Increasing energy efficiency in households: An analysis on predictors of energy-saving behaviour

Bachelor thesis

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Abstract: At the hand of increased energy demand, global warming and climate change have become severe challenges for humankind worldwide. It becomes crucial to reduce the energy use of individuals to cope with this crisis. Therefore, a better understanding of psychological determinants that stimulate energy-saving behaviour is needed.

This research studied the connection between seven constructs that were determined to impact an individual's intention to save energy.

A quantitative questionnaire survey design was utilised to examine the connection between Threat and Coping (PMT theory), Perceived consumer effectiveness (PCE), Collectivism, Resistance to change, Trust in Science, Political orientation, and energy-saving behaviour. The total sample consisted of 152 participants. Multiple regression analysis was performed to see if the constructs could predict energy-saving behaviour in households.

Regression analysis showed that Perceived consumer effectiveness and Political orientation were antecedents of a household's energy saving behavior. Indicating that higher Perceived consumer effectiveness can lead to more energy-saving behaviour in individuals, whereas a right-wing political orientation can induce less energy-saving behaviour in individuals.

The findings of the study contribute to the understanding of psychological determinants' influence on energy-saving behaviour. In addition, a new scale for measuring energy-saving behaviour in households has been developed, which can be used in further research.

Keywords: Pro-environmental behaviour; Household energy consumption; Household energy conservation; Energy-saving behaviour; Behaviour; Antecedents; Protection Motivation theory; Threat; Coping; Perceived consumer effectiveness; Collectivism; Resistance to change; Trust in science; Political orientation

Introduction

Global warming and climate change have become serious global issues as a result of growing energy consumption. This global energy demand has arisen due to the economic growth and growth in the world population (Jakucionyte-Skoiene, Dagilute, Lobikiene, 2019; Zohuri, 2020).

To combat this climate change, the European Union (EU) has formulated the Climate Act, which entails that every European country must compose goals to reduce climate change. One of the goals of this Climate Act is to make more use of renewable energy. The EU plans to double renewable energy from 32% to 65% by 2030 (European Parliament, n.d.). Besides, the European Parliament's Energy Union aims to improve energy efficiency, reduce dependence on energy imports, and promote research in low-carbon and clean energy technologies (European Parliament, n.d.).

While the European parliament wants to improve energy efficiency and reduce dependence on energy imports, the demand for electricity and energy is still increasing. The primary production of energy in the EU in 2018 was 635 million tons of oil equivalent, which was 1.1% lower than in 2017 (Eurostat, 2020). In 2018, the global energy consumption increased by 2.3%, while the rate of improvement in energy efficiency descended for the fourth year in a row (Hub, n.d.). It indicates that primary energy production decreased, but global energy consumption increased. The European Parliament intends to decrease energy consumption and promote energy efficiency when the numbers show that energy efficiency improvements stagnate and energy demand increased (Hub, n.d.).

A substantial amount of energy is consumed by households. In 2017, European households accounted for 27.2% of the final energy consumption in the EU (Eurostat, 2019). The primary use of energy in households is for heating (64.1%). In addition, electricity use for lighting and electrical appliances contains 14.4%, while water heating uses 14.8%. The combination of heating and water represents 78.9% of the energy used by households (Eurostat, 2019). On average, a Dutch household consumes 1.269 m3 gas and 2.765 kWh electricity per year (MilieuCentraal, n.d.), while an average household in the United Kingdom uses around 3.731 kWh per year (Topping, 2021). Large consumers in households are electrical heaters, air conditioners, large television screens, dryers, and dishwashers (Essent, 2019). Since a substantial amount of energy is used in households, getting households to minimise their use can aid in battling climate change.

In order to reduce energy consumption in households, habitants would have to engage in energy-saving behaviours. Energy-saving behaviour in households are the behaviours by which individuals try to reduce overall energy (electricity) use in their household (Sweeney et al., 2013). Examples of these behaviours are lessening behaviours and efficiency behaviours in households. Lessening behaviours are behaviours that save energy through reduced use, like turning off lights when not in use or reducing the use of appliances (Boudet et al., 2016). In contrast, efficiency behaviours refer to structural changes that require investments and costs, which means long-lasting energy conservation effects. Examples of efficiency behaviours are purchasing energy-efficient equipment such as a LED light bulb or intelligent thermostats (Boudet et al., 2016). This research included both lessening and efficiency behaviours in the overall term energy-saving behaviour.

As energy use should be minimalised in order to, e.g., reduce pollution, and therefore combat climate change, this study focuses on the possible determinants of energy-saving behaviour in households. As a result, this paper will focus on the question: 'which determinants are antecedents of energy-saving behaviour in the household?'

Theoretical framework

In an attempt to grasp what leads people to energy-saving behaviour, it is essential to know which antecedents and theoretical models could improve or condemn it. Past research has used different antecedents and models to disclose energy-saving behaviour. This study will focus on the protection motivation theory and the antecedents: Threat, Coping, Perceived consumer effectiveness, Collectivism, Resistance to change, Trust in science, and Political orientation.

Protection Motivation theory

In order to explain possible feelings of Threat and Coping of individuals towards energy-saving behaviour in households, the Protection Motivation Theory (PMT) is used. The Protection Motivation Theory (PMT) can explain how individuals perceive the need for energy reduction based on their risk perception of climate change. It is assumed that cognitive processes underlying threat and response can assess whether an individual might engage in pro-environmental behavioural changes (Maddux & Rogers, 1983). In addition, a specific attribute of the PMT is that it supposes that people consider current behaviours and their anticipations of new environmentally friendly behaviour in terms of respective costs and

rewards when deciding to show pro-environmental behaviour (Shafiei & Maleksaeidi, 2020). The theory has the underlying assumption that two cognitive processes impact protection motivation in reaction to a threat such as climate change (Rainear, & Christensen, 2017). These two processes are Threat and Coping. The Threat consists of the perceived severity and perceived vulnerability, whereas Coping consists of the perceived response efficacy and the perceived self-efficacy (Maddux & Rogers, 1983). People determine their threat and coping for climate change and decide whether action is needed or not. In Threat, they establish if climate change is perceived as severe and if individuals believe they are personally at risk of undergoing the harmful effects of climate change first-hand (Rainear, & Christensen, 2017). For Coping, response efficacy refers to the individual beliefs of avoiding the threat by taking (recommended) action, and self-efficacy refers to whether an individual perceives themself capable of performing the recommended action (Rainear, & Christensen, 2017). The opinions on Threat and Coping lead to a particular behaviour intention and the actual behaviour. Martens and Rost (1998) provided evidence that a higher intention to perform environmentally-friendly behaviour correlates with a higher perceived response efficacy. This theory predicts that Threat and Coping processes form the way an individual can think about climate change and consequently might influence energy-saving behaviour in households.

Hypothesis 1: Perceived Threat (Severity and Susceptibility) is an antecedent of energy-saving behaviour in households.
Hypothesis 2: Perceived Coping (Self-efficacy and Response efficacy) is positively associated with energy-saving behaviour in households.

