Altruism, Empathy and Political Orientation – Antecedents of Energy Saving behaviour?

Bachelor Thesis

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Abstract

Fighting climate change has become one of the most important issues in society today. Engaging in pro-environmental or specifically, in Energy Saving behaviour is effective in combatting this crisis. Therefore, it is crucial to recognize what leads people to display Energy Saving behaviour. This study aimed to investigate whether altruism, empathy or political orientation are predictors of Energy Saving behaviour. Protection motivation theory was used as a predictive model because it consists a more extensive set of predictors than other models.

The study consisted of a quantitative survey, measuring participants' level of Coping and Threat Appraisal, Altruism, Empathy and Political Orientation. Multiple regression analysis was conducted and results indicated a significant correlation between Coping Appraisal, as well as Political Orientation and Energy Saving behaviour. In other words, Coping Appraisal is associated with more Energy Saving behaviour in individuals, whereas right-wing Political Orientation might lead to less Energy Saving behaviour among residents.

This study provides insight into antecedents effect on Energy Saving behaviour within households. Additionally, there has been a new scale developed in order to measure Energy Saving behaviour within households. This scale can be made use of in future research.

Keywords: Pro-environmental behaviour; Residents; Energy Saving behaviour; Antecedents; Protection Motivation Theory; Coping Appraisal; Threat Appraisal; Altruism; Empathy; Political Orientation

Introduction

Preserving the earth so future generations have the possibility to live on it illustrates a primary challenge in today's society. Therefore, the aspect of sustainability has become one of the most important topics of interest throughout the last years. In fact, in 2015, the General Assembly of the United Nations agreed on 17 sustainable development goals (SDGs) which should be implemented until 2030. In more detail, the SDGs' main duty besides topics as ending poverty and improving health and education are to cope with climate change and work towards securing the world's oceans and forests (United Nations, 2015).

An important action we have to engage in, to reach the SDGs and to fight climate change is pro-environmental behaviour, which can be defined as behaviour that promotes the environment and damages it as little as possible (Steg & Vlek, 2009). One type of pro-environmental practice is Energy Saving behaviour, which can be defined as a reduction of unnecessary energy use and in turn reduces energy depletion (Hong, She, Wang & Dora 2019). Moreover, Energy Saving behaviour can also help alleviate energy shortage problems as well as mitigate environmental problems. Additionally, Energy Saving behaviour can be divided into two main categories. The first category incorporates energy-efficient investment or purchasing behaviour, for example the investment in energy-efficient products. The second category is composed of curtailment or habitual behaviour, which includes direct reduction and the modification of everyday behaviour (Hong et al., 2019). Examples of curtailment behaviour would be to turn off appliances that are not needed or riding the bicycle instead of taking the car (Zhang, Yu, Wang & Wei, 2018). Past research has considered curtailment behaviour, which also includes repeated performance, as effective in explaining households total energy consumption (Marechal, 2009). Therefore, the focus of this research will be on curtailment behaviour.

In order to lower energy usage and increase Energy Saving behaviours, it is important to develop important communication and marketing strategies. These are only effective, if researchers are able to understand and identify factors that influence individuals' Energy Saving behaviour. Therefore, researchers focus on Energy Saving behaviour in the residential area. According to previous research, residential Energy Saving behaviour could be a major factor in prohibiting natural problems like global warming and decreases the release of carbon dioxide (Zhang et al., 2018).

Researchers proved that there are several antecedents, which are able to influence individuals' Energy Saving behaviour and further, decrease disproportionate residential energy usage (Hong et al., 2019). According to Tang, Warkentin and Wu (2019) antecedents

of Energy Saving behaviour can be divided into three categories: social demographic factors, policy interventions, and psychological factors. Variables such as age, gender, income, housing status, marital status, and educational level, belong to the category of social-demographic factors. As a matter of fact, these are important factors affecting residents' energy usage (Tang, Warkentin & Wu, 2019). However, residents' energy-usage is also influenced by policy interventions for instance taxes, financial aids, money, discounts or rewards and feedback (Tang et al., 2019). Lastly, psychological factors such as values, social norms and attitudes showed a significant relationship with residents' energy saving behaviour (Frederiks, Stenner & Hobman, 2015). The focus of this research will be on psychological factors.

In order to fight climate change, decreasing energy usage is vital. Determining antecedents of residents' Energy Saving behaviour will, therefore, be the aim of this research. Furthermore, this paper will be directed at answering the question: What are the antecedents of Energy Saving behaviour?

Theoretical Framework

In order to understand what leads people to energy-saving behaviour it is crucial to understand which theoretical models and antecedents promote or inhibit it. Past research has used different theoretical models and antecedents in order to explain Energy Saving behaviour. However, the role of personality characteristics in pro-environmental behaviour research, has been mostly ignored. Therefore, the focus in this study will be on the protection motivation theory as a predictive theoretical model, and antecedents will be: Altruism, Empathy and Political orientation.

Protection Motivation Theory

Rogers (1975) developed the Protection Motivation Theory (PMT), in order to describe factors that are able to account for risk prevention behaviours (Bockarjova & Steg, 2014). In more detail, the PMT combines personal as well as social factors which are included in the cognitive decision process. During the decision process of risk-reducing behaviour, the PMT balances between two processes: Threat appraisal and coping appraisal.

Threat Appraisal is aimed at evaluating the dangers of an actual risk and combines two concepts: Severity and Vulnerability (Rainear & Christensen, 2017). Severity can be defined

as how hazardous a risk is evaluated by an individual. Vulnerability describes an individuals' sensitivity towards an actual risk (Bockarjova & Steg, 2014). Coping Appraisal is aimed at evaluating if executing a certain behaviour would be productive (Rainear & Christensen, 2017). Coping appraisal also combines two concepts: Self-efficacy and Response-efficacy. Self-efficacy is characterized as an individuals' belief to engage in a certain behaviour or action. Response-efficacy is represented by the effectiveness of behaviour that diminishes or prevents actual risks. .

Threat and Coping Appraisals lead to an exchange of positive and negative aspects of securing and maladaptive behaviour, which results in a conclusion to perform a behaviour or not. In conclusion, this implies that low threat and low Coping Appraisal reduces the chance that a certain activity is going to happen, while high threat and coping heightens the chance of a behavioural process (Bockarjova & Steg, 2014).

Protection motivation theory to explain energy-saving behaviour

As Rainear and Christensen (2017) mentioned, theories as the Norm Activation Model, the Value-Belief-Norm theory or the Theory of Planned Behaviour have been of most interest to researchers, in order to explain pro-environmental behaviours. Protection Motivation Theory (PMT) has been rarely used in past research in order to understand pro-environmental behaviour. PMT might be an addition to previous executed research that is helpful in explaining pro-environmental behaviour, as it contains a more extensive set of predictors than the other models. Firstly, PMT is aimed at identifying costs and benefits of adjustment behaviour which decreases environmental risks. Secondly, PMT also helps to evaluate the advantages of goods and actions which lead to higher environmental risks. Therefore, PMT might also help to improve and enlarge our comprehension of motivators, which can be addressed to encourage pro-environmental choices and decrease environmental risk (Bockarjova & Steg, 2014).

Understanding the influence of Coping and Threat Appraisal in the study's context is important to draw conclusions about its effect on Energy Saving behaviour. Therefore, an explanation of these processes is vital. During Threat Appraisal, Severity is formalized as the extent to which individuals assume climate change to have hazardous unfavourable consequences whereas vulnerability describes the extent to which individuals consider themselves at risk to suffer from hazardous consequences of climate change. During Coping Appraisal, Response efficacy captures whether individuals consider pro-environmental

behaviours as a productive way to decrease the unfavourable consequences of climate change. In addition, Self-efficacy would determine whether an individual assumes to engage in pro-environmental behaviour (Rainear & Christensen, 2017). In conclusion, PMT could potentially explain how people balance Threat and Coping Appraisals to engage in pro-environmental behaviours and fight climate change.

