour of others might drive this influence of others, but also what others do might be the easiest to copy. Individuals who are not strongly engaged with nature or show signs of disinterest might therefore be more likely to follow the behaviour of others, as it saves their own resources regarding this topic.

Hence the link between descriptive norms and pro-environmental behaviour and policy support should be stronger in individuals with a moderate endorsement of biospheric values compared to individuals with higher endorsement of biospheric values. Studying this interaction can help us understand under which circumstances descriptive norms are linked stronger to pro-environmental behaviour and policy support.

Following this reasoning I hypothesise that there is a moderation effect of biospheric values on the relationship between descriptive norms and climate action, in a way such as that a lower endorsement of biospheric values leads to a stronger association between descriptive norms and climate action, compared to a higher endorsement of biospheric values.

Descriptive norms, group identification, and values

There might be, moreover, a three-way interaction in the relationship between descriptive norms, climate action, group identification and biospheric values. The influence of biospheric values on the relationship between descriptive norms and climate action might be less pronounced in individuals which have a strong group identification, compared to individuals with a lower group identification. Individuals with a high group identification are more likely to follow descriptive norms, and this effect might stretch over to their individual values as well. Although values influence the relationship between descriptive norms and climate action, this relation is commonly not assumed to be direct (Stern, 2000). There is, on the other hand, strong evidence for the influences of groups (Lapinski & Rimal, 2005; Rimal et al., 2005; Tajfel & Turner, 2004b; Turner et al., 1987). I therefore hypothesise that the influence of biospheric values on the relation of descriptive norms and climate action is smaller in individuals with a strong group identification compared to individuals with a weaker group identification.

The current study

In a cross-national survey, sourced from 23 countries, the robustness and generalizability of the proposed interactions and moderations will be tested. Hence, based on the above, I derived the following hypothesis:

H1: The stronger the descriptive norms, the more an individual engages in (a) pro-environmental behaviour and (b) supports climate policies.

H2: The stronger the group identification, the stronger the relationship of descriptive norms and (a) pro-environmental behaviour and (b) policy support.

H3: Biospheric values positively link to (a) pro-environmental behaviour and (b) policy support.

H4: The link between descriptive norms and (a) pro-environmental behaviour and (b) policy support is stronger in individuals with moderate endorsement of biospheric values compared to individuals with higher endorsement of biospheric values.

H5a: The stronger individuals identify with a group, the more their (a) pro-environmental behaviour and (b) policy support is linked with the descriptive norm, and the less this relationship depends on the endorsement of biospheric values.

Methods

The European Social Survey

The European Social Survey (ESS) is a cross-national survey which is collected in various countries. The data is collected on a biyearly basis with altering samples. The ESS measures in its core modules various topics, ranging from media use, social trust, subjective wellbeing, and socio-demographics up to human values (European Social Survey, 2020). The data is collected using strict probability sampling. Participants are, in terms of demographics, a representative sample of the population age 15 or older who live in private households in the country (European Social Survey, 2017), to achieve this the sample was stratified (The ESS Sampling Expert Panel, 2016). Participants get selected solely by place of living, there is no differentiation regarding nationality, citizenship or language (European Social Survey, n.d.).

Countries with more than 2 million inhabitants must collect at least 1,500 hundred participants, whereas countries with less than 2 million inhabitants have to collect at least 800 participants.

This study uses the ESS round 8 data which, next to the core modules, had a rotating module on attitudes towards climate change and energy (European Social Survey, 2016). In Round 8, 23 countries (Austria, Belgium, Czechia, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovenia, Spain, Sweden, Switzerland, United Kingdom) participated. Data was collected in face-to-face interviews in the participants' homes (European Social Survey, 2017). The collection period was from August 2016 until December 2017, the collection periods of the countries ranged from 2 to 8 months.

All analyses can be found on the Open Science Framework at https://osf.io/vk7gd/.

Participants

The ESS round 8 dataset is comprised of 44,387 participants, with 21,027 (47.4%) men, and 23,351 (52.6%) women, participants had the option not to answer this question but none did so. The participants' mean age was 49.14 years (*SD* = 18.61; range: 15–100).

Materials

Predictor Variables

Descriptive norms. Descriptive norms were measured by asking "How likely do you think it is that large numbers of people will limit their energy use to try to reduce climate change?", on which respondents had to answer on an 11-point Likert scale (0 = not at all likely, 10 = extremely likely). The mean and standard deviation for this and all the following variables can be found in Table 1, Table 2 contains a correlation matrix of all variables.

Group identification. To measure group identification, I used the question "How emotionally attached do you feel to [country]?", on which respondents were asked to indicate how strong their attachment was on an 11-point Likert scale (0 = not at all emotionally attached, 10 = very emotionally attached). The [country] term was matched with the country of residence of the participants. The descriptive norm item used is likely to be interpreted on a higher level such as the country level. Therefore an item on the country level might best relate to this norm (Roccas et al., 2008).

Biospheric Values. Endorsement of biospheric values was measured using an item from the modified Portrait Value Questionnaire (Schwartz, 2003) of the ESS core module. The general instruction of the Portrait Value Questionnaire was “Now I will briefly describe some people. Please listen to each description and tell me how much each person is or is not like you. Use this card for your answer” and was used the same for all 21 different values. The biospheric value item consisted of the following sentences: “She/he strongly believes that people should care for nature. Looking after the environment is important to her/him.” Participants indicated their similarity with the described person on a 6-point Likert scale (1 = very much like me, 6 = not like me at all). The item was reverse coded so that higher values reflect higher endorsement.

Outcome Variables

Pro-environmental Behaviour. Pro-environmental behaviour was measured with two items, one focusing on energy efficiency behaviours and the other on energy curtailment behaviours.

Energy Efficiency. Energy efficiency behaviour was measured by asking “If you were to buy a large electrical appliance for your home, how likely is it that you would buy one of the most energy efficient ones?”, on which respondents answered on an 11-point Likert scale (0 = not at all likely, 10 = extremely likely).

Energy Curtailment. The second item reflected energy curtailment behaviour. Participants were asked, “In your daily life, how often do you do things to reduce your energy use?”. The answer options were presented on a 6-point Likert scale (1 = never, 6 = always) with the additional option of 55 = "cannot reduce energy use". As the last option cannot be positioned on an ordinal scale these data points (n = 233) were excluded.

The Spearman-Brown coefficient (Eisinga et al., 2013) across the PEB items was low (ρ = .506). Items were thus analysed separately.

Policy Support. Three items were used to analyse policy support. Participants were asked to indicate their agreement with three statements as follows: "To what extent are you in favour or against the following policies in [country] to reduce climate change?" on a 5-point Likert scale (1 = strongly in favour, 5 = strongly against); They were asked about "increasing taxes on fossil fuels, such as oil, gas and coal", "using public money to subsidise renewable energy such as wind and solar power", and the third "a law banning the sale of the least energy efficient household appliances". The items were reverse coded so that higher values indicate higher endorsement of the respective policy.

Because the Cronbachs alpha was low (α = .497) the items were analysed separately. Moreover, there is also a difference in the content of items, that is they refer to different problems and are of different magnitude.

Table 1

Descriptive Statistics for all Variables

Variable	*N*	*M*	*SD*	Min	Max	Range
Predictor Variables						
Descriptive norm	38,331	4.12	2.14	0.00	10.00	11.00
Group identification	38,331	7.78	2.17	0.00	10.00	11.00
Biospheric Values	38,331	4.84	1.03	1.00	6.00	6.00
Outcome Variables						
PEB: Energy efficiency	38,331	7.84	2.22	0.00	10.00	11.00
PEB: Energy curtailment	38,331	4.19	1.18	1.00	6.00	6.00
Policy support: Fossil fuel taxation	38,331	2.81	1.23	1.00	5.00	5.00
Policy support: Subsidies renewables	38,331	3.98	1.06	1.00	5.00	5.00
Policy support: Household appliances	38,331	3.57	1.16	1.00	5.00	5.00

Note. The means and standard deviations for the variables, split up by country, can be found in Appendix A, Tables 5 and 6. Predictor variables were standardized for the analysis.

Table 2

Correlation Table of all Variables

	PEB: Energy efficiency	PEB: Energy curtailment	Policy support: Fossil fuel taxation	Policy support: Subsidies renewables	Policy support: Household appliances	Descriptive norm	Group identification	Biospheric Values
PEB: Energy efficiency	1.00							
PEB: Energy curtailment	0.33*	1.00						
Policy support: Fossil fuel taxation	0.03*	0.01	1.00					
Policy support: Subsidies renewables	0.12*	0.09*	0.24*	1.00				
Policy support: Household appliances	0.24*	0.15*	0.22*	0.27*	1.00			
Descriptive norm	0.05*	0.05*	0.09*	0.02*	0.06*	1.00		
Group identification	0.15*	0.09*	-0.04*	0.03*	0.03*	0.04*	1.00	
Biospheric Values	0.23*	0.25*	0.09*	0.14*	0.17*	0.04*	0.14*	1.00

Note. Pearson correlation of all variables, * indicates p-values < .001.