Perceived consumer effectiveness

Essential for energy-saving behaviour is knowing whether individuals perceive that they are able to save energy in their households. Therefore, perceived consumer effectiveness (PCE) will be studied to discover whether individuals perceive that they can make a difference in combatting climate change and reducing energy. Perceived consumer effectiveness measures the extent to which people believe that their behaviours and actions can make a difference in solving a problem (Segev, 2015). The concept of PCE is similar to the self-efficacy of the social learning theory and is situation-specific (Bandura, 1986). Perceived consumer effectiveness is a strong predictor of pro-environmental behaviour (Arias & Trujillo, 2020). Kim and Choi (2005) found that individuals with a higher PCE were more likely to engage in ecological consumption than those with a lower PCE. An explanation for this is that

individuals are more likely to act if they perceive their actions can impact the situation. Hence, if people feel concerned about climate change but perceive that their actions cannot lead to change, they will be less likely to engage in these activities (Segev, 2015). Lee et al. (2019) concluded that PCE is positively related to environmental activism. Since PCE is positively related to pro-environmental behaviours, this might also increase energy-saving behaviour within households.

Hypothesis 3: Perceived consumer effectiveness (PCE) has a positive effect on energy-saving behaviour in households.

Collectivism

Next to individuals' perceptions that they might be able to make a change, such as PCE, it might be interesting to know whether individuals differ in their energy-saving behaviour when they focus on society's views or their own opinions. Individuals might feel that their actions cannot solve climate change, but individuals with a higher level of collectivism view climate change as a collective mission and could be more pro-environmental (Xiang et al., 2019). Therefore, the level of collectivism will be studied. Individuals with a collectivistic worldview believe that societal interests should come before individual interests and that society is responsible for securing conditions that individuals need to thrive (Seveg, 2015). The focus of collectivism is on interdependence, consensus, and prioritising group goals over the goals of an individual (Segev, 2015). Numerous studies have found that being individualistic or collectivistic has an impact on several social behaviours. Hwang and Kim (2007) found a direct influence of collectivism on social norms. It is expected that the higher the level of society's collectivism, the higher the concern for the environment will be (Higueras-Castillo et al., 2019). Individuals with a collectivistic worldview are more prone to concerned reactions to environmental degradation and the risk of climate change (Seveg, 2015). Therefore, individuals who mostly take an individualistic view tend to be more sceptical of environmental risks. The quality of the environment is considered a collective or public resource that can only be persevered if people want to cooperate for this collective good (Higueras-Castillo et al., 2019).

Since the outcomes of energy-saving behaviours are more likely to benefit society than the individual, collectivism might be a value significant to pro-environmental behaviours and energy-saving behaviour (Segev, 2015). Pinto et al. (2011) explained that socially-oriented individuals are more concerned about the influence of their decisions and behaviours

on society, which leads to being more engaged with environmental thinking. Previous research by McCarthy and Shrum (2001) implied a positive relationship between collectivism and pro-environmental attitudes. Collectivistic individuals are more likely to engage in pro-environmental behaviours because they tend to be more cooperative, more willing to help others, and emphasise group goals over personal ones (Kim & Choi, 2005). Since battling climate change might be a threat to all of society, this focus on group goals might affect the level of energy-saving in households.

Hypothesis 4: Collectivism is positively associated with energy-saving behaviour in households.

Resistance to change

In order to get individuals to reduce energy in the household, a change of behaviour is needed. A resistance to change behaviour can influence the level of energy-saving behaviour in households. A factor of resistance to change is that individuals do not want to give up their comfortable lifestyle. Lifestyle and habit are two of the main factors determining energy consumption behaviour (Zhang, & Li, 2014). Resistance to change contains keeping the status quo or the persistence to avoid change (Pardo del Val & Martínez Fuentes, 2003). A lot of energy in households is used for lifestyle- and luxury choices, such as TV, dishwashers, information and communication equipment (e.g., phones, laptops), and air conditioning (Thøgersen, 2017). Higher luxury in houses tends to lead to higher energy usage.

Expectations of comfort in households via central heating or air conditioning have become the norm. Individuals see a need for reducing energy consumption but want to maintain a comfortable and healthy household environment (Ortiz et al., 2017). For energy-saving, this means that if a change occurs, that produces discomfort, people will react in ways that tend to restore their comfort (Ortiz et al., 2017). This restoring of comfort might lead to rebound effects or resistance to change altogether, which could affect the energy-saving behaviour of residents.

Hypothesis 5: Resistance to change is negatively associated with energy-saving behaviour in households.

Trust in science

In order to motivate individuals to save energy in their households to fight climate change, the level of trust individuals have in scientists and climate change might influence their intent to save energy. Borick and Rabe (2012) discovered that of those who do not believe in global warming, eight out of ten believe that scientists are overstating evidence about climate change for their interests. Compared to individuals who believe in global warming, only three out of ten believe that scientists are overstating the case (Borick, & Rabe, 2012). Trust is a psychological state determined by positive expectations about the reliability of energy-saving products (Park, & Kwon, 2017). Clayton et al. (2015) declare that the effect of information provision depends on the sources of information and how people evaluate these sources. In other words, information has a higher chance of changing beliefs and behaviour if people rate the source favourably and have confidence in the source (Clayton et al., 2015). The beliefs about climate change science are formed partly by the extent of trust in climate change science and the institutions that produce such science. If an institution is mistrusted, society will still reject most reliable results (Scheman, 2001). Thus, if trust in science is low, one might be less likely to accept the idea of climate change, and the intent to reduce energy could decrease.

Hypothesis 6: Trust in science is positively associated with energy-saving behaviour in households.

Political orientation

Since believing in climate change might affect energy-saving behaviour, this study also focuses on the Political orientation of household residents. The link between right-wing political orientation and climate change denial is substantially studied (Jylhä, Strimling, & Rydgren, 2020). Political orientation is defined as identification with one of the political parties spread out on the political spectrum (Pellegrini et al., 1997). Right-wing populist parties often challenge sustainable energy transformations by taking positions on climate change that place them outside the political mainstream. According to these parties, climate-change politics are only legitimate if they aid the nation and their core people directly or exclusively (Fraune, & Knodt, 2018). In addition, right-wing parties mostly object to recognise human-caused climate change, compared to left-wing parties (Hoffarth & Hodson, 2016). Serious concern for environmental risks has been associated with left-leaning political ideology, whereas lower concern for environmental risks associates with a right-leaning ideology (McCrea, Leviston, & Walker, 2016).

Right-wing parties and left-wing parties do have different values. A common characteristic of populist right-wing parties, leaders, or movements is the non-acceptance of pluralism, and the representation of the people who feel betrayed by elites (politicians, government, media, among others) deemed corrupt or morally inferior (Schaller & Carius, 2019). Anger and fear towards the elites often come from long-standing social disappointments about inequality of market liberalisation, perceived threats to wealth, one's culture, security, and steadiness (Schaller, & Carius, 2019). For example, right-wing parties might fear that higher electricity prices will influence the economic market and threaten their wealth. These higher electricity prices can lead to economic insecurity, which denounces the free market idea for businesses that right-wing parties have (Gromet et al., 2013).