Altruism

The level of Altruism within individuals, might stimulate individuals to engage in Energy Saving behaviours and fight climate change. Therefore, the relationship between altruism and pro-environmental actions as well as sustainable practices has gained a lot of attention in research. In general, Altruism is described by Ciccarelli and White (2018) as "prosocial behaviour that is done with no expectation of reward and may involve the risk of harm to oneself"(p.534). Batson (1994) adds that in order to enhance the well-being of others, individuals encounter personal costs and fail to obtain individual benefits. In the context of this study, Griskevicius, Tybur and Van den Bergh's (2010) interpretation of Altruism is beneficial: Pro-environmental behaviour contains typical characteristics of Altruism and therefore, can also be conceived as prosocial behaviour.

According to Schwartz (1994), self-transcendence which is related to Altruism and helping behaviour, is a concept that is mostly used in environmental studies to investigate the effect on pro-environmental behaviour. Previous studies discovered that self-transcendent values have a positive effect on pro-environmental behaviours and that self-transcendence is connected to environmental awareness (Rice, 2006; Pinto, Nique, Añaña, & Herter, 2011) . Lee, Kim, Kim and Choi (2014) investigated the antecedents and interrelationships of three types of pro-environmental behaviour, whereas one of them accounted for Altruism. Results indicated that people, who are altruistically oriented are more protective towards the environment. Furthermore, altruistically oriented people also worry more about the environment and have a positive mindset about their capabilities to make a change. Similarly, Lades, Laffan and Weber (2021) executed a study of seven different preference measures in predicting pro-environmental behaviour. Their main finding was that solely altruism was able to systematically explain pro-environmental behaviour. Moreover, this finding showed that Altruism can explain and predict the general tendency to act pro-environmentally.

Evaluating the findings of previous studies, it can be assumed that Altruism is associated with Energy saving behaviour. In more detail, people with high-level altruistic

behaviour are more concerned about other individuals and nature than people with low-level altruistic behaviour. Moreover, it can be assumed that people displaying high levels of altruism will be more likely to engage in Energy Saving behaviour than those people with low levels of altruism.

Empathy

Altruism and Empathy have been found to be highly correlated in past research. In more detail, the empathy-altruism hypothesis was developed, which suggests that empathy felt for a person in need evokes altruistic motivation (Batson, as cited in Klimecki, Mayer, Jusyte, Scheeff & Schönenberg, 2016). Therefore, Empathy is included as a determinant of Energy Saving Behaviour as well.

Decisions regarding Energy Saving behaviour have an societal impact and contain a social element. The central goal for individuals adopting energy-saving behaviours is collective and permanent well-being. In order to achieve this well-being, a person must be able to understand and encounter others' emotions from their frame of reference, which can be defined as empathy (Sharma & Christopoulos, 2021). Additionally, empathy can be defined as an emotional reaction of oneself towards another individual, who is in a situation of distress or a situation of need. In more detail, feelings of empathy towards another person include a sense of sympathy, tenderness and compassion (Batson, Chang, Orr, & Rowland, 2002).

Various researchers have investigated the relationship between empathy and the environment. Geiger, Bowman, Clouthier, Nelson, and Adams (2017) found that experiencing the devastation of nature and seeing other individuals' or animals suffer evokes a comparable empathic reaction in participants. In more detail, they examined an overlap of brain activity in areas, which were associated with empathic simulation and perspective-taking, while looking at pictures of the damage to the environment and animals. Moreover, this finding suggests analogous cognitive and affective processes, while looking at those images. Instead, Berenguer (2007) tested whether there is an effect of the manipulation of empathy, empathetic feeling, environmental attitudes and behaviours. Results indicated that participants persuaded to experience empathy were also displaying sustainable consumption of natural resources. Furthermore, participants persuaded to feel empathy also demonstrated more intense feelings towards the environment. In contrast, Sharma and Christopoulos (2021) tested whether there is a relationship between empathetic concern and Energy Saving behaviour. Empathetic

concern is a positive feeling and was defined as imagination of oneself in the situation of another person (Pizarro, as cited in Sharma and Christopoulos, 2021). Results indicated that there is a significant positive relation between empathetic concern and the possibility to save energy.

Although there have been a few studies investigating the effect of Empathy on pro-environmental behaviour, none of the previous studies investigated whether the concept of Empathy as a whole is able to predict pro-environmental behaviour. Nevertheless, the results of previous studies suggest a relationship between Empathy and Energy Saving Behaviour. It can be assumed that individuals with a high level of Empathy will be more likely to perform Energy Saving behaviours than participants with a low score of Empathy.

Political orientation

Past research has identified a relationship between political orientation and empathy. Waytz, Adam, Iyer, Young and Graham (2016) identified empathy, as one of the central factors, that separates left- and right wing orientation. Consequently, Political orientation is associated with Energy Saving behaviour as well.

Even though climate change is approved by science and a serious challenge for today's society, the support for Energy Saving Behaviour may differ. People have different opinions about climate change and its importance, which can be observed by people's Political Orientation. Therefore, Political Orientation might be a factor, that is successful in explaining pro-environmental behaviour.

Kannan and Veazie (2018) defined political orientation as an "individual (micro) level term" and segmented it in two ways: the first would be political party affiliation, for instance, if people are associated with republicans or democratic parties. The second one would be political ideology or the linkage towards different political topics that characterize political parties. Proch, Elad-Strenger and Kessler (2018) provided more insights about the spectrum range of political orientation from conservatism to liberalism. In fact, conservatism is characterized by a reluctance to change, whereas liberalism represents the approval of societal change. Additionally, this view is also applicable to the political distinction between "left" and "right", the seating arrangement of the French Assembly, during the time of the French revolution (Laponce, as cited in Proch, Elad-Strenger & Kessler, 2018).

Researchers identified a political divide with regard to climate change views in West-European countries. For instance, left-wing citizens were more likely to believe that climate

change is human-made than right-wing citizens. Additionally, left-wing citizens are more likely to consider climate change as a far-reaching danger which we should enact on, by exhibiting enthusiasm to conquer climate change and further, reinforce politics to take action reducing greenhouse gas emissions. Furthermore, left-wing-oriented people are more worried about climate change and its resulting effects than right-wing-oriented ones. Throughout the last years, this political divide of left-wing and right-wing oriented people has even increased (McCright, Dunlap and Marquart-Pyatt, 2015). Lockwood (2018) examined that, right-wing parties and their supporters in Europe, are more prone to express different forms of climate scepticism than in other countries. Moreover, they also tend to be more hostile towards carbon taxation and pricing and lastly, hostile towards renewables.

In conclusion, previous studies suggest a relationship between Political Orientation and residents' energy-saving behaviour. It can be assumed that people with a low score on Energy Saving Behaviour will be rather right-wing oriented, than people with a high score on Energy Saving which will be rather left-wing oriented.

The current study

The current study is aimed at determining antecedents of residents' Energy Saving Behaviour. The focus of this study will be on psychological theory and psychological factors in order to explain Energy Saving Behaviour. Therefore, this study will examine, if there is a relation between Protection Motivation Theory, Altruism, Empathy, Political Orientation and Energy Saving Behaviour (see Fig.1). Concludingly, five hypotheses were developed.

H1: Coping Appraisal – Response- and Self-efficacy – is associated with individuals' Energy Saving behaviour.

H2: Threat Appraisal – Severity and Vulnerability – is an antecedent of individuals' Energy Saving behaviour.