Data Preparation and Analyses

Earlier studies using the same data set, with similar dependent variables indicated that there is no difference between the listwise deletion of data and both expert-based imputation as well as multiple imputation by chain equations (Bouman, Verschoor, et al., 2020). Accordingly, this study refrains from imputation. Data was, thus, deleted listwise.

To test the research question of which factors help to explain the relationship between descriptive norms and climate action a model comparison was used to identify how well the proposed model fits the data. Following this, multiple linear regressions were calculated for each outcome variable. In a subsequent analysis, the robustness of the model was tested for the individual countries separately.

All analyses were performed in R Studio (Posit Team, 2023), using the packages car (Fox & Weisberg S, 2019), broom (Robinson et al., 2023), and psych (Revelle, 2022). All visualisations were done with the R-package ggplot2 (Hadley Wickham, 2016).

Results

Model Comparison

The Akaike information criterion (AIC) and the Bayesian information criterion (BIC) were calculated for all models for each outcome variable individually (see Table 3 for the model description and Appendix B for the full model comparison). For both pro-environmental outcome variables, as well as policy support, the BIC indicated the best fit for model 3. For subsidies for renewable energies as well as a ban of the least energy efficient household appliance, the BIC was lowest for model 2. The AIC still indicated a notable drop in its values for model 3 for both of these outcome variables. The full model comparison can be found in Appendix B.

Variance Inflation Factors (VIFs) were calculated using the “car” package in R (Fox & Weisberg S, 2019). VIFs were lower than 2 for all variables, being under the suggested threshold of 10 (Disatnik & Sivan, 2016; Vittinghof et al., 2005).

The model comparison suggests that H5, the three-way interaction, is not reflected in the data. There were, moreover, no significant effects found for the three-way interaction in the linear regressions for any of the outcome variables, thus not supporting H5 (Appendix B).

In line with the theoretical reasoning and the results from the model comparison the final analysis of the models was done with the model with model (3), that is with the two moderators group identification and biospheric values (see Table 3). Because the interaction of group identification and biospheric values was not hypothesised and the model with the three-way interaction showed lower BICs for all outcome variables they were not taken into account. Thus, to test the hypotheses a linear regression for model (3) for all outcome variables was performed, results of this analysis can be found in Table 4.

Table 3

Model Terms of the Model Comparison

Variables	Model			
	model (1)	model (2)	model (3)	model (4)
descriptive norm	X	X	X	X
biospheric values		X	X	X
group identification		X	X	X
descriptive norm x group identification			X	X
descriptive norm x biospheric values			X	X
group identification x biospheric values				X
descriptive norm x group identification x biospheric values				X

Note. X indicates which predictors are included in the model.

Pooled Analysis

Descriptive Norms and Group Identification

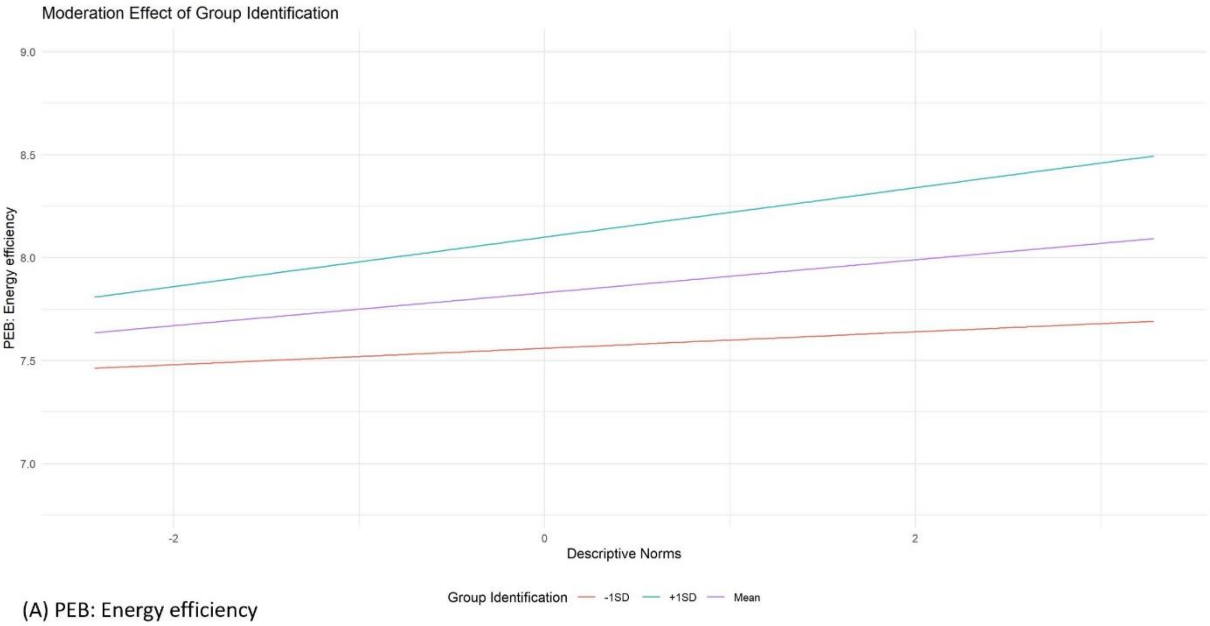
It was first analysed whether descriptive norms positively link to pro-environmental behaviour and policy support. A significantly positive relationship between descriptive norms and all outcome variables of pro-environmental behaviour and two policy support outcomes was found, thus supporting H1a and partly H1b. Only subsidies for renewable energies was not significantly linked to descriptive norms (Table 4, line 1). However, this main effect was qualified by a partial interaction with group identification.

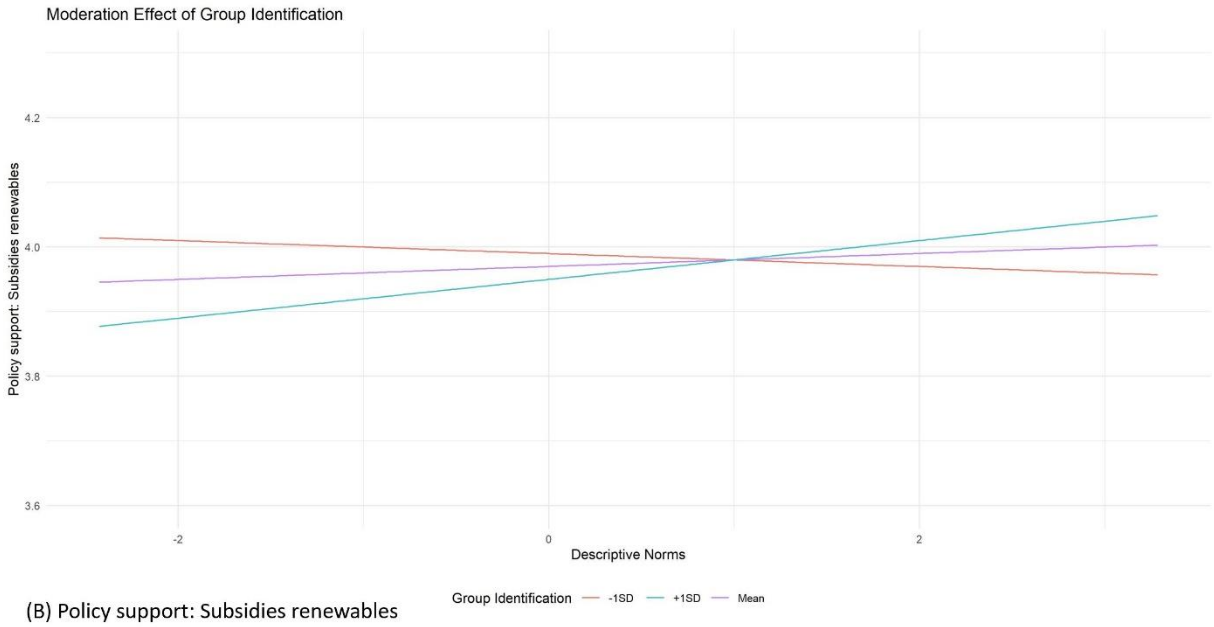
For energy efficiency behaviour, subsidies for renewables and a ban of the least energy efficient household appliance the link between descriptive norms and these behaviours was particularly strong for participants who strongly identified with their group. Thus, partially supporting H2a and H2b (Table 4, line 4). The interactions are graphically presented in Figure 1 (A-C).

Interestingly, and not hypothesised, group identification was positively linked to both pro-environmental behaviour outcome variables as well as with subsidies for renewables. Conversely, when they strongly identified with their group their support for fossil fuel taxation was lower (Table 4, line 2).