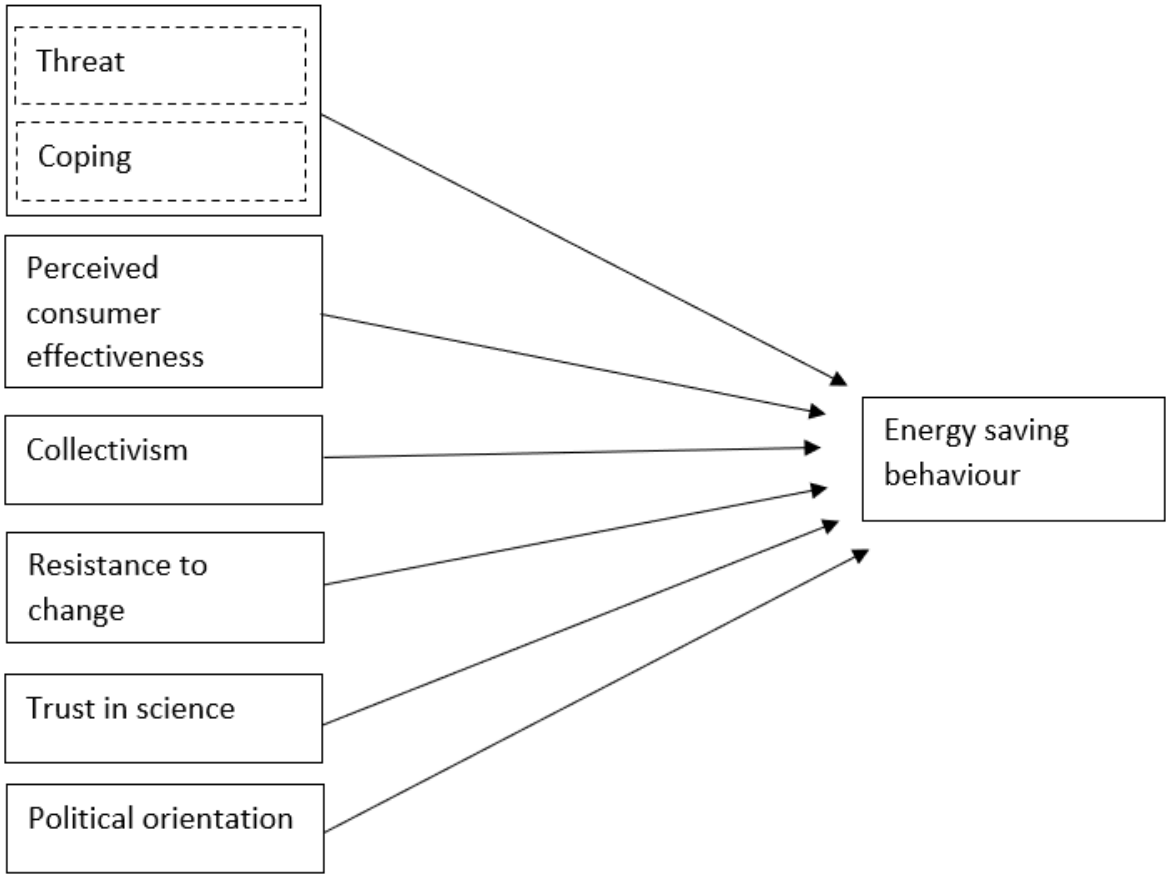
On the other hand, left-wing parties favour minority groups, question the status quo and seek unprejudiced reforms. Left-oriented individuals are 'more open-minded in pursuing creativity, novelty, and diversity (Kandler et al., 2012). Voting for populist parties (on the left and right) is predicted by low socio-economic status, low levels of trust, strong protest attitudes and external political efficacy, and high levels of Euroscepticism (Spruyt et al., 2016). Thus, political orientation relates to climate change, with different opinions from right- and left-wing parties, which could consequently impact households' intention to save energy.

Hypothesis 7: Political orientation negatively affects energy-saving behaviour in households.

Conceptual model

Figure 1

Visualisation of the determinants researched in connection to energy-saving behaviour.



Methods

Design & Participants

A quantitative questionnaire was utilised to examine the connection between the determinants and electricity-saving behaviour. A priori power analysis on the program G power was done to examine the required sample size for achieving significant results (Faul et al., 2009). For the regression analysis (Effect size $f^2 = 0.15$, α error probability = 0.05, power (1-β error probability) = 0.80, number of predictors = 7) a required sample sized of at least 103 participants was estimated, with an actual power of 0.80.

The total sample consisted of 202 participants. Incomplete responses with less than 95% complete were deleted. After this, the sample consisted of 152 participants. The participants were composed of 100 females (65.8%) and 52 males (34.2%) between the ages 18 and 65 (M = 30.20, SD = 12.00). Further, 55 Dutch (36.2%), 82 German (53.9%), and 14 students (9.2%) with different nationalities (e.g., Finnish, American, or Italian) participated in the questionnaire. Of all participants, 54 (35.5%) finished High school, 10 (6.6%) Trade school, 59 (38.8%) had a bachelor's degree, 25 (16.4%) a master's degree, 1 (0.7%) a PhD or higher, and 3 (2.0%) preferred not to say. In addition, 75 of the participants were students (49.3%), with 42 indicating that they had a part-time job (27.6%) and 33 without a part-time job (21.7%). Another 53 participants noted that they worked full-time (34.9%) and 18 participants part-time (11.8%). At last, 5 participants were currently non-employed (3.3%). The other demographics are shown in table 1.

Table 1
Demographic Data of the Participants. Number of Participants (N) =152

Demographics	Frequency (%)
Study program (N=75)	
Business studies and Public Policy	10 (6.6)
Engineering and Technology	6 (3.9)
Information Technology	2 (1.3)
Life sciences and Medicine	7 (4.6)
Natural sciences	4 (2.7)
Social sciences	43 (28.3)
Prefer not to say	3 (2.0)
Study year (N=75)	
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 person	24 (15.8)
2 persons	46 (30.3)
3 persons	34 (22.4)
4 persons	33 (21.7)
5 persons	8 (5.3)
6 persons or more	6 (3.9)
Prefer not to say	1 (0.7)
Household composition	
Single household	24 (15.8)
Single parent	1 (0.7)
Couple household with children	35 (23.0)
Couple household without children	37 (24.3)
Shared household with family	24 (15.8)
Shared (student) household	30 (19.7)

Note. Frequencies of study program and study year differ from N = 152 since not all participants were students.

Procedure

Prior to conducting the study, the BMS Ethics Committee (EC) of the University of Twente approved the design on April 9th, 2021. The questionnaire was conducted via the website Qualtrics and spread out by convenience sampling, using social media platforms, such as Facebook, Instagram, and WhatsApp, to reach as many participants as possible.