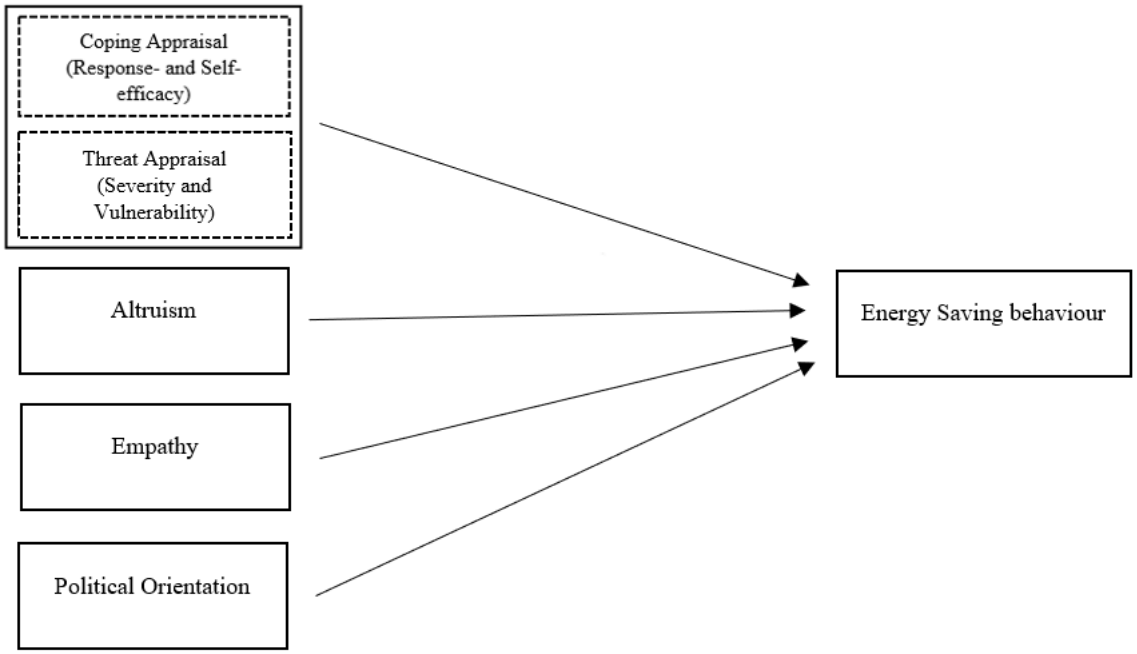
H3: Altruism is associated with Energy Saving behaviour.

H4: Empathy is an determinant of Energy Saving behaviour.

H5: Political orientation is associated with Energy Saving behaviour.

Figure 1.

Visualisation of the Antecedents of residents' Energy Saving behaviour.



Method

Participants and Design

A quantitative questionnaire survey design was utilised to examine the connection between the determinants of Energy Saving beehaviour. Before conducting the actual research, the programme G power was used and an a priori analysis was conducted to examine the required sample size for achieving significant results (Faul, Erdfelder, Buchner, & Lang, 2009). For the regression analysis (Effect size f^2=0.15, error probability = 0.05, power (1-β error probability) = 0.80, number of predictors = 5) a required sample size of at least 92 participants was estimated, with an actual power of 0.80.

Overall, 202 participants participated in the research. After applying a 95% progress criterion, which indicates that participants answered 95% of questions, 152 participants were still included in the research. The participants were composed of 100 females (65.8%) and 52 males (34.2%) between the ages 18 and 65 (*M* = 29.98, *SD* =11.787). In fact, 55 Dutch (36.2%), 82 German (53.9%), and 14 students (9.2%) with different nationalities (e.g. American, Canadian, English,…) participated in the questionnaire (for more information see

Table 1). With regard to participants highest degree of education completed, it can be said that 54 participants completed high school (35.5%), 10 participants finished trade school (6.6.%), 59 participants obtained a bachelor's degree (38.8%), 25 participants obtained a master's degree (16.4%), 1 participant completed a Ph.D. or even higher education (0.7%) and 3 participants (2.0%) did not want to admit their highest degree of education completed. Additionally, participants were asked about their employment status. 42 participants (27.6%) mentioned that they were students with a part-time job, while 33 participants (21.7%) indicated that they were students without a part-time job. 53 participants (34.9%) indicated that they were working full-time, 18 participants (11.8%) were working part-time and 5 participants were non-employed (3.3%). Of those 75 participants, 10 participants (6.6%) were engaged in business studies and public policy, 6 participants (3.9%) were doing engineering and technology, 2 participants (1.3%) were performing information technology, 7 participants (4.6%) were engaged in life sciences and medicine, 4 participants (2.7%) were doing natural sciences, 43 participants (28.3%) were doing social sciences and 3 participants (2.0%) did not want to admit their study. Other demographic variables can be found in the Table 1 below.

Table 1

Demographic Data of the Participants. Number of Participants (N) =152

	Total (N=88)	
Demographics	Frequency	Percent (%)
Study year		
1st year Bachelor	10	6.6
2nd year Bachelor	7	4.6
3rd year Bachelor	30	19.7
Pre-Master	2	1.4
Master	22	14.5
Prefer not to say	4	2.7
Household size		
1	24	15.8
2	46	30.3
3	34	22.4
4	33	21.7
5	8	5.3
6 or more	6	3.9
Prefer not to say	1	.7
Household composition		
Single household	24	15.8
Single parent	1	.7
Couple household	72	57.3
Shared household with family	24	15.8
Shared (student) household	30	19.7

Note: the number of participants answering study year does not add up to the total participant number (152 participants), as not all participants were students.

Procedure

Before conducting the study, it was approved by the BMS Ethics Committee (EC) of the University of Twente on April 9th, 2021. Convenience and snowball sampling was applied. The questionnaire was conducted via the website Qualitrics and shared via social media websites, as Instagram, Facebook, WhatsApp to reach as many participants as possible. In addition, the questionnaire was uploaded to SONA, where students of the University of Twente were able to sign-up for the study.

Prior to answering the questions, the participants were requested to read the informed consent form and needed to agree to the terms and conditions, to be able to proceed (Appendix A). In the Informed Consent, participants were informed about the study, procedure, confidentiality, and anonymity of the participants' data, as well as the contact details of the researcher. To ensure the anonymity of the participants, the collection of the IP addresses within Qualtrics was turned off.

Then, the respondents were asked to answer the questions about their demographic data, including the option, to not respond to these questions (Appendix B). The demographic part entailed questions about the participant's gender, age, nationality, level of education, occupation, household size and household composition. After that, the respondents needed to fill in the questions about the various constructs (Appendix D).More specifically, twelve different constructs were measured: Environmental Attributes[1]; Financial Concerns[1]; Altruism; Empathy; Risk Perception (PMT); Consumer Effectiveness[1]; Collectivism[1]; Resistance to Change[1]; Trust in Science; Electricity Consumption/Conservation Behaviour; Identity; and lastly, Political Orientation[1].

To measure the various constructs, different scales have been used (Appendix C). Most scales were measured with a five-point Likert-type scale ranging from (1) 'Strongly disagree' to (5) 'Strongly agree.' Solely, the Energy-saving behaviour scale was measured using a five-point Likert scale ranging from (1) 'Never' to (5) 'Always.' Regarding the last part of the study, students could not proceed to the next question if they had not answered the previous question. Thereby, it was ensured that everyone is answering the questions needed for the analysis. In total, the questionnaire took approximately twenty minutes to complete. The participants did not receive any incentive for finishing the questionnaire (e.g. money or credit points). The whole questionnaire can be found in Appendix D.

[1] These measurements were part of the questionnaire but were beyond the scope of this study.