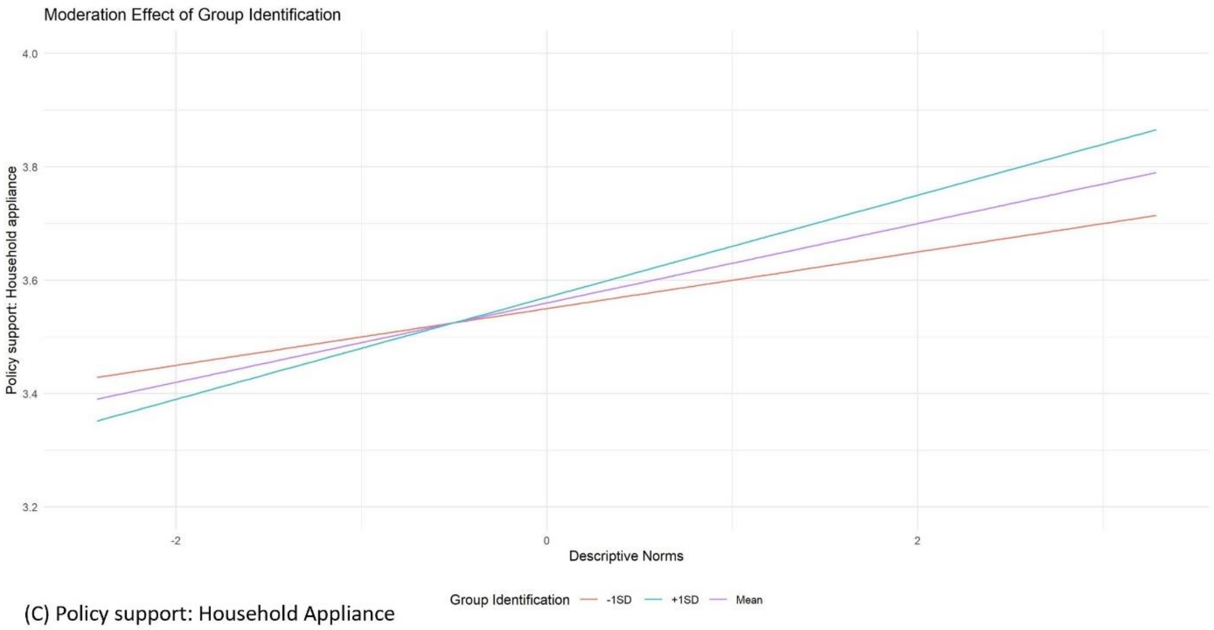
Figure 1

Moderation Effects of Group Identification





(B) Policy support: Subsidies renewables



(C) Policy support: Household Appliance

Note. Linear regressions with the moderation effect of group identification on energy efficiency behaviour (A), subsidies for renewable energies (B), and a ban of the least energy efficient household appliance (C).

Table 4

Regression Results of Model (3) for all Outcome Variables

	PEB: Energy efficiency	PEB: Energy curtailment	Policy support: Fossil fuel taxation	Policy support: Subsidies renewables	Policy support: Household appliances
	β *(SE)* [95%CI]	*β* *(SE)* [95%CI]	*β* *(SE)* [95%CI]	*β* *(SE)* [95%CI]	*β* *(SE)* [95%CI]
descriptive norm	0.08 (0.01) [0.06, 0.10]*	0.05 (0.01) [0.04, 0.06]*	0.11 (0.01) [0.10, 0.12]*	0.01 (0.01) [0.00, 0.03]	0.07 (0.01) [0.06, 0.08]*
group identification	0.27 (0.01) [0.25, 0.29]*	0.07 (0.01) [0.06, 0.08]*	-0.07 (0.01) [-0.8, -0.6]*	0.02 (0.01) [0.01, 0.03]+	0.01 (0.01) [0.00, 0.03]
biospheric values	0.47 (0.01) [0.45, 0.49]*	0.29 (0.01) [0.28, 0.30]*	0.11 (0.01) [0.10, 0.12]*	0.15 (0.01) [0.14, 0.16]*	0.19 (0.01) [0.18, 0.20]*
descriptive norms x group identification	0.04 (0.01) [0.02, 0.06]*	0.00 (0.01) [-0.01, 0.01]	0.01 (0.01) [-0.01, 0.02]	0.02 (0.01) [0.01, 0.03]*	0.02 (0.01) [0.01, 0.03]*
descriptive norms x biospheric values	-0.04 (0.01) [-0.06, -0.02]*	-0.01 (0.01) [-0.02, 0.00]	-0.02 (0.01) [-0.03, -0.01]+	0.00 (0.01) [-0.01, 0.01]	-0.02 (0.01) [-0.03, 0.00]+
Adjusted R^2	0.07	0.07	0.02	0.03	0.02

Note. β are standardized regression coefficients, + indicate a p-value <0.01, * indicate a p-value <.001.

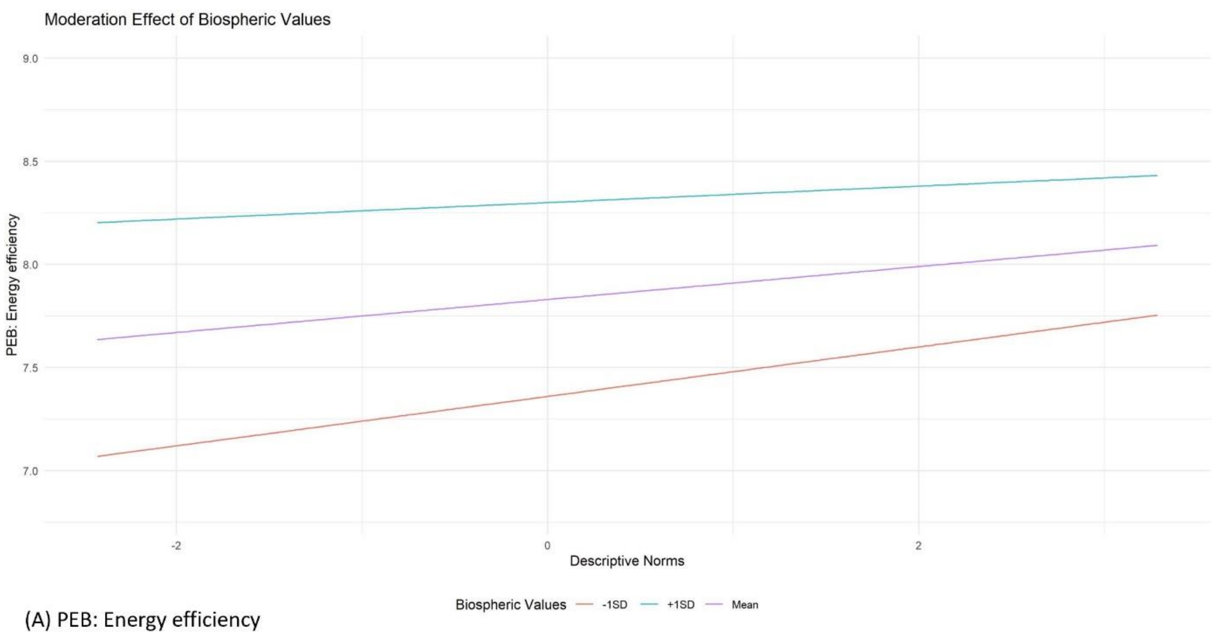
Descriptive Norms and Biospheric Values

I then analysed whether biospheric values are positively linked to pro-environmental behaviour and policy support. Indeed, higher biospheric values were positively linked to a stronger endorsement of all outcome variables, supporting H3a and H3b (Table 2, line 3). Again, interaction effects of biospheric values were found, liming the interpretability.

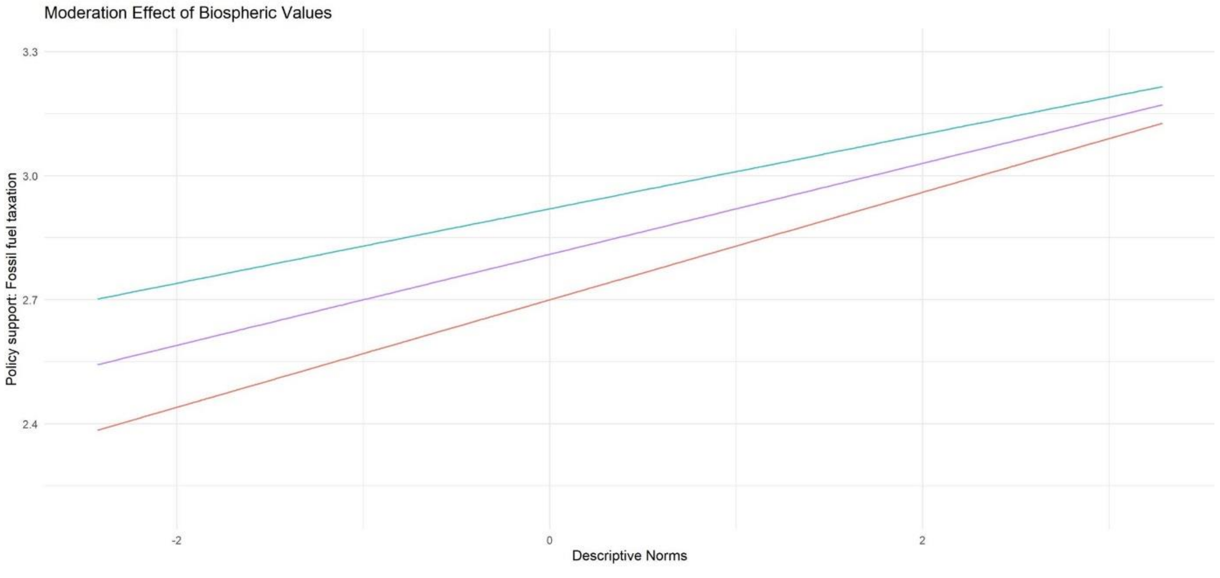
Subsequently, I analysed whether the link between descriptive norms and pro-environmental behaviour and policy support was weaker when the endorsement of biospheric values was high. For energy efficiency behaviour, fossil fuel taxation as well as a ban of the least energy efficient household appliance the link between descriptive norm and these behaviours was particularly weaker the stronger the endorsement of biospheric values, thus partly supporting H4a and H4b (Table 4, line 5). The interactions are graphically presented in Figure 2 (A-C).