Further, the questionnaire was uploaded to SONA, where students from the University of Twente were able to sign-up for the study. In total, the questionnaire took approximately twenty minutes to complete. The participants received a link to the questionnaire. Before answering the questions, the participants were requested to read the informed consent form (Appendix A) and needed to agree to the terms and conditions to proceed.

To ensure the anonymity of the participants, the collection of the IP addresses within Qualtrics was turned off. Then, the respondents had 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 (see Appendix B). After that, the participants needed to fill in the questions about the various constructs (Appendix D). More specifically, thirteen different constructs were measured: threat, coping, perceived consumer effectiveness, collectivism, resistance to change, trust in science, energy consumption/conservation behaviour, political orientation, environmental awareness/attitudes[1], financial concerns[1], empathy[1], altruism[1], identity[1].

To measure the various constructs, different scales have been used (see Appendix C). Most scales were measured with a five-point Likert-type scale ranging from (1) 'Strongly disagree' to (5) 'Strongly agree.' For one scale, namely the Energy-saving behaviour scale, a five-point Likert scale ranging from (1) 'Never' to (5) 'Always' was used. Participants could not proceed to the next question if they did not answer the previous question. Thereby, it ensures that participants answered the questions needed for the analysis. 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.

Threat and Coping

Threat and Coping were measured using the Risk behaviour diagnosis scale (Witte, 1996) (see Appendix C). Each subscale was composed of three items. A Cronbach's alpha of .89 for Threat and a Cronbach's alpha of .70 for Coping were calculated. Therefore, the individual items were recoded into an overall Threat and overall Coping construct. For example, one of the statements for Coping was: 'Energy-saving within households prevents climate change.' For Threat, a statement was: 'I am at risk because of climate change.' The complete list of items can be found in Appendix C.

Perceived consumer effectiveness

To measure perceived consumer effectiveness, the consumer effectiveness scale is used (Segev, 2015). The scale indicated the reliability of Cronbach's alpha of .78. Furthermore, the individual items were recoded into an overall Perceived consumer effectiveness construct. The consumer effectiveness scale consists of four items, namely (1) Each person's behaviour 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.

Collectivism

To measure the level of Collectivism, a three-item scale was used. This scale is based upon the Collectivism scale of Segev (2015). A Cronbach's alpha of .78 was found. Therefore, the individual items were recoded into an overall Collectivism construct. The scale contains statements like (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 cooperative participant in group activities is important to me, and (3) readily helping others in need of help is important to me.

Resistance to change

Furthermore, to collect data on Resistance to change, the Resistance to Change Scale is based upon. This scale has 15 items to check if an individual is resistant to change (White et al., 2020). The study found a Cronbach's alpha of .83, and therefore the individual items were recoded into an overall Resistance to change construct. Examples of this scale are (1) I generally consider changes to be a negative thing, (2) when I am informed of a change of

plans, I tense up a bit, (3) my views are very consistent over time. The complete list of items can be found in Appendix C.

Trust in science

For the construct Trust in science, the 21-item Trust in Science and Scientists Inventory was implemented (Nadelson et al., 2014). A Cronbach's alpha of .91 was found. Therefore, the items were recoded into the overall construct of Trust in science. Examples of these statements are (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) we can trust scientists to share their discoveries even if they do not like their findings. The complete item list can be found in Appendix C.

Energy-saving behaviour

To measure energy-saving behaviour within households, the Conservation sub-scale of the Pro-Environmental Behaviour Scale (PEBS) has been used (Markle, 2013). A five-point scale has been used for the first six items from (1) 'never' to (5) 'always.' 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? Further, the scale has been extended to include six more items based on the scale for current behaviour (Zierler et al., 2017). Some items were 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 have finished charging? Since the item 'At which temperature do you wash most of your clothes?' negatively influenced the Cronbach's alpha, this item is deleted (see table 2). Accordingly, the combined items had a Cronbach's alpha of .71, and the individual items were recoded into an overall Energy-saving behaviour construct. The newly constructed scale has been named the Energy-saving Behaviour Scale.

Table 2

The 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

Lastly, to measure whether participants are left-wing or right-wing oriented, a single item has been used. Participants needed to indicate their political orientation on a scale from 1 (left) to 5 (right). Watkins et al. (2016) found good test-retest reliability for this item. A similar item is used by Kroh (2007) and Bauer et al. (2017).

Debriefing

The survey ended with a thank you note (see appendix E). Students from the University of Twente, who signed up through SONA, were granted credit points after successful participation. Apart from that, participants did not receive any incentive for finishing the questionnaire (e.g., money).

Results

Correlations

To assess the relationship between the demographic variables and household energy-saving behaviour, correlation analysis with Spearman's rho was done, which found no significance for age, education, study year, and household size.

Comparing the other demographics and constructs, there was a correlation between Age and Collectivism. This indicates that higher age results in a lower feeling of Collectivism. Another high positive correlation is between Political orientation and Collectivism. This means that the higher level of Political orientation (*1 = left, 5 = right*), the less collectivism there is. In addition, Trust in science correlated positively with Threat. Higher trust in science related to a higher feeling of Threat. Another high positive correlated finding was between Coping and Perceived consumer effectiveness. This indicates that a higher feeling of Coping increases Perceived consumer effectiveness (See table 3).

When looking at the constructs in relation to energy-saving behaviour, the correlations were analysed by Pearson correlation. A positive correlation was found between Threat and Energy-saving behaviour. This indicates that a higher threat level shows a higher energy-saving behaviour in households. Next to that, a positive correlation between Coping and energy-saving behaviour was found. The correlation shows that the higher the feeling of coping is for an individual, the more energy-saving behaviour might be expected. In addition, a positive correlation between Perceived consumer effectiveness and energy-saving behaviour was found. Thus, for this construct, the energy-saving behaviour might increase for the level of Perceived consumer effectiveness that individuals feel.

Furthermore, a positive correlation was found between Collectivism and energy-saving behaviour. This correlation can explain the influence of collectivism on the energy-saving behaviour of individuals, which means that the higher the feeling of collectivism is, the more energy-saving behaviour can be expected. To assess whether being right-wing-oriented could affect energy-saving behaviour, a significant negative correlation was found for Political orientation and energy-saving behaviour, indicating that for a higher level of Political orientation (*left = 1, right = 5*), less energy-saving behaviour might occur. Furthermore, no significant correlation was found between Resistance to change and energy-saving behaviour. In addition, a negative non-significant correlation was found between Trust in science and energy-saving behaviour (see table 3).