Altruism. To measure the various constructs, different scales have been used (Appendix C). In order to measure the level of Altruism, the Self-Report Altruism Scale (S-RAS) has been applied (Rushton, Chrisjohn & Fekken, 1981). For the scale, high reliability has been found (α=.87). The scale consists of 20 items as for example 'I have helped push a stranger's car out of the snow', 'I have given directions to a stranger', or ' I have made change for a stranger' (see Appendix C). To calculate the total scores for each scale, the average value of the items measuring the construct were taken and joined into a new total score variable.

***Empathy*.** For the assessment of Empathy, the Toronto Empathy Questionnaire (TEQ) was used (Spreng, McKinnon, Mar, & Levine, 2009). The scale consisted of overall 16 items. Before calculating the overall reliability, several items had to be reverse coded (Appendix C). High reliability has been found for this scale (α =. 80). Examples of items used in this scale are 'When someone else is feeling excited, I tend to get excited too', 'Other people's misfortunes do not disturb me a great deal' and 'It upsets me to see someone being treated disrespectfully' (see Appendix C). As a last step, the average value of the items that were measuring Empathy was taken and combined into a new total score variable.

***Threat and Coping Appraisal* .** To measure Threat and Coping Appraisal, the Risk Behaviour Diagnosis Scale has been utilised (Witte, 1996). The scale with items of Coping and Threat Appraisal indicated a moderate to high reliability (α=.69; α=.89). The scale is composed of 12 items in total (see Appendix C). Coping appraisal was measured using six items. Three of them were measured with the subscale of response efficacy, as for instance 'Energy-saving within households prevents climate change'. The other three items were measured with the subscale of self-efficacy, for example 'I am able to save energy within my household'. Besides, threat appraisal was also measured with six items. Three of them were measured with the subscale of susceptibility, for example ' I am at risk because of climate change.' The other three items were measured with the severity scale, as for instance ' Climate change has severe negative consequences'. All 12 items were measured using a five-point Likert scale (Guarnaccia, & Henry, 2019) (Appendix C). After reliability analysis, the average value of the items of the Coping Appraisal (Response- and Self-efficacy subscale) and Threat Appraisal (Susceptibility and Severity subscale) were taken and incorporated into a new total score variable. Consequently, the two new composed variables were Coping Appraisal average score and Threat Appraisal average score.

Energy Saving Behaviour within Households. To measure Energy Saving behaviour within households, the conservation sub-scale of the Pro-Environmental Behaviour Scale (PEBS) has been used. For the first six items, a five-point scale has been used from (1) 'never' to (5) 'always'. For the last item, a three-point scale has been used (1) 'hot', (2) 'warm', (3) 'cold' (Markle, 2013). Example items would be: (1) How often do you turn off the lights when leaving a room? or (5) How often do you limit your time in the shower in order to conserve water? or (7) At which temperature do you wash most of your clothes? Further, the scale has been extended to include six more items, which were based on the scale for current behaviour (Zierler et al., 2017) (see Table 2). Some items have been left out, as they either overlapped with the Pro-Environmental Behaviour Scale (PEBS) or were out of the scope of this study. The items included in this study are as follows: (1) How often do you turn off computer monitors when you are not at your desk? (2) How often do you turn off other non-essential electrical equipment? (3) How often do you switch off standby modes of appliances or electronic devices? (4) How often do you turn things off completely, rather than to a "standby" mode. (5) How often do you discuss energy use in meetings? (6) How often do you leave items plugged in, even when they've finished charging? Reliability analysis indicated a higher reliability score, if item 12 would be deleted, therefore item 12 was excluded. Hence, a high-reliability score has been found ($\alpha = .71$). Finally, the average value of the items that were measuring Energy Saving Behaviour was taken and combined into a new variable.

Table 2

Items of the energy-saving behaviour scale.

Statement
(1) How often do you turn off the lights when leaving a room?
(2) How often do you turn off computer monitors when you are not at your desk?
(3) How often do you turn off other non-essential electrical equipment?
(4) How often do you switch off standby modes of appliances or electronic devices?
(5) How often do you turn things off completely, rather than to a "standby" mode.
(6) How often do you cut down on heating or air conditioning to limit energy use?
(7) How often do you turn off the TV when leaving a room?
(8) How often do you limit your time in the shower in order to conserve water?
(9) How often do you wait until you have a full load to use the washing machine or dishwasher?
(10) How often do you discuss energy use in meetings?
(11) How often do you leave items plugged in, even when they've finished charging?
(12) At which temperature do you wash most of your clothes?

Political Orientation. To measure whether participants are either left-wing or right-wing oriented, a single item has been used (Watkins, et al., 2016). Participants needed to indicate their political orientation on a scale from 1(left) to 5(right) (Appendix C).

Debriefing. Lastly, participants were thanked for their time and participation. Moreover, the aim of the study and its underlying factors were named and explained. For further questions, the emails of all three researchers were named. In case of any complaints, there was an email provided from a member of the BMS Ethics committee (Appendix E).

Results

Correlation analysis

At first, there was a correlation analysis conducted, with Spearman's Rho, to evaluate the relationship between the demographics and Energy Saving behaviour. There have been no significant correlations found between demographics and Energy Saving behaviour.

Besides results that were of interest due to the conceptual model, some other correlations were surprising. Correlation analysis indicated a positive correlation between Threat Appraisal and Empathy, which shows that when a high level of Threat Appraisal is found, participants also had a high level of Empathy. In addition, there is a negative correlation between Threat Appraisal and Political Orientation, indicating that participants with a low level of Threat Appraisal will score low on the Political Orientation scale, indicating that they are left-wing oriented (left = 1, right = 5). Furthermore, Political Orientation negatively correlates to Empathy. This finding suggests that people which were indicating to be left-wing oriented, had a high score on Empathy. Right-wing oriented participants, had a low score on Empathy (see table 3).

Results obtained during correlation analysis, which are of interest for the conceptual model, suggested a positive correlation between Coping Appraisal and Energy Saving behaviour. In other words, a high level of Coping Appraisal is associated with a high level of Energy Saving behaviour. Besides, there has been a positive correlation found between Energy Saving behaviour and Threat Appraisal. This result implies that a high score of Threat Appraisal is associated with a high score on Energy Saving behaviour. Altruism and Energy Saving behaviour showed a positive correlation as well. In more detail, a high score on the Altruism scale also indicates a high score on Energy Saving behaviour. Correlation analysis illustrated a positive correlation for Empathy and Energy Saving behaviour. A high score on Empathy also implies a high score on Energy Saving behaviour. Finally, Political Orientation showed a negative correlation with Energy Saving behaviour. Moreover, a participant who scored high on Political Orientation (left = 1, right = 5), will most likely show less Energy Saving behaviour (see table 3) .

Table 3

Means (M), Standard Deviations (SD), and Correlation between Demographics and the variables Coping Appraisal, Threat Appraisal, Altruism, Empathy, Political Orientation and Energy Saving behaviour

	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
r/r$_s$			*r*$_s$	*r*$_s$	*r*$_s$	*r*$_s$	*r*$_s$	*r*	*r*	*r*	*r*	*r*
1. Age	30.16	11.95	1									
2. Level of education	2.39	1.16	**.46****	1								
3. Study year	3.27	1.37	**.68****	**.71****	1							
4. Household size	2.82	1.31	-.16*	-.21**	-.25*	1						
5. Coping Appraisal	3.73	0.53	.18*	-.09	-.26*	.15*	1					
6. Threat Appraisal	4.18	0.68	-.19*	-.11	.16	.05	**.31****	1				
7. Altruism	2.97	0.57	.15*	.20**	.07	-.02	.21**	-.04	1			
8. Empathy	4.03	0.41	-.26**	-.11	-.09	.03	.16*	**.37****	.09	1		
9. Political Orientation	2.45	0.87	.20**	.03	.04	.07	-.27**	**-.38****	-.13	**-.40***	1	
10. Energy Saving behaviour	3.48	0.51	-.01	-.11	.09	.07	.29**	.21**	.18*	.24**	-.29**	1

Note. Bold font indicates correlation of .30 and higher.

*. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).

Multiple regression analysis

Multiple linear regression analysis was executed in order to determine if the independent variables Coping Appraisal (Response and Self-efficacy), Threat Appraisal (Severity and Susceptibility), Altruism, Empathy and Political Orientation can predict Energy Saving Behaviour, as the dependent variable (see table 4).

Firstly, multiple regression analysis indicated an overall model fit of R^2 =.16. In other words, this finding indicates that the model's data are able to explain 16% of the variation. Furthermore, the model was a significant predictor of Energy Saving Behaviour within households, F (5, 147)=5.51, p=<.01.

Secondly, there has been a significant relationship observed between Coping Appraisal and Energy Saving behaviour (B = 1.76; t = 2.21; p = .03). As this result indicates, the higher an individual's Coping Appraisal, the higher a person performed on Energy Saving behaviour, which supports Hypothesis 1.

There has been no significant relationship observed between Threat Appraisal and Energy Saving behaviour (B = 0.04; t = 0.62; p = .54). As a result, Hypothesis 2 can be rejected.

There has been no significant relationship examined between Altruism and Energy Saving behaviour (B = 0.10; t = 1.41; p =.16) and therefore, Hypothesis 3 can be rejected.

The fourth Hypothesis can be rejected because there has been no significant relationship found between Empathy and Energy Saving behaviour (B = 0.15; t = 1.36; p =.18).

Next, a significant relationship has been observed between Political Orientation and Energy Saving behaviour (B = -0.10; t = -1.83; p =.07). As this finding suggests, an individual who had a high score on Political Orientation (right-wing oriented) was associated with less intention to save energy. Consequently, Hypothesis 5 can be accepted.

Table 4

Multiple linear regression of energy-saving behaviour by coping appraisal, threat appraisal, altruism, empathy and political orientation

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.00	.60		3.35	<.01
	Coping appraisal	1.76	.08	.18	2.21	.03
	Threat appraisal	0.04	.07	.05	0.62	.54
	Altruism	0.10	.07	.11	1.41	.16
	Empathy	0.15	.11	.12	1.36	.18
	Political orientation	-0.10	.05	-.16	-1.83	.07

a. Dependent Variable: Energy-saving behaviour

Note: p <.10 has been regarded as significant.

Discussion

The aim of the present study was to investigate whether Coping Appraisal, Threat appraisal, Altruism, Empathy and Political Orientation have an effect on participants' Energy Saving behaviour. Five hypotheses were developed in order to make assumptions about the aim of this study. Two hypotheses have yielded significant results. The hypothesis "Political Orientation is associated with Energy Saving behaviour" has been supported by the results. In more detail, right-wing oriented people were less prone to environmental behaviour. This finding was expected, since previous research suggested a relationship between those variables. Neumayer (2004) already determined that left-wing parties and individuals show more pro-environmental behaviour than right-wing oriented people. Besides, previous research demonstrates that right-wing political orientation has a negative effect on people's comprehension of climate change, which in turn could reduce people's motivation to focus on environmental-friendly behaviours (Zia & Todd, 2010; Dunlap & McCright, 2008).

For the hypothesis "Coping Appraisal – Response- and Self-Efficacy –is associated with individuals' Energy Saving behaviour" a significant result was found as well. Results demonstrated that participants who scored high on Coping Appraisal also scored high on Energy Saving behaviour. This finding was expected by previous scholars, which indicated that PMT is a successful predictor of pro-environmental behaviour (Gardner & Stern, 2002; Rainear & Christensen, 2017). However, the hypothesis" Threat Appraisal – Severity and

Vulnerability –is an antecedent of individuals' Energy Saving behaviour" was rejected. One explanation for this finding is provided by Horng, Hu, Teng and Lin (2014). Their findings suggested that Coping Appraisal is a better predictor of energy saving and carbon reduction behaviours than Threat Appraisal. Furthermore, they refer to previous studies, where PMT (Coping and Threat Appraisal) was used in order to explain health-related behaviour and disease prevention (Plotnikoff et al., 2010; Henson, Cranfield, & Herath, 2010). In those studies, Threat Appraisal was a substantial motivation for protection behaviour because the danger of disease posed an immediate and critical risk on individuals' health. This is opposed to global warming, which is driven by a different ambition. Preservation of health is associated and triggered by fear, whereas environmental protection behaviours as for instance Energy Saving behaviour in this study would be triggered by responsibility.

There have been no significant results found for, Altruism or Empathy. One reason for this finding in regression analysis might be that there is an intercorrelation between variables which influences the results. In more detail, the independent variables, Coping and Threat Appraisal, Altruism, Empathy and Political Orientation might have an effect on one another. However, there might also be other reasons for insignificant results.

The hypothesis "Altruism is associated with Energy Saving behaviour" was rejected, as no significant result was found. This is not in line with past research which suggests a significant influence of Altruism on Energy Saving behaviour (Gärling, Fujii, Gärling, & Jakobsson, 2003; Lades et al., 2021). Nevertheless, there were also several researchers which questioned the existence of 'true' altruism. Therefore, the term warm glow was invented, where individual's contribution to the public environment results in individuals experience of moral satisfaction (Nunes & Schokkaert, 2003). In a more recent study, Hartman, Eisend, Apaolaza, and D'Souza (2017) showed that warm glow is a stronger predictor for pro-environmental behaviour than Altruism. Therefore, the concept of Altruism in general, might not have been the best predictor for assessing residents Energy Saving behaviour.

With respect to the hypothesis "Empathy is an determinant of Energy Saving behaviour" no significant result has been found. This finding is contradictory to what has been found in previous research. Berenguer (2007) argued that individuals with a high level of empathy also demonstrated stronger environmental attitudes and behaviours. However, one reason for this finding might be "[…] that the relationship between Empathy and sustainability is complex, fluid and contingent (p.13)". Moreover, the relationship is neither linear nor has it a direct cause and effect link. One explanation for this might be that the relationship between empathy and nature is different across societies established on emotions,

distinct values and shared experiences (Brown et al., 2019). In more detail, there might also exist differences in individuals' empathetic tendencies, due to a unique mixture of genetic as well as environmental influences that motivate individuals' in empathy-related practices and behaviours (Davis, 1996). Another explanation is that, Empathy towards others, does not necessarily result in prosocial or pro-environmental behaviour. Consequently, there are limits to the relationship of empathy and nature that potentially support sustainability. A solution to overcome these issues, is to view empathy in light of identity and place interactions, which might give valuable insights into sustainability research (Brown et al., 2019). In conclusion, the measurement of Empathy might not have been the most accurate predictor of Energy Saving behaviour.

4.1 Strengths and Limitations

A major strength of the executed research is that more participants executed the research than was suggested. G-Power analysis implied to have at least 92 participants to achieve a power of 80%. In this research, 152 participants were included. In conclusion, more participants were recruited than were needed.

Another strength of this research would be that Dutch as well as German participants might have been very well aware of their Political Orientation and were able to correctly attribute their political orientation. In the Netherlands, the general elections already took place this year whereas the German elections will follow in September 2021.

A last strength of this research would be the development of the Energy Saving behaviour scale. This scale was composed of items taken from the Pro-Environmental Behaviour scale (Markle, 2013) as well as items of a scale measuring current behaviour (Zierler et al., 2017). The scale yielded a high reliability ($\alpha = .71$) and therefore, can be used in future studies aimed at identifying Energy Saving behaviour.