Figure 2

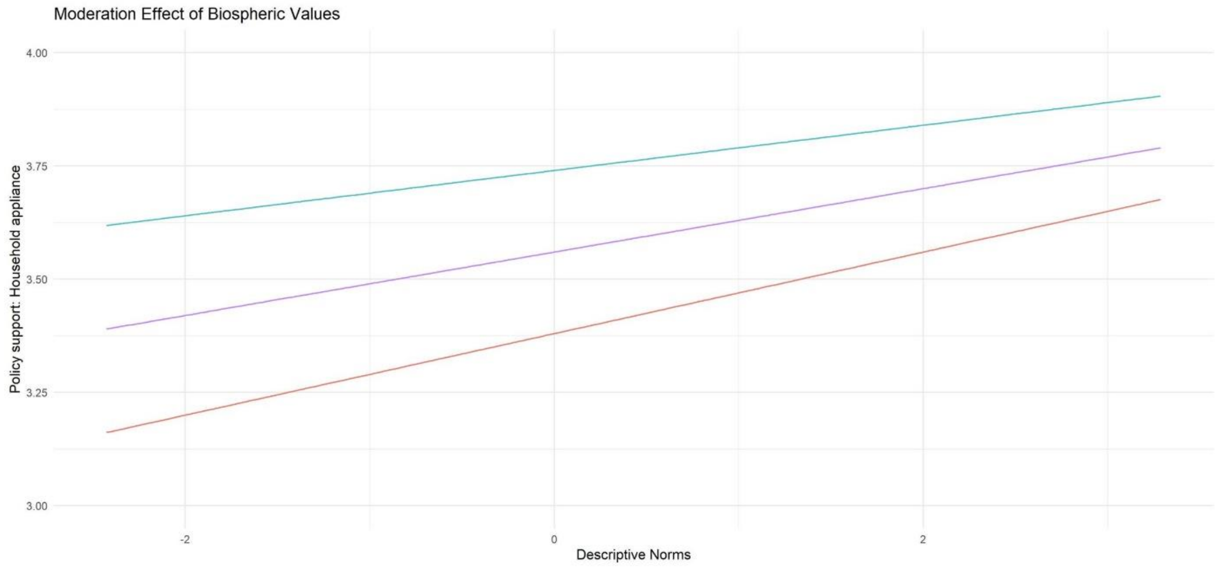
Moderation Effect of Biospheric Values on Energy Efficiency Behaviour



(A) PEB: Energy efficiency



(B) Policy support: Fossil fuel taxation



(C) Policy support: Household Appliance

Note. Linear regressions with the moderation effect of biospheric values on energy efficiency behaviour (A) and fossil fuel taxation (B), and a ban of the least energy efficient household appliance (C)

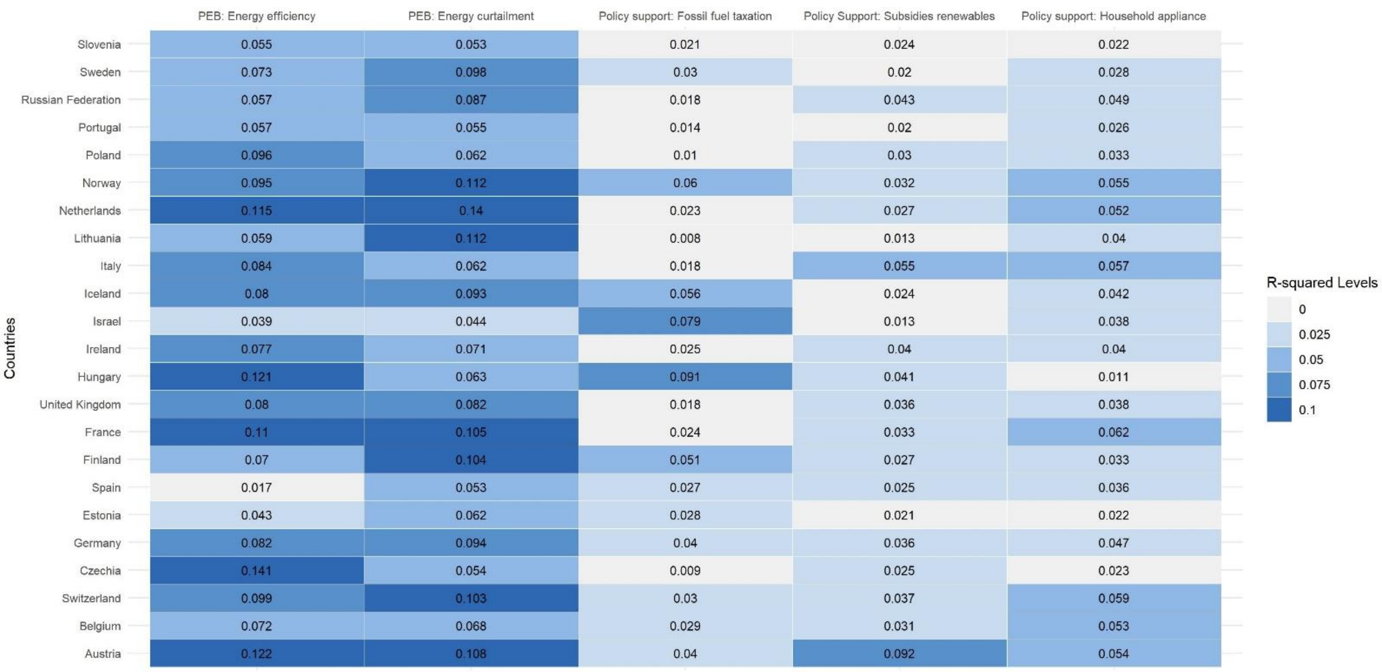
Country Level Analysis

Following the overall analysis, the robustness of the model was tested on the country level as well. In general, the pattern replicated throughout the countries. Figure 3 shows the R^2

of model 3 for all outcome variables. Spain showed the lowest R^2 out of all countries for energy efficiency behaviour. Israel showed low R^2 in both pro-environmental behaviour outcome variables. But together with Hungary, Israel showed the largest R^2 of model (3) for fossil fuel taxation.

Figure 3

Heatmap of the Country Level R^2 for model (3)



Note. Darker values indicate higher explained variance. The darkest colour indicates a medium effect size, white indicates no effect size.

Descriptive Norms and Group Identification on the Country Level

Standardised regression coefficients were calculated on the country level. Overall, they were in line with the regression coefficients of the whole sample, showing only some deviation. For energy efficiency behaviour, descriptive norms had negative standardised regression coefficients in Italy (Appendix C, Figure C1).

The negative influence of group identification on the link between descriptive norms and fossil fuel taxation was particularly pronounced for Hungary (Appendix C, Figure C3). Although overall positive, the standardised regression coefficients for the moderating effect of group identification were negative for the link between descriptive norms and subsidies for renewables for Spain, Finland and Great Britain (Appendix C, Figure C4).

Descriptive Norms and Biospheric Values on the Country Level

The standardised regression coefficients for biospheric values were similar to the overall value for most country, an exception here were lower levels for Spain for the relationship between biospheric values and energy efficiency behaviour (Appendix C, C1). The standardised regression coefficients were deviating for three countries for energy curtailment behaviour. Russia, Hungary, and Czechia had lower standardised regression coefficients for the direct effect of biospheric values (Appendix C, C2). Two countries strongly deviated for fossil fuel taxation. Although overall the standardised regression coefficients for biospheric values were strongly positive, both Lithuania and Hungary had negative values (Appendix C, C3).

No deviations from the pattern were visible for the negative influence of biospheric values on the relationship of descriptive norms and any of the outcome variables.

Discussion

This study aimed to investigate whether the often-found positive relationship between descriptive norms and different forms of climate action is influenced by other factors, namely biospheric values and group identification in which the norm exists. More specifically, it is often suggested that the more individuals perceive others to take climate action (i.e. descriptive norms) the more likely they themselves are to take climate actions too. However, findings on this relationship are inconsistent (e.g. Bergquist et al., 2019) and I hypothesised and tested that the relationship depends on both group identification and biospheric values.

Social identity theory suggests that the stronger the group identification of an individual is, the more likely they are to adhere to group norms. Specifically, for individuals with a stronger group identification the centrality and importance of the group for their self-concept increases, thus leading to a stronger motivation to act consistent with the perceived group norms. Moreover, they might strive for prototypical behaviour in order to maximize their influence on the group.