Table 3

Means (M), Standard deviations (SD), and Correlation of the Demographics and Constructs (N =152)

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
r/r_s			r_s	r_s	r_s	r_s	r	r	r	r	r	r	r	r
Age[1]	30.16	11.95												
Education[2]	2.39	1.16	**.46****											
Study year[3]	3.27	1.37	**.68****	**.71****										
Household size[4]	2.82	1.31	-.16*	-.21**	-.25*									
Energy-saving behaviour[5]	3.48	0.51	-.03	-.11	-.05	.07								
Threat[6]	4.18	0.68	-.23**	-.13	.16	.08	.21**							
Coping[7]	3.73	0.53	.01	-.09	-.18	.19**	.29**	**.31****						
PCE[8]	3.72	0.68	-.05	.12	-.08	.12	**.31****	.17*	**.62****					
Collectivism[9]	4.05	0.59	-.27**	-.13	-.03	.14*	.20**	**.43****	**.33****	.27**				
Resistance to change[10]	2.81	0.49	<-.01	-.11	-.04	.04	-.10	-.10	-.03	-.02	-.14*			
Trust in science[11]	3.76	0.46	-.22**	-.07	.21*	<-.01	.10	**.44****	.10	.04	.20**	-.14*		
Political orientation[12]	2.45	0.87	.16*	.02	.02	.05	-.29**	**-.38****	-.27**	**-.35****	**-.38****	.13	-.29**	

Note. Bold front 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

This study used multiple linear regression to predict the energy-saving behaviour of individuals based upon Threat, Coping, PCE, Collectivism, Resistance to change, Trust in science, and Political orientation (see table 4).

The overall model fit was $R^2 = 0.12$. This indicates that the model's input can explain only 12% of the observed variation. Therefore, the constructs counted for 12% of the explained variance on energy-saving behavior in households.

For the independent variables in the multiple regression analysis, it was tested whether there is a significant relationship with energy-saving behaviour with all the other independent variables included in the model. This study considered $p < 0.1$ a marginally significant result.

First, no significant relationship was found between the construct of Threat and energy-saving behaviour ($\beta = 0.08$, $t = 0.81$, $p = .42$). Thus, hypothesis 1 was rejected.

Secondly, there is no significant relationship found between Coping and energy-saving behaviour ($\beta = 0.11$, $t = 1.03$, $p = .31$). Therefore, hypothesis 2 was not confirmed.

Furthermore, a marginal significance was found for the relationship between PCE and energy-saving behaviour in households ($\beta = 0.18$, $t = 1.73$, $p = .09$). This relationship shows that a higher amount of PCE leads to an increase of 0.18 in the likelihood of showing energy-saving behaviour. This states that PCE might be a predictor of energy-saving behaviours in households. Therefore, hypothesis 3 was accepted.

For Collectivism, no significant relationship with energy-saving behaviour was observed ($\beta = 0.02$, $t = 0.19$, $p = .85$). Therefore, hypothesis 4 were not accepted.

No significant relationship was found for Resistance to change and energy-saving behaviour ($\beta = -0.06$, $t = -0.81$, $p = .42$). Hypothesis 5 was not confirmed.

In addition, no significant relationship was found between Trust in science and energy-saving behaviour ($\beta = -0.01$, $t = -0.07$, $p = .94$). This means that hypothesis 6 was rejected.

Furthermore, a marginally significant relationship was found between Political orientation and energy-saving behaviours ($\beta = -0.16$, $t = -1.78$, $p = .08$). For Political orientation, it was found that the level of energy-saving behaviour decreased for a higher level of Political orientation (1 = left, 5 = right). Thus, individuals that are more right-wing-oriented are less likely to perform energy-saving behaviour. Thus, hypothesis 7 can be accepted.

Since there are two marginally significant results, it confirms that these constructs might affect the prediction of energy-saving behaviour. For the other non-significant constructs, the relationship with energy-saving behaviour cannot be confirmed.

Table 4

Multiple regression analysis of Resistance to change, Trust in science, Threat, Coping, PCE, Collectivism, and Political orientation.

Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	2.760	.624		4.426	.000
	Threat	.058	.072	.077	.806	.421
	Coping	.100	.097	.105	1.028	.306
	PCE	.130	.075	.175	1.726	.086
	Collectivism	.015	.078	.017	.187	.852
	Resistance to change	-.066	.081	-.063	-.808	.420
	Trust in science	-.007	.096	-.006	-.071	.944
	Political orientation	-.095	.053	-.161	-1.776	.078

a. Dependent Variable: Energy saving behaviour

Note. Below 0.1 is taken as marginally significant.

Additional analyses

To explain the non-significant finding of Trust in science and energy-saving behaviour, a further frequency analysis was done with the Trust in science inventory to investigate the answering patterns of participants. With this, the answer pattern possibly could give insights into how participants thought about trust in science and why a possible relation between the constructs was not found. It was checked for every item how often participants indicated ‘completely disagree’, ‘disagree’, ‘neither agree nor disagree’, ‘agree’ or ‘completely agree’. This analysis indicated that for item 2, ‘neither agree nor disagree’ was chosen 65 times (42.8%), whereas the other answering options were less chosen, with ‘agree’ being chosen 49 times (32.2%) and ‘disagree’ was chosen 25 times (16.4%). For item 8, ‘neither agree nor disagree’ was chosen 64 times (42.1%) and ‘agree’ 60 times (39.5%), while ‘disagree’ was

chosen 19 times (12.5%). This frequency analysis showed that ‘neither agree nor disagree’ was often chosen for Trust in science inventory scale items.

Since Trust in science focuses on the beliefs in climate change, it could be the case that political orientation also plays a role in the beliefs on climate change. To know whether these constructs influenced each other in relation to energy-saving behaviour, further analyses were done. To explain this possible interaction effect between Trust in science and Political orientation, the multiple regression was tested for interaction by recoding Trust in science and Political orientation into a new interaction variable, which found no significance ($F(3,152) = 4.73$, $p = .59$). In addition, a multicollinearity analysis was done to check for high intercorrelations between the constructs, but no multicollinearity was detected (Trust in science, tolerance = 0.92, VIF = 1.09, Political orientation, tolerance = 0.92, VIF = 1.09). The analysis can be found in Appendix F.

A factor analysis was done to see the underlying components and see if Coping and Perceived consumer effectiveness have the same underlying factors and thus similarity. The Kaiser-Meyer-Olkin (KMO) value of .71 indicated that the data was adequate for factor analysis. In the factor analysis, all items of the study were examined using varimax rotations. As a result, the Coping and Perceived consumer effectiveness items scored high (primary loadings ranging up to .80) on the same component. In addition, three Coping items too scored high on a different component (primary loadings ranging up to .83); these items focused on being able to save energy within their households. Perceived consumer effectiveness did not score high on that component (ranging from .08 to .21) since the items of PCE focused more on being able to protect the environment from climate change. The complete factor analysis with rotation matrix can be found in Appendix G.

Discussion

This research aimed to investigate possible determinants in predicting energy-saving behaviour in households. To answer the research question: ‘which determinants are antecedents of energy-saving behaviour in the household?’, a quantitative study was conducted, making use of a self-developed questionnaire to assess Threat, Coping, Perceived consumer effectiveness, Collectivism, Resistance to change, Trust in science, and Political orientation. Data shows that Political orientation and Perceived consumer effectiveness can predict energy-saving behaviour in households. Higher Perceived consumer effectiveness induces more energy-saving behaviour in individuals, whereas a right-wing Political orientation can induce less energy-saving behaviour in individuals. However, the data shows

no prediction for energy-saving behaviour based on Threat, Coping, Collectivism, Resistance to change, and Trust in science. Therefore, it cannot be said whether these constructs are predictors of energy-saving behaviour in households. Next to that, the R^2 value was low, which indicates that the constructs only explained a small part of energy-saving behaviour in this model.