Neither a strength nor a limitation is the R^2 of this model. The model's data were only able to explain 16% of the variation. Even though this is not a high model fit, an r-squared below 50% is normal in social sciences (Moksony & Heged, 1990). Moreover, there were two significant results found during regression analysis. Regarding insignificant results, the connection with Energy Saving behaviour cannot be confirmed by the findings. Lastly, the low r-squared could also indicate that the model misses important predictors of Energy Saving Behaviour that could improve the overall fit of the model. One suggestion for a predictor that could be included is Social Norm. Wang, Wang, Guo, Zhang & Wang (2018) found a

significant relationship between social norm and Energy Saving Behaviour. Focusing on social norms, for instance role models, opinion leaders, ambassadors motivate a decrease in energy-consumption behaviour. In addition, expectations of other individuals can influence Energy Saving behaviour (Ohnmacht, Schaffner, Weibel & Schad, 2017). Another factor that might explain the low r-squared, could be the fact that response costs, as third component of Coping Appraisal, was not included in the present study. Rainear and Christensen (2017) add that a few studies include response costs to measure protection motivation. Therefore, including this concept in the conceptual model, in order to predict Energy Saving behaviour, might increase the overall model fit.

Nevertheless, this study also encountered some limitations. A first limitation that can be noted regarding this study, was the sampling method. As a result of convenience and snowball sampling, our sample consisted of very young and well-educated participants. With regard to Energy Saving Behaviour, this is rather a detriment, as there might have been different results when having a different sample. Pinto et al. (2011) found that older people report to engage in more pro-environmental actions than younger people. Gifford and Nilson (2014) hypothesize that important events must have affected the older generation which did not affect the younger one. In more detail, age would not cause this effect on pro-environmental behaviour, rather events that had an impact on an age group. Therefore, if the sample would have consisted of more older people, this might have affected our results concerning Energy Saving behaviour. Furthermore, a different sampling method would have resulted in a more diverse sample and would have been more accurate in order to make inferences about the general population.

The last limitation is the use of the Risk Behaviour Diagnosis Scale, in order to measure Coping and Threat Appraisal. This scale might not have been an accurate measure, as Coping Appraisal had a significant value, but Threat Appraisal did not. An explanation is the fact that items 11 and 12 within the Risk Behaviour Diagnosis Scale sounded very similar for instance “climate change is extremely harmful” and “climate change is a severe threat” (Appendix C). More specifically, a readjustment of items in the Risk-Behaviour Diagnosis Scale was administered in order to make the items more comprehensive for participants. This readjustment might have resulted in some repetition for the participants, which might have led to different scoring of items.

4.2 Future research

Overall, there are a lot of possibilities for administering future research. One of them would be to do administer an experimental design where, participants are primed with an altruistic or empathetic factor and are then asked about their Energy Saving behaviour. Christian and Alm (2014) administered an experimental design with an empathy prime. In their study, one of the prime tasks was to let participants write the golden rule after they read different versions of the identical moral rule from six religions. This would be one approach to prime empathy and thus, get more insight into if this trait is an antecedent of Energy Saving behaviour.

Another suggestion for future research would be to investigate whether Political Orientation influences Energy Saving behaviour, or if Energy Saving behaviour influences Political Orientation. Therefore, a more extensive scale that measures diverse dimensions of Political Orientation should be used to investigate this. Moreover, there are different kinds of parties, for example in Germany, and therefore, it might be interesting whether a specific party affiliation can be associated with Energy Saving behaviour. Hufer, Kornadt, Kandler and Riemann (2019) gave participants a list with the 8 most popular parties in Germany. Participants had to indicate to what party they feel most attracted. During Analysis, this was re-scaled into left- and right-wing Political Orientation. This might be an interesting approach to consider for future studies.

4.3 Conclusion

In conclusion, this study was aimed at investigating whether Coping Appraisal, Threat Appraisal, Altruism, Empathy and Political Orientation have an effect on Energy Saving behaviour. Coping Appraisal, as well as Political Orientation, had a significant influence on Energy Saving behaviour, whereas Threat appraisal, Altruism and Empathy did not. This result was surprising, as literature indicated a relationship between all the independent variables and the dependent variable. Therefore, more research in this particular field is required. Nevertheless, this research contributes towards our understanding of the connection between personality factors and Energy Saving behaviour. Furthermore, this study may also hold important suggestions for designing pro-environmental interventions. The effect of personality factors on Energy Saving behaviour can be taken into account, when tailoring messages to their target audience. Even though the effect of personality factors on Energy Saving behaviour should not be overestimated, this research gave important insights into our understanding of antecedents of Energy Saving behaviour.

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Appendices

Appendix A- Informed consent

You are being invited to participate in a research study about **household energy consumption.** This study is being done by Sophie Weigandt, Milou Poort and Elena Niehoff from the Faculty of Behavioural, Management and Social Sciences at the **University of Twente.**

The purpose of this research study is to study household energy behaviour and will take you **approximately 20 minutes** to complete.

Your participation in this study is entirely **voluntary** and you can **withdraw** at any time. You are free to omit any question. Further, there are no right or wrong answers. Just choose the answer option that you believe fits you the best. The questionnaire is not regarding judging the amount of energy you consume, but rather to get an indication of the perception regarding household energy usage.

We believe that there are no known risks associated with this research study. Your data will be treated **confidentially.** We will minimise any risks by using anonymised data, which means it is not possible to trace the answers to yourself. The anonymous data will be used for research purposes only and will not be shared with any third parties.

Contact details of the **researchers** for further information: Elena Niehoff; e.niehoff@student.utwente.nl; Sophie Weigandt; s.weigandt@student.utwente.nl; Milou Poort; m.h.j.poort@student.utwente.nl

Contact details for **complaints** about the research: Lyan Kamphuis-Blikman; l.j.m.blikman@utwente.nl

Thank you for considering participation in this study!

If you click on the button below, you consent that you agree with the information stated above and that you are at least 16 years of age.

I agree.

Appendix B – Demographic Questions

Q2: What gender do you identify as?

- Female
- Male
- Other
- Prefer not to say

Q3: How old are you?

- Blank space

Q4: What is your nationality?

- Dutch
- German
- Other
- Prefer not to say

Q5: What is the highest degree or level of education you have completed?

- High school
- Trade school
- Bachelor's degree
- Master's degree

- Ph.D. or higher
- Prefer not to say

Q6: What is your current employment status?

- I’m a student with a part-time job
- I’m a student without a part-time job
- I’m working part-time
- I’m working full-time
- I’m non-employed
- Prefer not to say

Q7: Which study-programme are you following?

- Business studies and Public Policy
- Engineering and Technology
- Information Technology
- Life Sciences and Medicine
- Natural Sciences
- Social Sciences
- Prefer not to say
- Display This Question:
- If: What is your current employment status?
- I’m a student with a part-time job- is selected
- I’m a student without a part-time job- is selected

Q8: Which year are you in?

- 1st year Bachelor
- 2nd year bachelor
- 3rd year Bachelor
- Pre-Master
- Master
- Prefer not to say

- Display This Question:
- If: What is your current employment status?
- I’m a student with a part-time job- is selected
- I’m a student without a part-time job- is selected

Q9: Including yourself, how many people currently live in your household?

- 1
- 2
- 3
- 4
- 5
- 6 or more
- Prefer not to say

Q10: How is your current household composition?

- Single household
- Single parent with child(ren)
- Couple household with child(ren)
- Couple household without child(ren)
- Shared household with family (including parents and/or siblings)
- Shared (student) household
- Prefer not to say

Appendix C – Scales used per construct

1. Self-report Altruism Scale (Rushton, Chrisjohn & Fekken, 1981)

Below you will be given some statements about altruistic behaviour, please indicate your corresponding agreement. Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Never	Rarely	Sometimes	Usually	Always
(1) I have helped push a stranger's car out of the snow.					
(2) I have given directions to a stranger.					
(3) I have made a change for a stranger.					
(4) I have given money to charity.					