Influences of biospheric values on behaviour (e.g. Stern, 2000) suggest that biospheric values might have some moderating effects, in a way that a strong value expression might override the influence of descriptive norms. That is, strong biospheric values might already lead to climate action, no matter what the perceived norm is.

In line with hypothesis 1a that descriptive norms relate to pro-environmental behaviours, a positive link between descriptive norms and both behaviours was found. Mixed evidence was found for hypothesis 1b, descriptive norms was positively linked to fossil fuel taxation and subsidies for renewables but not for a ban of the least energy efficient household appliance. This observation is largely consistent with previous research showing that individuals are more likely to engage in pro-environmental behaviour when they perceive others to engage in it as well (Bergquist et al., 2019; Chan et al., 2022; Lapinski et al., 2007). These findings suggest that climate action could partly be explained through the underlying mechanisms of descriptive norms, social influence and conformity.

Although most relations were significant, the standardised regression coefficients for descriptive norm, as well as the explained variance of the whole model, were rather small for all outcome variables, suggesting a rather weak link with descriptive norms. But the link between descriptive norms and climate actions might be larger for some target groups than for others, e.g. for individuals who have stronger group identification.

Partial support for the positive moderating role of group identification (H2a and H2b) was indeed found. This suggests that the link between descriptive norms an climate actions may, in some cases, be influenced by an individual's identification with their group. I argued based on social identity that descriptive norms are more influential, the more an individual identifies with the group, mostly because the group's importance and centrality increase. Indeed, the relationship between descriptive norms and energy efficiency, and policies regarding subsidies for renewables and the ban of the least energy efficient household appliance, was stronger the more individuals identified with their country. However, no such moderation effects were observed for energy curtailment or support for fossil fuel taxation. It might be that the link between descriptive norms and energy efficiency behaviours is stronger related to group identification because of the comparatively low effort and the small impact on the personal lives. Copying behaviours which require low effort might be easier for individuals, but also the gain of social approval by the group with comparatively little effort might motivate people to take up these pro-environmental behaviours.

The second proposed main effect of biospheric values was positively linked to all outcome variables, thus supporting H3a and H3b. This indicates that there is a positive link in individuals with higher biospheric values with engagement in pro-environmental behaviour and climate policy support. This finding is consistent with common theories in environmental psychology, such as the value belief norm theory (Stern, 2000).

Although significant, the standardised regression coefficients for descriptive norm, as well as the explained variance of the whole model, were rather small for all outcome variables. The effect might therefore be larger for some target groups than for others.

Another reason why the relationship between descriptive norms and climate actions is weak may be because individuals with strong biospheric values are not as strongly influenced by descriptive norms since they already care about the environment and thus take climate actions anyway, regardless of what others do. Indeed, in line with hypotheses 4a and 4b I found that biospheric values negatively moderate the relationship of descriptive norms and climate actions. However, these moderations were only observed for energy efficiency behaviour and fossil fuel taxation but not for the other climate actions. Individuals who showed stronger endorsement of biospheric values showed a weaker relationship between descriptive norms and these two outcome variables compared to individuals with lower biospheric values.

The lack of support for hypothesis 5, the idea that the moderation of biospheric values on descriptive norms and climate action is moderated by group identification, indicates that these variables do not all depend on each other. This could be due to the complex interplay between these factors, which may not be easily captured in a single model (Hogg & Reid, 2006).

In general, it is noteworthy that there was a difference in the explained variance between pro-environmental behaviour and policy support. The model explained more variance for both pro-environmental behaviours than for all three policy support items. This might be because both pro-environmental behaviour items are only targeted at oneself, indicating that the influence of the social predictor variables is stronger when explaining individual private behaviour, compared to policy support which would affect others. This difference might be explained through perceptions of personal responsibility (e.g. Bouman, Verschoor, et al., 2020). Descriptive norms, furthermore, might influence behaviour stronger because they serve as examples of behaviours. These behaviours are then done to get social approval, policy support is on the other side less visible than pro-environmental behaviours. Therefore, a stronger influence of descriptive norms on pro-environmental behaviour, compared to policy support, might be likely. Moreover, the reasoning of the model, biospheric values and group identification as moderators, might overall fit better to personal behaviours. Changing individuals' behaviour might be more likely when others are perceived as acting as well, whereas policy support might depend on other factors such as trust in the government, perception of fairness or perceived effectiveness (Bergquist et al., 2022).

It might moreover be that there is a difference in support for paternalistic approaches (such as policies) and voluntary actions by individuals (this is at least discussed in behavioural policy-making; e.g. Thaler & Sunstein, 2021). This might explain why the explained variance is higher for the individual behavioural outcome variables, considering that individual measures were used as predictors.

Relation Between Group Identification and Climate Action

I moreover found a main effect of group identification for both pro-environmental behaviours which was not hypothesised. Individuals with higher group identification were more likely to engage in both types of behaviour. Opposed to this there was a negative relation of group identification with fossil fuel taxation, indicating that higher group identification is linked to lower support for fossil fuel taxes. This negative relation might be explained through conservatism. The group identification item asked for emotional attachment to the country of residence, a trait which is commonly assumed to be inherent to the patriotic aspects of conservatism (Harrison & Boyd, 2018), suggesting that more conservative people would score higher in this question. Indeed, emotional attachment to a country is likely to measure group identification on the country level in some form of patriotism (Roccas et al., 2008). Conservativs are, moreover, less likely to support more radical policies such as fossil fuel taxation (Båtstrand, 2015), because these policies would typically foster some kind of larger change (Harrison & Boyd, 2018). Especially because fossil fuel taxation is a highly discussed, emotionally loaded, and controversial topic, it might differ from the other two policy support items.

Another explanation might be that taxation is associated with higher costs for citizens, the more individuals care about fellow citizens the more reluctant they might be to accept policies which have a negative financial impact on them. People may act sustainably when descriptive norms prescribe it, but not support policies they believe will negatively impact their group (Elgaaied-Gambier et al., 2018). Thus, suggesting group identification motivates some pro-environmental actions through a desire to benefit the group, but opposes policies perceived as against group interests. Group identification could also directly motivate action through a desire to benefit one's group. Increased feelings of responsibility, commitment to the group's goals and the desire to maintain a positive group image might be drivers for this process (Terry & Hogg, 1996).

Country Level Analysis

Analysis on the country level revealed that the findings and relationships are rather consistent across countries. The general direction of the hypothesised relations, as described in the overall analysis, was found with only a few exceptions. Such an exception are the higher standardised regression coefficients for group identification on energy efficiency behaviour in Czechia and Hungary, and negative standardised regression coefficients of descriptive norms on energy curtailment behaviour in Portugal, Poland and Israel.

The strongest deviation between the country level and overall analyses was found for fossil fuel taxation, here almost half of the countries did not show a meaningfully explained variance, likely because of the small size of the effect.

Although the model fit and strength of relationships varied slightly between the countries the results are overall very consistent.

Limitations, Implications and Future Research

This study has several limitations. Firstly, the measurements only consisted of one item, making it impossible to estimate measurement errors. Single-item measures can be less reliable and valid than multi-item measures, as they are more susceptible to measurement random error and may not fully capture the complexity of the construct being measured. This could have led to an underestimation of the relationships between variables, as the measures may not have accurately captured the constructs of interest. Multi-item measurements should be implemented in future research to see more accurate descriptions of the constructs.

The cross-sectional design of the study, and the correlational analysis, also does not allow to draw causal inferences from the findings. Cross-sectional designs only provide a snapshot in time, making it difficult to determine the direction of causality. Experimental designs could mitigate this problem and shed light on the causal relationship of the observed factors. Experimental studies could provide more nuanced insights into the complex interplay between factors and help to identify more effective strategies for promoting climate action.

The construct validity is also weak, the items do not reflect the underlying constructs optimally but are proximations. This accounts especially for descriptive norms and group identification. Descriptive norms were measured on a rather abstract level "How likely do you think it is that large numbers of people will limit their energy use to try to reduce climate change?", and not directly linked to most outcome variables (only energy curtailment behaviour is directly connected to the descriptive norms measure). This might explain the rather weak relationship of descriptive norms with some outcome variables. Hence future research should measure descriptive norms in direct relation to each measured outcome variable, instead of using a rather abstract item for descriptive norms measurement.

Group identification was also measured on a rather abstract level ("How emotionally attached do you feel to [country]?"). Usually, group identification is measured in relation to a specific group. Social identity theory assumes that a more important group leads to stronger influences, but the measure in this case refers to a rather abstract group. There is, nevertheless evidence that more abstract identities can positively relate to climate actions too (McFarland et al., 2019; Reese, 2016).

In general, the effects found were comparatively small, both regression coefficients and explained variance. There was moreover a difference in the explained variance between the pro-environmental behaviour outcome variables and the policy support outcome variables. The low variance might be explained through the fit of the descriptive norm, which was on a rather abstract level, and the pro-environmental behaviour outcomes, which were concrete. The policy support outcomes moreover substantially deviated from the descriptive norm.

Other potential moderators, such as personal norms (Schwartz, 1977) or perceived behavioural control (Ajzen, 1991), could also be explored. Personal norms, for example, might relate more directly to descriptive norms compared to biospheric values showing a stronger influence. Observing these factors could provide a more comprehensive understanding of the factors that influence climate action.