The research showed a marginally significant relationship between Perceived consumer effectiveness and energy-saving behaviour. Both the current study and the research of Allen (1982) showed a connection between PCE and energy-saving behaviour, and therefore it can be said that Perceived consumer effectiveness could be an antecedent of energy-saving behaviour of individuals. Since Perceived consumer effectiveness is about the belief that an individual's efforts can make a difference in the solution to a problem, individuals who believe that their efforts do indeed make a difference also intend to show more energy-saving behaviour (Ellen et al., 1991). Individuals must have the idea that their efforts are of value to perform that action. The findings of this study might be promising for energy-saving campaigns. In order to set up campaigns for energy-saving, it might be helpful to recognise the construct of perceived consumer effectiveness. Therefore, this study can help organise campaigns for energy-saving so that individuals feel that their efforts are of value, which can lead to more energy-saving behaviours.

Another marginally significant relationship finding is between Political orientation and energy-saving behaviour. This finding corresponds to Gromet et al. (2013), who showed that more politically conservative (right-wing oriented) individuals were less likely to invest in energy-efficient technology than liberal (left-wing oriented) individuals. Here, the finding was explained in the way that right-wing-oriented individuals are more likely to dismiss concerns about climate change and favour policies that favour free-market for businesses with fewer environmental regulations (Gromet et al., 2013). Protecting the environment is often linked to left-wing policies and often conflicts with right-wing ideology. Therefore, a concern for the environment and energy-saving behaviour is more often linked to left-wing policies, which these study findings support. Dietz et al. (2013) added that conservatism leads to greater support for energy independence and reducing energy costs. It, therefore, means that conservatives are not strictly opposed to energy efficiency per se, but that they are opposed to energy efficiency linked to climate change (Dietz et al., 2013; Whitfield et al., 2009).

For Threat and Coping, the study did not find the expected relationships in this sample. A significant relation between Threat and intention to engage in water conservation

behaviour and green consumerism was found by Kothe et al. (2019). In addition, Kothe et al. (2019) also described a relationship between Coping and homeowners' water conservation intentions. However, for saving energy in households, no relationship was found. In a study about climate change risk perception, a relationship with energy-saving behaviour was found by Lacroix and Gifford (2018). In the study of Lacroix and Gifford (2018), they used the Climate Change Risk Perception index to indicate risk perception without using the constructs Threat and Coping. This scale might fit the risk of climate change and energy-saving behaviour more than the Risk behaviour diagnosis scale used in the current study. The Risk behaviour diagnosis scale was adjusted to this study's research topic, which meant that the items became quite similar to each other. For example, the items 'Energy-saving within households prevents climate change' and 'Energy-saving within households works in stopping climate change' are similar. Therefore, it might be that participants indicated these items as too similar. This similarity could have led them to score both items the same way or to indifferent scoring. Since the adjusted Risk behaviour diagnosis scale items were similar, more variation in items is needed. The Climate Change Risk Perception index can therefore be a more appropriate option for further research.

Since a high correlation was found between Coping and Perceived consumer effectiveness, additional factor analysis has been done to indicate whether these constructs measured the same construct in this study. Factor analysis showed that both Coping and Perceived consumer effectiveness scored high on one component, which means they both measured the level of individuals being able to deal with climate change. The self-efficacy part of Coping relates closely to the perceived consumer effectiveness of an individual.

Nevertheless, the three items of response-efficacy also scored highly on another component, where Perceived consumer effectiveness did not. Therefore, this might indicate that both constructs measured almost the same, but that the response efficacy part of Coping focused more on the perceived effectiveness of individuals' actions to deal with energy-saving in households. In comparison, Perceived consumer effectiveness focused more on the perceived effectiveness of actions in relation to climate change. Response efficacy, therefore, measured something else than both perceived consumer effectiveness and self-efficacy. Since both response efficacy and self-efficacy were part of the Coping component, this might explain a difference between Coping and Perceived consumer effectiveness. This could clarify the fact that Perceived consumer effectiveness found a significant relationship with energy-saving behaviour, while Coping did not. For this reason, the components have been discussed separately in this research.

For Collectivism, no positive relationship with energy-saving behaviour in households was found. This finding might be caused by the usage of the Collectivism scale with only three items. The three items in the Collectivism scale measure the group feeling of an individual, but it is not clear whether one can say that it truly measures Collectivism. For example, one of the questions is 'Readily helping others in need of help is important to me.' This question might indicate a level of Collectivism but can also measure the level of altruism of that individual. When looking at Xiang et al. (2019), they found a relationship between collectivism and climate-friendly behaviour, namely that individualistic-oriented individuals were more prone to environmental inaction. What differed from this current study and the study by Xiang et al. (2019) is that they made use of the 16-item individualism-collectivism scale. This scale is a bipolar scale and focuses on individualism and collectivism, where the current study only focused on collectivism with a three-item scale. From the collectivism scale, it cannot be stated that a low score might indicate individualism. It might be the case that measuring individualism is overlooked in this study. Since Xue et al. (2016) and Xiang et al. (2019) found significant positive relationships between collectivism and pro-environmental behaviours, further research is recommended to use the 16-item individualism-collectivism scale. This scale focuses on individualism and collectivism, meaning that a better distinction can be made whether being individualistic or collectivistic can indicate less energy-saving behaviour. Using more items to test participants on their levels of collectivism is expected to improve construct validity.

Research by El Amri (2020) found that many people do not change behaviour in buying or using more energy-efficient products, even when faced with insistent messages prompting individuals to reduce energy consumption. This resistance to change behaviour in favour of energy-saving is explained by whether the consumer adopts an energy-efficient behaviour and the attribution of the cause of this behaviour to the self or external factors (El Amri, 2020). Most individuals that were resistant to change attributed the cause of their behaviour to external factors. This relation might explain a relationship between being resistant to change and energy-saving behaviour in households, even though this current study did not find significance in the results. A study by Jessen-Hannula (2006) states that most resistance to change energy-saving behaviour is because of financial risks. It was found that citizens of Finland were resistant to change towards energy efficiency because of unwillingness to invest in energy innovations since it is believed to be a financial risk (Jessen-Hannula, 2006). Since financial risks were not part of this study, further research can

investigate whether financial risks might indicate a resistance to change the energy-saving behaviour of individuals in households.