(5) I have given money to a stranger who needed it (or asked me for it).

(6) I have donated goods or clothes to a charity.

(7) I have done volunteer work for a charity.

(8) I have donated blood.

(9) I have helped carry a stranger's belongings (books, parcels, etc.).

(10) I have delayed an elevator and held the door open for a stranger.

(11) I have allowed someone to go ahead for me in a lineup (at Xerox machine, in the supermarket).

(12) I have given a stranger a lift in my car.

(13) I have pointed out a clerk's error (in a bank, at the supermarket) in undercharging me for an item.

(14) I have let a neighbour whom I didn't know too well borrow an item of some value to me (e.g. a dish, tools, etc.)

(15) I have bought 'charity' Christmas cards deliberately because I knew it was a good cause.

(16) I have helped a classmate who I did not know that well with a homework assignment when my knowledge was greater than his or hers.

(17) I have before being asked, voluntarily looked after a neighbour's pets or children without being paid for it.

(18) I have offered to help a handicapped or elderly stranger across a street.

(19) I have offered my seat on a bus or train to a stranger who was standing.					
(20) I have helped an acquaintance to move households.					

2. Toronto Empathy Questionnaire (Spreng, McKinnon, Mar, & Levine, 2009)

Below you will be given some statements about empathic behaviour, please indicate your corresponding agreement. Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Never	Rarely	Sometimes	Usually	Always
(1) When someone else is feeling excited, I tend to get excited too.					
(2)® Other people's misfortunes do not disturb me a great deal.					
(3) It upsets me to see someone being treated disrespectfully.					
(4)® I remain unaffected when someone close to me is happy.					
(5) I enjoy making other people feel better.					
(6) I have tender, concerned feelings for people less fortunate than me.					
(7)® When a friend starts to talk about his/her problems, I try to steer the conversation towards something else.					
(8) I can tell when others are sad even when they do not say anything.					
(9) I find that I am "in tune" with other people's moods.					
(10)® I do not feel sympathy for people who cause their own serious illnesses.					
(11)® I become irritated when someone cries.					

(12) ® I am not really interested in how other people feel.

(13) I get a strong urge to help when I see someone who is upset.

(14)® When I see someone being treated unfairly, I do not feel very much pity for them.

(15)® I find it silly for people to cry out of happiness.

(16) When I see someone being taken advantage of, I feel kind of protective towards him/her.

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3. Risk Behaviour Diagnosis Scale (Witte, 1996)

Below you will be given some statements about risk behaviour regarding energy-saving in your household, please indicate your corresponding agreement.
Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
<u>Response efficacy</u>					
(1) Energy-saving within households prevents climate change.					
(2) Energy-saving within households works in stopping climate change.					
(3) Energy-saving within households is effective in fighting climate change.					
<u>Self-efficacy</u>					

(1) I am able to save energy within my household.

(2) It is easy to save energy within my household.

(3) I can save energy within my household.

Susceptibility

(1) I am at risk because of climate change.

(2) It is possible that I will experience the effects of climate change.

(3) I think I will experience side-effects of climate change.

Severity

(1) Climate change has severe negative consequences.

(2) Climate change is extremely harmful.

(3) Climate change is a severe threat.

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4. Energy Saving Behaviour Scale (Markle, 2013; Zierler, 2017)

Below you will be given some statements about how your energy-saving behaviour, please indicate your likelihood of conducting this behaviour.
Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Never	Rarely	Sometimes	Usually	Always
(1) How often do you turn off the lights when leaving a room?					

(2) How often do you turn off computer monitors when you are not at your desk?

(3) How often do you turn off other non-essential electrical equipment?

(4) How often do you switch off standby modes of appliances or electronic devices?

(5) How often do you turn things off completely, rather than to a "standby" mode.

(6) How often do you cut down on heating or air conditioning to limit energy use?

(7) How often do you turn off the TV when leaving a room?

(8) How often do you limit your time in the shower in order to conserve water?

(9) How often do you wait until you have a full load to use the washing machine or dishwasher?

(10) How often do you discuss energy use in meetings?

(11) How often do you leave items plugged in, even when they've finished charging?

Statement	Hot	Warm	Cold
(7) At which temperature do you wash most of your clothes?			

5. Political orientation (Watkins et al., 2016)

Below you will be given a statement about political orientation, please indicate your corresponding agreement. Remember: There is no right or wrong answer. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Q29: In political matters, people talk of ‘the left’ and ‘the right’. How would you place your views on this scale, generally speaking?

- On a five-point Likert-scale (1=left, 5=right)

Questionnaire

Below you will be given some statements about attitudes regarding energy-saving in your household, please indicate your corresponding agreement.

Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

***Energy-saving appliances include devices, such as energy-efficient washing machines, dishwashers, refrigerators, thermostats, etc. within the household.**

Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
(1) The use of energy-saving appliances* contributes to the prevention of climate change.					
(2) The use of energy-saving appliances* contributes to the reduction of environmental pollution.					

(3) Overall, energy-saving appliances* are environmentally friendly.

(4) I find it important to be conscious about my energy behaviour.

(5) I find it important to save energy.

(6) I find it important to use more sustainable energy.

(7) We must reduce energy consumption to solve climate problems.

(8) I am very concerned about climate change.

(9) I have a personal responsibility to help to solve environmental problems.

(10) Everyone should do whatever they can to protect the environment.

(11) I buy environmentally friendly products if possible.

Below you will be given some statements about financial attitudes regarding energy-saving in your household, please indicate your corresponding agreement.

Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

(1) I am willing to pay more money to purchase energy-saving appliances as opposed to regular appliances.	
(2) For me, the purchase of an energy-saving device is worth it, despite the high price.	
(3) I am willing to purchase energy-saving appliances at a high price.	
(4) The purchase of energy-saving devices is of great importance.	
(5) Purchasing energy-saving appliances is a wise move.	
(6) Purchasing energy-saving appliances is pleasant.	

Below you will be given some statements about altruistic behaviour, please indicate your corresponding agreement. Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Never	Once	More than once	Often	Very often
(1) I have helped push a stranger's car out of the snow.					
(2) I have given directions to a stranger.					
(3) I have made a change for a stranger.					
(4) I have given money to charity.					

(5) I have given money to a stranger who needed it (or asked me for it).

(6) I have donated goods or clothes to a charity.

(7) I have done volunteer work for a charity.

(8) I have donated blood.

(9) I have helped carry a stranger's belongings (books, parcels, etc.).

(10) I have delayed an elevator and held the door open for a stranger.

(11) I have allowed someone to go ahead for me in a lineup (at Xerox machine, in the supermarket).

(12) I have given a stranger a lift in my car.

(13) I have pointed out a clerk's error (in a bank, at the supermarket) in undercharging me for an item.

(14) I have let a neighbour whom I didn't know too well borrow an item of some value to me (e.g. a dish, tools, etc.)

(15) I have bought 'charity' Christmas cards deliberately because I knew it was a good cause.

(16) I have helped a classmate who I did not know that well with a homework assignment when my knowledge was greater than his or hers.

(17) I have before being asked, voluntarily looked after a neighbour's pets or children without being paid for it.

(18) I have offered to help a handicapped or elderly stranger across a street.

(19) I have offered my seat on a bus or train to a stranger who was standing.

(20) I have helped an acquaintance to move households.