These findings suggest that group identification and biospheric values are worthwhile integrating into theories of normative influence, such as the theory of normative social behaviour. Clearer understanding of target groups of descriptive norms interventions might foster the strength and reliability of these interventions outside of the laboratory. Future research should develop a more complete model of factors driving climate action, including interactions with interests, morals, and a wider range of moderators and outcomes.

Further research might also look at the unexpected findings of the negative link between group identification and policy support. A better understanding of the relation between conservatism and different level of pro-environmental behaviour and policy support in relation to group identity might help to understand climate actions by some parts of the population.

This study focused on individual climate action, a focus which has recently been criticised and discussed in the field of behavioural sciences (Chater & Loewenstein, 2022). While policy support is an individual behaviour which does not fall under this criticism, the model does not capture policy support particularly well. But there have been suggestions that still both individual and system changes are necessary (Hertwig, 2023).

Conclusion

In conclusion, this study shed some light on the complex dynamic in which descriptive norms relate to climate action. The findings also support previous research on influences of biospheric values on climate action. Unexpectedly, and not hypothesised, I also found that group identification on a country level is linked to some climate actions as well. The moderation effects indicate that for some climate actions, biospheric values and group identification are an indicator of the susceptibility of participants towards descriptive norms interventions. The difference in the explained variance of the model between behaviours and policy support shows that future research is needed on what the determinants of policy support actually are. This research still can help policymakers and practitioners define target groups more clearly to reach stronger effects within their interventions. Concluding from this research descriptive norms intervention might be especially beneficial in individuals with lower biospheric values, whereas individuals with already high biospheric values might not be that susceptible to these interventions. This also suggests that widespread social norm intervention might miss their expected effects due to an unclear target audience.

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Appendix A – Variables by Country

Table 5

Mean Scores and Standard Deviations for the Predictor Variables Split up by Country

Country		Descriptive norms		Group identification		Biospheric values	
	N	*M*	*SD*	*M*	*SD*	*M*	*SD*
Austria	1,831	4.11	2.24	7.93	2.01	4.88	1.05
Belgium	1,731	4.34	1.79	6.59	2.35	4.88	0.87
Czechia	1,974	3.55	2.16	7.84	2.01	4.59	1.05
Estonia	1,853	3.61	2.15	7.82	2.12	4.92	0.93
Finland	1,851	4.34	2.08	8.40	1.73	4.99	0.97
France	1,992	4.10	1.87	8.08	1.87	4.70	1.23
Germany	2,727	3.70	1.96	7.49	2.17	4.89	0.99
Hungary	1,231	3.86	2.23	8.29	2.05	5.03	1.00
Iceland	810	3.98	1.82	8.23	1.87	4.79	1.06
Ireland	2,483	4.33	2.21	7.73	2.05	4.76	1.10
Israel	1,795	4.23	2.34	8.18	2.47	4.77	1.18
Italy	2,105	4.56	2.21	7.93	2.03	5.03	0.88
Lithuania	1,507	4.52	2.25	7.76	2.22	4.55	1.17
Netherlands	1,558	4.40	1.81	7.17	1.89	4.79	0.94
Norway	1,486	4.60	1.99	8.33	1.77	4.42	1.11
Poland	1,383	4.04	2.05	8.45	1.89	4.98	0.89
Portugal	1,146	3.99	2.49	8.44	1.94	4.75	0.94
Russia	1,449	4.14	2.27	7.15	2.63	4.81	1.09
Slovenia	1,193	3.62	2.07	7.22	2.51	5.21	0.79
Spain	1,537	4.14	2.35	7.62	2.57	5.16	0.88
Sweden	1,446	4.79	2.05	7.95	1.98	4.78	1.01
Switzerland	1,428	4.02	2.03	7.90	1.88	5.06	0.91
United Kingdom	1,842	3.79	1.96	7.08	2.43	4.75	1.10

Table 6

Mean Scores and Standard Deviations for the Outcome Variables Split up by Country

Country		Energy efficiency		Energy curtailment		Tax Fossil fuels		Subsidize renewables		Ban least energy efficient appliances	
	N	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Austria	1,831	8.10	2.00	4.00	1.19	2.80	1.20	4.24	0.85	3.80	1.10
Belgium	1,731	8.04	1.87	4.24	1.13	2.76	1.23	3.95	1.04	3.74	1.09
Czechia	1,974	7.92	2.06	4.01	1.16	2.66	1.29	3.52	1.31	3.46	1.36
Estonia	1,853	7.68	2.29	4.19	1.17	2.58	1.03	3.93	0.93	3.30	1.06
Finland	1,851	7.86	2.09	4.20	1.02	3.37	1.07	3.94	0.97	3.55	1.02
France	1,992	7.93	2.10	4.47	1.14	2.52	1.18	3.90	1.02	3.69	1.12
Germany	2,727	8.46	1.95	4.47	1.05	2.98	1.15	4.11	0.94	3.83	1.16
Hungary	1,231	7.65	2.34	4.33	1.10	2.68	1.26	4.46	0.91	3.49	1.17
Iceland	810	6.88	2.70	3.89	1.13	3.23	1.14	3.68	0.97	3.19	1.17
Ireland	2,483	7.68	2.23	4.17	1.19	2.65	1.26	3.72	1.16	3.35	1.23
Israel	1,795	7.93	2.46	3.90	1.37	2.69	1.23	3.86	1.18	3.63	1.19
Italy	2,105	8.44	1.75	4.33	1.21	2.63	1.25	3.95	1.06	3.85	1.01
Lithuania	1,507	8.17	1.98	4.11	1.18	2.68	1.27	3.86	0.99	3.24	1.15
Netherlands	1,558	7.55	2.16	4.14	1.10	2.94	1.23	4.23	0.89	3.42	1.23
Norway	1,486	6.95	2.36	4.05	1.08	3.22	1.24	4.26	0.82	3.36	1.12
Poland	1,383	8.12	2.04	4.03	1.10	2.37	1.04	4.02	0.95	3.61	1.09
Portugal	1,146	8.43	2.05	4.44	1.20	2.64	1.31	3.82	1.26	3.88	1.16
Russia	1,449	6.39	2.52	3.57	1.35	2.70	1.12	3.62	1.04	3.31	1.03
Slovenia	1,193	8.10	2.18	4.39	1.13	2.67	1.23	4.50	0.79	3.74	1.17
Spain	1,537	8.10	2.14	4.43	1.22	2.50	1.24	4.06	1.11	3.72	1.09
Sweden	1,446	7.49	2.18	4.08	1.09	3.49	1.21	4.26	0.88	3.35	1.20
Switzerland	1,428	8.20	2.10	4.23	1.12	3.23	1.17	4.13	0.89	3.81	1.13
United Kingdom	1,842	7.28	2.50	4.31	1.18	2.88	1.17	3.72	1.07	3.45	1.13

Appendix B – Model Comparison for all Outcome Variables

Table 7

Model Comparison for Each Outcome Variable

Variables	Model			
	PEB: Energy efficiency			
	model (1)	model (2)	model (3)	model (4)
descriptive norm	0.11 (0.01)* [0.09, 0.13]	0.09 (0.01)* [0.07, 0.11]	0.08 (0.01)* [0.06, 0.10]	0.08 (0.01)* [0.06, 0.10]
biospheric values		0.51 (0.01)* [0.49, 0.53]	0.47 (0.01)* [0.45, 0.49]	0.47 (0.01)* [0.44, 0.49]
group identification			0.27 (0.01)* [0.25, 0.29]	0.27 (0.01)* [0.25, 0.29]
descriptive norm x group identification			0.04 (0.01)* [0.02, 0.06]	0.05 (0.01)* [0.02, 0.07]
descriptive norm x biospheric values			-0.04 (0.01)* [-0.06, -0.02]	-0.04 (0.01)* [-0.06, -0.01]
group identification x biospheric values				-0.04 (0.01)* [-0.06, -0.01]
descriptive norm x group identification x biospheric values				0.01 (0.01) [-0.01, 0.02]
BIC	169761.4	167750.4	167750.4	167196.9
AIC	169735.7	167716.2	167128.7	167119.9
Adjusted R^2	0.00	0.05	0.07	0.07
N	38,331	38,331	38,331	38,331

Variables	Model			
	PEB: Energy curtailment			
	model (1)	model (2)	model (3)	model (4)
descriptive norm	0.07 (0.01)* [0.05, 0.08]	0.05 (0.01)* [0.04, 0.06]	0.05 (0.01)* [0.04, 0.06]	0.05 (0.01)* [0.04, 0.06]
biospheric values		0.30 (0.01)* [0.29, 0.31]	0.29 (0.01)* [0.28, 0.30]	0.29 (0.01)* [0.28, 0.30]
group identification			0.07 (0.01)* [0.06, 0.08]	0.07 (0.01)* [0.06, 0.08]
descriptive norm x group identification			0.00 (0.01) [-0.01, 0.01]	0.00 (0.01) [-0.01, 0.01]
descriptive norm x biospheric values			-0.01 (0.01) [-0.02, 0.00]	-0.01 (0.01) [-0.02, 0.00]
group identification x biospheric values				-0.01 (0.01) [-0.02, 0.00]
descriptive norm x group identification x biospheric values				0.00 (0.01) [-0.01, 0.01]
BIC	121238.1	118769.8	118654.8	118674.4
AIC	121212.4	118735.6	118594.9	118597.4
Adjusted R^2	0.00	0.07	0.07	0.07
N	38,331	38,331	38,331	38,331