For Trust in science, it was found that high-trust societies were more sustainable than low-trust societies (Rayner, 2010). However, this current study could not find a significant effect between Trust in science and energy-saving behaviour. A factor that might explain no correlation is that participants often responded with 'neither agree nor disagree' in the Trust in science inventory scale. For example, for the items 'scientists ignore evidence that goes against their work' and 'scientists do not care if non-scientists understand their work', more participants indicated 'neither agree nor disagree' than 'agree' or 'disagree'. Hence, there were a lot of conflicting thoughts on this construct. The participants who scored neither agree nor disagree on this item might have different opinions on why they chose the 'neutral' option. Answering neutral can indicate (1) moderate agreement, (2) no opinion, or (3) item is not clear. This research did not indicate a 'no opinion' option. In this case, it cannot be known whether the responses are valid or interpreted (Dalal et al., 2014). It is unspecified whether participants understood the question or had no opinion. This might have diverted the results.

To explain the non-significant finding of Trust in science and energy-saving behaviour, an interaction analysis was done with Political orientation. However, no interaction effect was found, even though studies by McCright et al. (2013) and Pechar et al. (2018) suggested an interaction. Furthermore, a multicollinearity analysis showed no high correlations or effects between the different constructs. Therefore, it cannot be suggested that the relationship between Trust in science and energy-saving behaviour was moderated by Political orientation, despite the fact that Gregersen et al. (2020) discovered political orientation to be a moderating variable in the relationship between beliefs and concern about climate change.

Furthermore, the r-squared value of the research was low (0.12), which indicates that the variance of the constructs explains only a small part of the energy-saving behaviour. Since this number is not extremely low for the social sciences, it still might give valuable insights into variables that also account for energy-saving behaviour in households. One of these variables could be social norms. Bonan et al. (2020) found that households that gain information about their more energy-efficient neighbours and simultaneously learned that energy-saving is a socially recognised value showed a decrease in their energy consumption. Ohnmacht et al. (2017) mentions that the expectations of others can affect energy-saving behaviour, and addressing social norms (in the form of role models, opinion leaders, or

ambassadors) induce energy-reductive behaviours. Other variables that can further predict the energy-saving behaviour in households are individuals' motivation and economic benefits (Mansor & Sheau-Tingi, 2019; Wang et al., 2011).

Strengths

A strong point in this research is that there were recent elections in The Netherlands in March 2021 and upcoming elections in Germany in September 2021, in which relevant topics were climate change and pro-environmental behaviours. Since most participants of this study live in The Netherlands and Germany, the participants may have already considered their ideas on these subjects and their political leanings, and therefore the answers can be considered more trustworthy. Furthermore, for the energy-saving behaviour construct, two scales were intertwined into one overall energy-saving behaviour scale. For this renewed scale, the analysis found good internal consistency. This newly made scale can therefore be used in further studies on the topic of energy-saving behaviour. Another strong point of the study is that a sample of 152 participants was found, where two hypotheses have been confirmed. Therefore, this study can add to the knowledge sustained in this field, and further research can build upon this study.

Limitations

A limitation of this study is that the sample was found by convenience sampling. Participants were family members, friends, and co-workers. Therefore, the sample includes not all interests and motives of the whole population. In addition, the sample was relatively young, namely 30 on average. In this sample, almost half of the participants were students. This number of students limits the study since young adults already have a more profound concern for environmental problems and are more likely to support energy-saving and renewable energy sources (Andor et al., 2018). Therefore, it might be that an older sample could have indicated different ideas about energy-saving behaviour since young adults are more concerned with environmental problems compared to older individuals.

In addition, many participants in the sample are higher educated. McFall and Garrington (2011) found that individuals with higher education are more likely to pay more for environmentally friendly products and to cut back on flying around the world. Potential explanations for this are greater awareness of environmental problems and the effect of education on income and hence the ability to pay. In addition, the willingness to pay more for products is highly associated with higher education (McFall & Garrington, 2011). This

connection might indicate that the current sample had a higher awareness of environmental problems than the average population, and therefore different outcomes were seen. Furthermore, it shows that younger generations with high education are more likely to change behaviour because of environmental concerns. A sample with a lower education might indicate a lower intent to pay more for environmental products and could show lower energy-saving behaviour.

For Political orientation, a limitation of the study is that, on average, the participants were most left-oriented. This could have skewed the results since McCrea, Leviston, and Walker (2016) found that left-wing-oriented individuals are generally more concerned with environmental risks than right-wing-oriented individuals. Therefore, it could be that this sample was already more energy-saving oriented than a less left-oriented sample. These participants might be more willing to participate in energy-saving behaviour, which could have given different insights about the participants' intention towards energy-saving behaviour. It might be that a sample with more right-wing participants might indicate less intention to energy-saving behaviour. This could provide more insights into whether right-wing oriented individuals have less intention to save energy in general or whether it is the case that they show less intention compared to left-wing oriented individuals. The results can only state that right-wing-oriented individuals intend to save less energy than left-wing-oriented individuals, but not whether right-wing oriented individuals do not intend to save energy in general. More research into this would be recommended.

Next to that, the construct of political orientation was measured using a one-item scale. Further research should focus on utilising a multidimensional scale for Political orientation with additional items.

A follow-up study would have to recruit more participants of older age, lower education, and right-wing orientation. In the current study, this sample is not representative of these groups. Additional research could give more insights into whether an older sample would think differently about the antecedents of energy-saving behaviour, what level right-wing-oriented individuals perform energy-saving behaviours, and what additional factors can determine showing energy-saving behaviour in households.

Conclusion

Altogether, this study showed that Perceived consumer effectiveness and Political orientation are antecedents of energy-saving behaviour in households. Additionally, this study constructed a new scale for energy-saving behaviour. This scale can be used for complementary research into energy-saving behaviours. Further research can include more participants of older age, lower education, and participants with a right-wing orientation. In sum, for energy reduction, Perceived consumer effectiveness and Political orientation need to be considered predictors of energy-saving behaviour in households.

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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
- PhD 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-program 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. 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
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.

2. Consumer effectiveness scale (Segev, 2015).

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 behaviour 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.					

3. Collectivism scale of Segev (2015).

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 cooperative participant in group activities is important to me.					
(3) Readily helping others in need of help is important to me.					

4. The Resistance to Change Scale of White et al. (2020)

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.

5. Trust in Science and Scientists Inventory (Nadelson et al., 2014).

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.

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

Below you will be given some statements about 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?					
		Hot	Warm	Cold	
(12) At which temperature do you wash most of your clothes?					

7. 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.

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)

1	2	3	4	5
Left	Leaning left	Middle	Leaning right	Right

Appendix D
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.
*__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) 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 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.

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 behaviour 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 cooperative 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.