Below you will be given some statements about empathic behaviour, please indicate your corresponding agreement. Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Never	Rarely	Sometimes	Often	Always
(1) When someone else is feeling excited, I tend to get excited too.					
(2) Other people's misfortunes do not disturb me a great deal.					
(3) It upsets me to see someone being treated disrespectfully.					
(4) I remain unaffected when someone close to me is happy.					
(5) I enjoy making other people feel better.					
(6) I have tender, concerned feelings for people less fortunate than me.					
(7) When a friend starts to talk about his/her problems, I try to steer the conversation towards something else.					
(8) I can tell when others are sad even when they do not say anything.					
(9) I find that I am "in tune" with other people's moods.					
(10) I do not feel sympathy for people who cause their own serious illnesses.					
(11) I become irritated when someone cries.					
(12) I am not really interested in how other people feel.					
(13) I get a strong urge to help when I see someone who is upset.					
(14) When I see someone being treated unfairly, I do not feel very much pity for them.					

(15) I find it silly for people to cry out of happiness.

(16) When I see someone being taken advantage of, I feel kind of protective towards him/her.

Below you will be given some statements about risk behavior regarding energy-saving in your household, please indicate your corresponding agreement.

Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Response efficacy					
(1) Energy-saving within households prevents climate change.					
(2) Energy-saving within households works in stopping climate change.					
(3) Energy-saving within households is effective in fighting climate change.					
Self-efficacy					
(1) I am able to save energy within my household.					
(2) It is easy to save energy within my household.					
(3) I can save energy within my household.					
Susceptibility					

(1) I am at risk because of climate change.

(2) It is possible that I will experience the effects of climate change.

(3) I think i will experience side-effects of climate change.

Severity

(1) Climate change has severe negative consequences.

(2) Climate change is extremely harmful.

(3) Climate change is a severe threat.

Below you will be given some statements about perceived competence regarding energy-saving in your household, please indicate your corresponding agreement.

Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
(1) Each person's behavior can have a positive effect on society by signing a petition in support of promoting the environment.					
(2) I feel I can help solve natural resource problems by conserving water and energy.					

(3) I can protect the environment by buying products that are environmentally friendly.					
(4) I feel capable of helping solve environmental problems.					

Below you will be given some statements about the extent of collectivism that you feel, please indicate your corresponding agreement.

Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
(1) Working hard for the goals of my group, even if it does not result in personal recognition is important to me.					
(2) Being a co-operative participant in group activities is important to me.					
(3) Readily helping others in need of help is important to me.					

Below you will be given some statements about changing and changes, please indicate your corresponding agreement.

Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**

(1) I generally consider changes to be a negative thing.

(2) I'll take a routine day over a day full of unexpected events any time.

(3) I like to do the same old things rather than try new and different ones.

(4) Whenever my life forms a stable routine, I look for ways to change it.*

(5) I'd rather be bored than surprised.

(6) If I were to be informed that there's going to be a significant change regarding the way things are done at school/work, I would probably feel stressed.

(7) When I am informed of a change of plans, I tense up a bit.

(8) When things don't go according to plans, it stresses me out.

(9) Often, I feel a bit uncomfortable even about changes that may potentially improve my life.

(10) When someone pressures me to change something, I tend to resist it even if I think the change may ultimately benefit me.

(11) I sometimes find myself avoiding changes that I know will be good for me.	
(12) I often change my mind.	
(13) I don't change my mind easily.	
(14) Once I've come to a conclusion, I'm not likely to change my mind.*	
(15) My views are very consistent over time.	

***items are reversed and therefore recoded.**

Below you will be given some statements about trust in scientists, please indicate your corresponding agreement.

Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
(1) When scientists change their mind about a scientific idea it diminishes my trust in their work.*					
(2) Scientists ignore evidence that goes against their work.*					
(3) Scientific theories are weak explanations.*					
(4) Scientists intentionally keep their work secret.*					

(5) We can trust scientists to share their discoveries even if they don't like their findings.

(6) Scientists don't value the ideas of others.*

(7) I trust the work of scientists to make life better for people.

(8) Scientists don't care if non-scientists understand their work.*

(9) We should trust the work of scientists.

(10) We should trust that scientists are being honest in their work.

(11) We should trust that scientists are being ethical in their work.

(12) Scientific theories are trustworthy.

(13) When scientists form a hypothesis they are just guessing.*

(14) People who understand science more have more trust in science.

(15) We can trust science to find the answers that explain the natural world.

(16) I trust scientists can find solutions to our major technological problems.

(17) We cannot trust scientists because they are biased in their perspectives*.

(18) Scientists will protect each other even when they are wrong.*

(19) We cannot trust scientists to consider ideas that contradict their own*.

(20) Today's scientists will sacrifice the well being of others to advance their research.*

(21) We cannot trust science because it moves too slowly.*

***items are reversed and therefore recoded.**

Below you will be given some statements about how your energy-saving behaviour, please indicate your likelihood of conducting this behaviour.

Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	Never	Rarely	Sometimes	Usually	Always
(1) How often do you turn off the lights when leaving a room?					
(2) How often do you turn off computer monitors when you are not at your desk?					
(3) How often do you turn off other non-essential electrical equipment?					
(4) How often do you switch off standby modes of appliances or electronic devices?					

(5) How often do you turn things off completely, rather than to a "standby" mode.	
(6) How often do you cut down on heating or air conditioning to limit energy use?	
(7) How often do you turn off the TV when leaving a room?	
(8) How often do you limit your time in the shower in order to conserve water?	
(9) How often do you wait until you have a full load to use the washing machine or dishwasher?	
(10) How often do you discuss energy use in meetings?	
(11) How often do you leave items plugged in, even when they've finished charging?	

Statement	**Hot**	**Warm**	**Cold**
(7) At which temperature do you wash most of your clothes?			

Below you will be given some statements about how you perceive yourself in regard to the environment, please indicate your corresponding agreement.

Remember: There are no right or wrong answers. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Statement	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**

(1) I have a lot in common with other environmentalists.

(2) I feel strong ties to other environmentalists.

(3) I find it difficult to form a bond with other environmentalists.

(4) I don't feel a sense of being 'connected' with other environmentalists.

(5) I often think about the fact that I am an environmentalist.

(6) Overall, being an environmentalist has very little to do with how I feel about myself.

(7) In general, being an environmentalist is an important part of my self-image.

(8) The fact that I am an environmentalist rarely enters my mind.

(9) In general, I'm glad to be an environmentalist.

(10) I often regret that I am an environmentalist.

(11) I don't feel good about being an environmentalist.

(12) Generally, I feel good when I think about myself as an environmentalist.

(13) Acting environmentally friendly is an important part of who I am.

(14) I am the type of person who acts environmentally friendly.

(15) I see myself as an environmentally-friendly person

Below you will be given a statement about political orientation, please indicate your corresponding agreement. Remember: There is no right or wrong answer. Please ask yourself critically, what choice fits you best. Be as honest as you can.

Q29: In political matters, people talk of 'the left' and 'the right'. How would you place your views on this scale, generally speaking?

- **On a five-point Likert-scale (1=left, 5=right)**

Appendix E

Debriefing and final message:

Thank you for your time and participation!

The aim of the study was to find possible underlying factors of energy-saving behaviour. These underlying factors were: environmental attributes; financial concerns; altruism; empathy; risk perception (PMT); consumer effectiveness; collectivism; resistance to change; trust in science; identity; and lastly, political orientation.

If you have any further questions or are interested in the results of the study, feel free to send an email to Elena Niehoff: e.niehoff@student.utwente.nl, Sophie Weigandt: s.weigandt@student.utwente.nl or Milou Poort; m.h.j.poort@student.utwente.nl.

Contact details for complaints about the research: Lyan Kamphuis-Blikman; l.j.m.blikman@utwente.nl

Please share the link with others! Thank you very much!

Your response has been recorded.