Variables	Model			
	Policy support: Fossil fuel taxation			
	model (1)	model (2)	model (3)	model (4)
descriptive norm	0.11 (0.01)* [0.10, 0.12]	0.10 (0.01)* [0.09, 0.12]	0.11 (0.01)* [0.09, 0.12]	0.11 (0.01)* [0.09, 0.12]
biospheric values		0.10 (0.01)* [0.09, 0.12]	0.11 (0.01)* [0.10, 0.12]	0.11 (0.01)* [0.10, 0.12]
group identification			-0.07 (0.01)* [-0.06, -0.08]	-0.07 (0.01)* [-0.06, -0.08]
descriptive norm x group identification			0.01 (0.01) [-0.01, 0.02]	0.01 (0.01) [0.00, 0.02]
descriptive norm x biospheric values			-0.02 (0.01)* [-0.03, -0.01]	-0.02 (0.01)* [-0.03, 0.01]
group identification x biospheric values				-0.01 (0.01) [-0.02, 0.00]
descriptive norm x group identification x biospheric values				0.01 (0.01) [0.00, 0.02]
BIC	124439.9	124181.3	124084.1	124098.6
AIC	124414.3	124147.1	124024.3	124021.6
Adjusted R^2	0.00	0.06	0.07	0.07
N	38,331	38,331	38,331	38,331

Variables	Model			
	Policy support: Subsidies renewables			
	model (1)	model (2)	model (3)	model (4)
descriptive norm	0.02 (0.01)* [0.01, 0.03]	0.01 (0.01) [0.00, 0.02]	0.01 (0.01) [0.00, 0.02]	0.01 (0.01)* [0.00, 0.02]
biospheric values		0.15 (0.01)* [0.14, 0.16]	0.15 (0.01)* [0.14, 0.16]	0.15 (0.01)* [0.13, 0.16]
group identification			0.02 (0.01)* [0.01, 0.03]	0.02 (0.01)* [0.00, 0.03]
descriptive norm x group identification			0.02 (0.01)* [0.01, 0.03]	0.02 (0.01)* [0.01, 0.03]
descriptive norm x biospheric values			0.00 (0.01) [-0.01, 0.01]	0.00 (0.01) [-0.01, 0.01]
group identification x biospheric values				-0.01 (0.01) [-0.02, -0.00]
descriptive norm x group identification x biospheric values				0.01 (0.00) [0.00, 0.02]
BIC	112215.6	111459.7	111463.3	111477.2
AIC	112189.9	111425.5	111403.4	111400.2
Adjusted R2	0.00	0.02	0.02	0.02
N	38,331	38,331	38,331	38,331

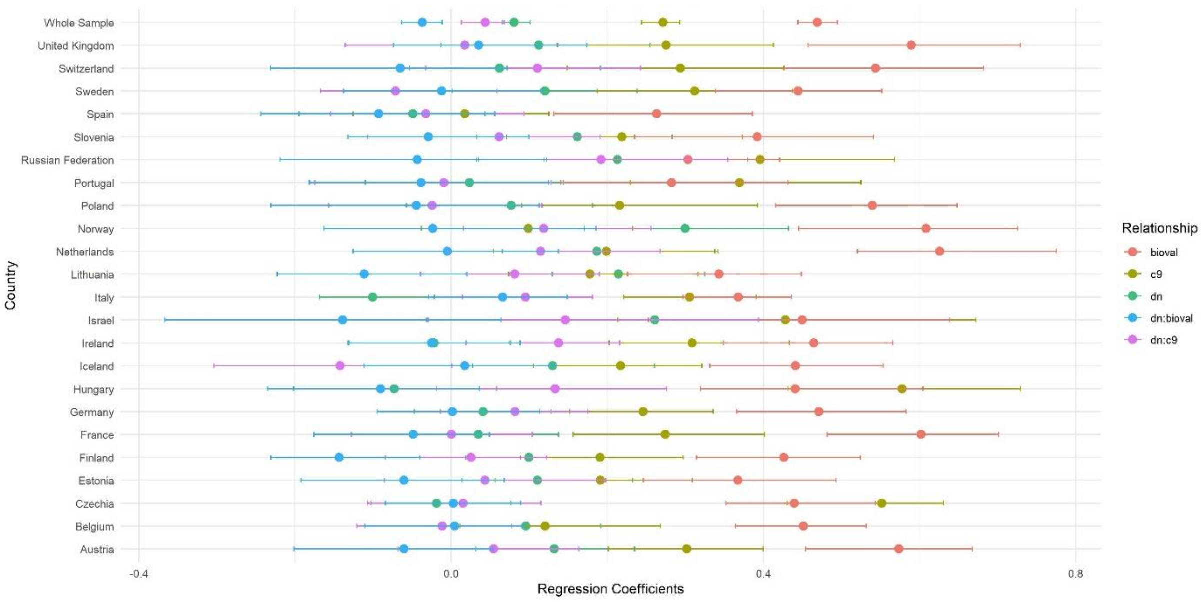
Variables	Model			
	Policy support: Household appliance			
	model (1)	model (2)	model (3)	model (4)
descriptive norm	0.07 (0.01)* [0.06, 0.09]	0.07 (0.01)* [0.06, 0.08]	0.07 (0.01)* [0.06, 0.08]	0.07 (0.01)* [0.05, 0.08]
biospheric values		0.19 (0.01)* [0.18, 0.20]	0.19 (0.01)* [0.18, 0.20]	0.19 (0.01)* [0.18, 0.20]
group identification			0.01 (0.01) [0.00, 0.02]	0.01 (0.01) [0.00, 0.02]
descriptive norm x group identification			0.02 (0.01)* [0.01, 0.03]	0.02 (0.01)* [0.01, 0.03]
descriptive norm x biospheric values			-0.02 (0.01)+ [-0.03, 0.00]	-0.02 (0.01)+ [-0.03, 0.00]
group identification x biospheric values				-0.01 (0.01) [-0.02, -0.00]
descriptive norm x group identification x biospheric values				0.01 (0.01) [0.00, 0.02]
BIC	120012.3	118978.8	118990.3	119005.5
AIC	119986.6	118944.6	118930.4	118928.6
Adjusted R2	0.00	0.03	0.03	0.03
N	38,331	38,331	38,331	38,331

Note. Each cell contains the estimate *β*, its standard error (), the 95% CI [], + indicate a p-value <0.01, * indicate a p-value <.001.

Appendix C – Country Level Regression Coefficients

Figure C1

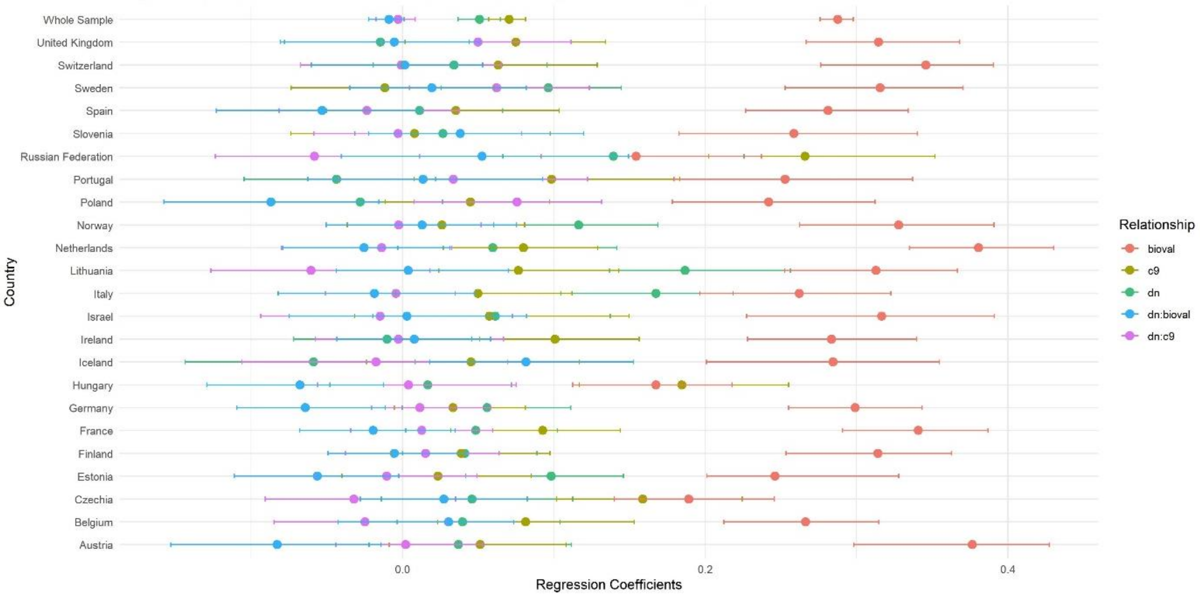
Country Level Analysis of Model (3) for Energy Efficiency Behaviour



Note. Standardized regression coefficients and corresponding 95% confidence intervals for each county for the relationship between energy efficiency and descriptive norms (turquoise), group identification (green), biospheric values (red), the interaction of biospheric values (blue), and the interaction of group identification (purple). The topline represents the grand mean over all 23 countries.

Figure C2

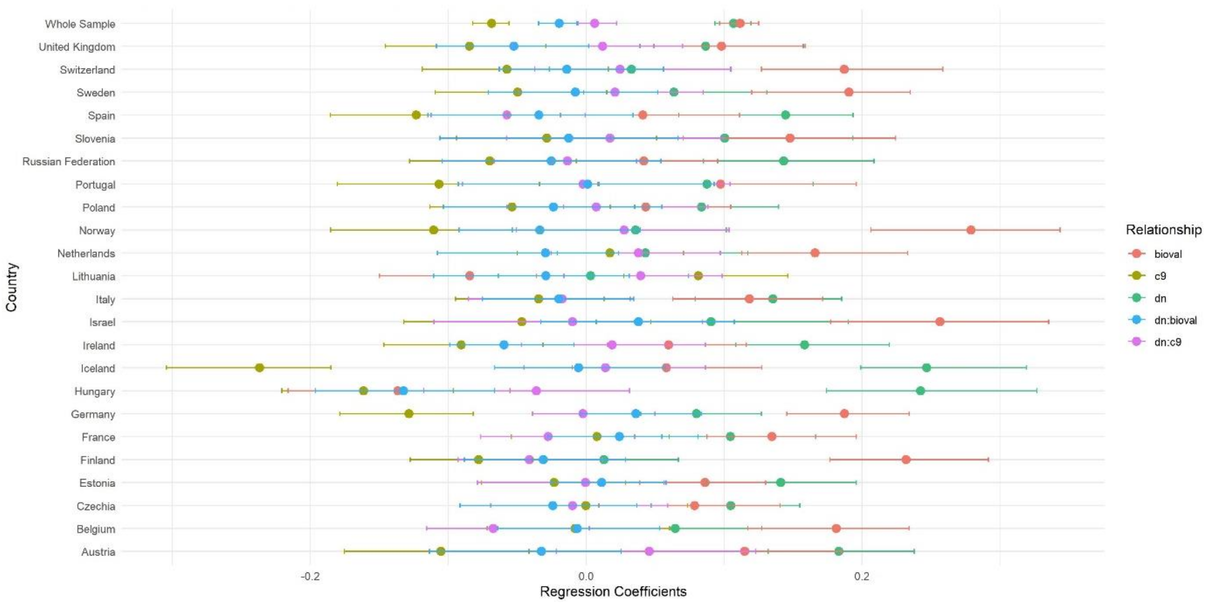
Regression Coefficients for Energy Curtailment Behaviour



Note. Standardized regression coefficients and corresponding 95% confidence intervals for each county for the relationship between energy efficiency and descriptive norms (turquoise), group identification (green), biospheric values (red), the interaction of biospheric values (blue), and the interaction of group identification (purple). The topline represents the grand mean over all 23 countries.

Figure C3

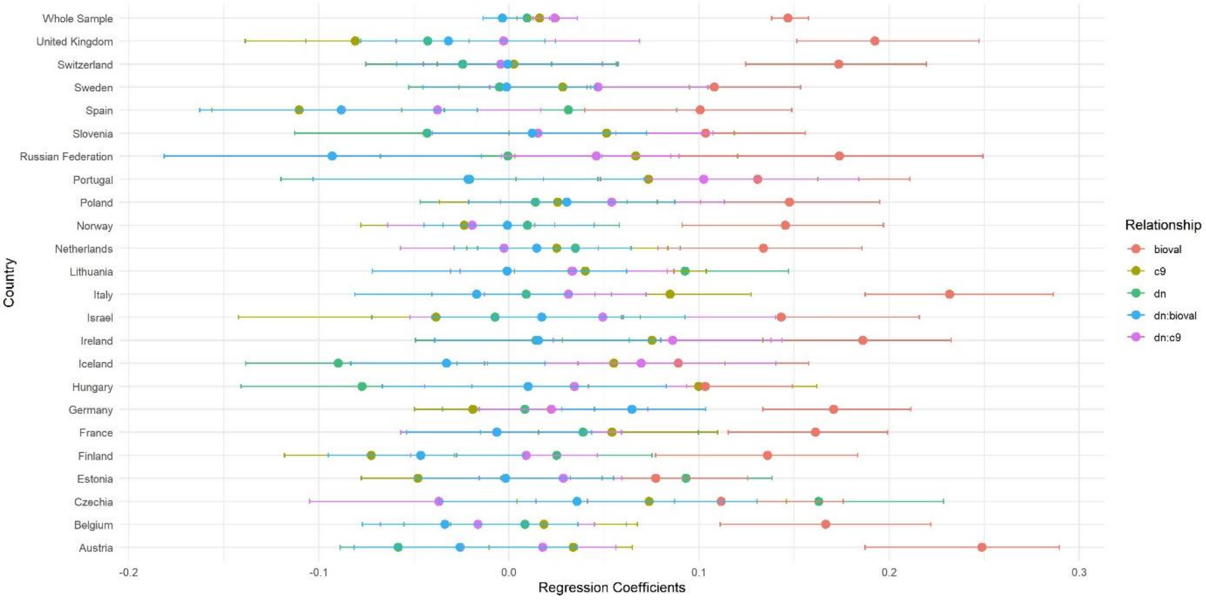
Regression Coefficients for Fossil Fuel Taxation



Note. Standardized regression coefficients and corresponding 95% confidence intervals for each county for the relationship between energy efficiency and descriptive norms (turquoise), group identification (green), biospheric values (red), the interaction of biospheric values (blue), and the interaction of group identification (purple). The topline represents the grand mean over all 23 countries.

Figure C4

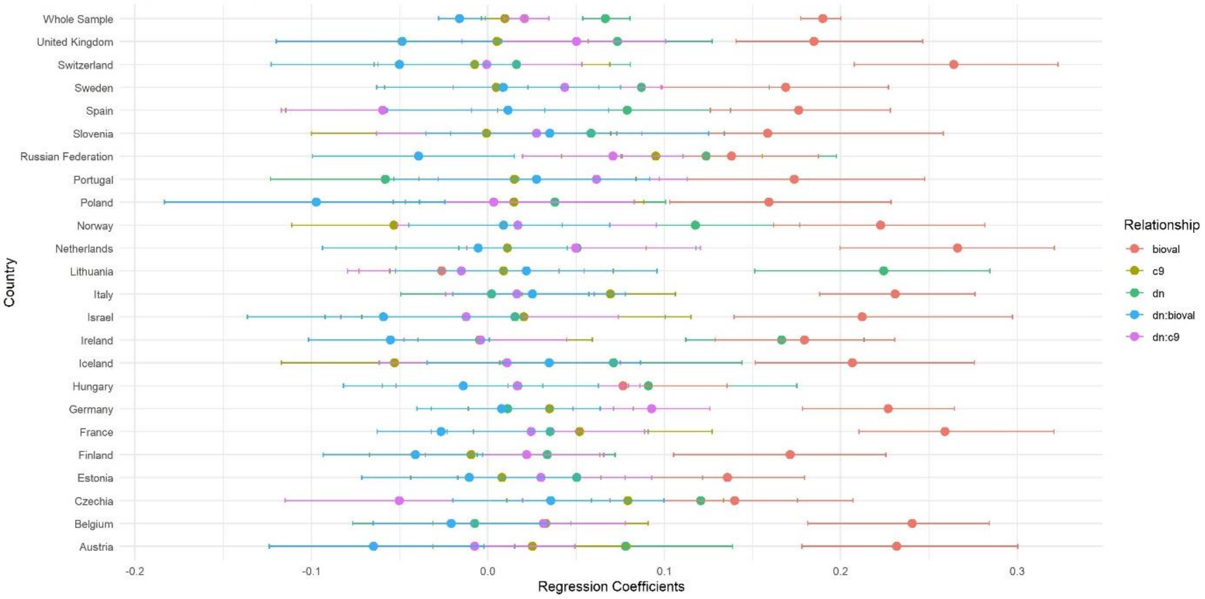
Regression Coefficients for Subsidies for Renewable Energy



Note. Standardized regression coefficients and corresponding 95% confidence intervals for each county for the relationship between energy efficiency and descriptive norms (turquoise), group identification (green), biospheric values (red), the interaction of biospheric values (blue), and the interaction of group identification (purple). The topline represents the grand mean over all 23 countries.

Figure C5

Regression Coefficients for the Ban of the Least Energy Efficient Household Appliance



Note. Standardized regression coefficients and corresponding 95% confidence intervals for each county for the relationship between energy efficiency and descriptive norms (turquoise), group identification (green), biospheric values (red), the interaction of biospheric values (blue), and the interaction of group identification (purple). The topline represents the grand mean over all 23 countries.