Appendix F: Interaction analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.296[a]	.088	.069	.49265

a. Predictors: (Constant), Trustinscience_politicalorientation, Trust in science, Political orientation

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.447	3	1.149	4.734	.003[b]
	Residual	35.921	148	.243		
	Total	39.368	151			

a. Dependent Variable: Energy saving behavior

b. Predictors: (Constant), Trustinscience_politicalorientation, Trust in science, Political orientation

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.307	1.000		3.308	.001
	Trust in science	.154	.258	.138	.597	.552
	Political orientation	.032	.372	.055	.087	.931
	Trustinscience_politicalorientation	-.053	.098	-.330	-.544	.587

a. Dependent Variable: Energy saving behavior

Appendix G: Factor analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.707
Bartlett's Test of Sphericity	Approx. Chi-Square	5648.835
	df	2278
	Sig.	.000

Communalities

	Initial	Extraction
Coping - 1. Energy-saving within households prevents climate change.	1.000	.630
Coping - 2. Energy-saving within households works in stopping climate change.	1.000	.672
Coping - 3. Energy-saving within households is effective in fighting climate change.	1.000	.727
Coping - 4. I am able to save energy within my household.	1.000	.778
Coping - 5. It is easy to save energy within my household.	1.000	.689
Coping - 6. I can save energy within my household.	1.000	.792
Threat - 7. I am at risk because of climate change.	1.000	.716
Threat - 8. It is possible that I will experience the effects of climate change.	1.000	.768
Threat - 9. I think I will experience side-effects of climate change.	1.000	.734
Threat - 10. Climate change has severe negative consequences.	1.000	.645
Threat - 11. Climate change is extremely harmful.	1.000	.797
Threat - 12. Climate change is a severe threat.	1.000	.861
PCE - 1. Each person’s behaviour can have a positive effect on society by signing a petition in support for promoting the environment.	1.000	.674
PCE - 2. I feel I can help solve natural resource problems by conserving water and energy.	1.000	.716
PCE - 3. I can protect the environment by buying products that are friendly to the environment.	1.000	.699
PCE - 4. I feel capable of helping solve environmental problems.	1.000	.707
Collectivism - 1. Working hard for the goals of my group	1.000	.740
Collectivism - 2. Being a co-operative participant in group activities is important to me.	1.000	.732
Collectivism - 3. Readily helping others in need of help is important to me.	1.000	.728
Resistancetochange - 1. I generally consider changes to be a negative thing.	1.000	.596
Resistancetochange - 2. I'll take a routine day over a day full of unexpected events any time.	1.000	.748
Resistancetochange - 3. I like to do the same old things rather than try new and different ones.	1.000	.672

Resistancetochange - 4. Whenever my life forms a stable routine, I look for ways to change it.	1.000	.735
Resistancetochange - 5. I'd rather be bored than surprised.	1.000	.748
Resistancetochange - 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.	1.000	.748
Resistancetochange - 7. When I am informed of a change of plans, I tense up a bit.	1.000	.743
Resistancetochange - 8. When things don't go according to plan, it stresses me out.	1.000	.648
Resistancetochange - 9. If one of my professors/co-workers changed the grading/function criteria, it would probably make me feel uncomfortable even if I thought I'd do just as well without having to do extra work.	1.000	.685
Resistancetochange - 10. Changing plans seems like a real hassle to me.	1.000	.702
Resistancetochange - 11. Often, I feel a bit uncomfortable even about changes that may potentially improve my life.	1.000	.701
Resistancetochange - 12. When someone pressures me to change something, I tend to resist it even if I think the change may ultimately benefit me.	1.000	.748
Resistancetochange - 13. I sometimes find myself avoiding changes that I know will be good for me.	1.000	.736
Resistancetochange - 14. I often change my mind.	1.000	.804
Resistancetochange - 15. I don’t change my mind easily.	1.000	.855
Resistancetochange - 16. Once I’ve come to a conclusion, I’m not likely to change my mind.	1.000	.655
Resistancetochange - 17. My views are very consistent over time.	1.000	.716
Trustinscience - 1. When scientists change their mind about a scientific idea it diminishes my trust in their work.	1.000	.752
Trustinscience - 2. Scientists ignore evidence that goes against their work.	1.000	.608
Trustinscience - 3. Scientific theories are weak explanations.	1.000	.691
Trustinscience - 4. Scientists intentionally keep their work secret.	1.000	.735
Trustinscience - 5. We can trust scientists to share their discoveries even if they don't like their findings.	1.000	.658
Trustinscience - 6. Scientists don't value the ideas of others.	1.000	.719
Trustinscience - 7. I trust the work of scientists to make life better for people.	1.000	.710
Trustinscience - 8. Scientists don't care if non-scientists understand their work.	1.000	.627
Trustinscience - 9. We should trust the work of scientists.	1.000	.772
Trustinscience - 10. We should trust that scientists are being honest in their work.	1.000	.793
Trustinscience - 11. We should trust that scientists are being ethical in their work.	1.000	.849

Trustinscience - 12. Scientific theories are trustworthy.	1.000	.609
Trustinscience - 13. When scientists form a hypothesis they are just guessing.	1.000	.666
Trustinscience - 14. People who understand science more, have more trust in science.	1.000	.619
Trustinscience - 15. We can trust science to find the answers that explain the natural world.	1.000	.716
Trustinscience - 16. I trust scientists can find solutions to our major technological problems.	1.000	.640
Trustinscience - 17. We cannot trust scientists because they are biased in their perspectives.	1.000	.707
Trustinscience - 18. Scientists will protect each other even when they are wrong.	1.000	.649
Trustinscience - 19. We cannot trust scientists to consider ideas that contradict their own.	1.000	.615
Trustinscience - 20. Today's scientists will sacrifice the well being of others to advance their research.	1.000	.645
Trustinscience - 21. We cannot trust science because it moves too slowly.	1.000	.664
Energysavingbehaviour - 1. How often do you turn off the lights when leaving a room?	1.000	.593
Energysavingbehaviour - 2. How often do you turn off computer monitors when you are not at your desk?	1.000	.632
Energysavingbehaviour - 3. How often do you turn off other non-essential electrical equipment?	1.000	.692
Energysavingbehaviour - 4. How often do you switch off standby modes of appliances or electronic devices?	1.000	.748
Energysavingbehaviour - 5. How often do you turn things off completely, rather than to a "standby" mode?	1.000	.745
Energysavingbehaviour - 6. How often do you cut down on heating or air conditioning to limit energy use?	1.000	.761
Energysavingbehaviour - 7. How often do you turn off the TV when leaving a room?	1.000	.654
Energysavingbehaviour - 8. How often do you limit your time in the shower in order to conserve water?	1.000	.810
Energysavingbehaviour - 9. How often do you wait until you have a full load to use the washing machine or dishwasher?	1.000	.769
Energysavingbehaviour - 10. How often do you discuss energy use in meetings?	1.000	.699
Energysavingbehaviour - 11. How often do you leave items plugged in, even when they've finished charging?	1.000	.725
Political orientation – 1	1.000	.642

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Coping - 1.	.033	.084	.060	**.680**	-.064	.113	.109	.032	.106	-.081	.108	-.082	-.094	-.090	.075	.044	.113	-.204	-.080
Coping - 2.	-.030	.064	-.100	**.673**	.037	.212	-.056	-.025	.085	.076	-.023	-.115	.233	.127	.174	.116	.065	.108	.011
Coping - 3.	.029	.152	.022	**.798**	-.014	.066	-.016	-.095	.007	.090	-.037	-.022	-.101	-.055	-.046	.133	-.072	-.028	-.085
Coping - 4.	.066	.083	-.011	**.189**	-.010	.023	**.828**	.079	-.023	-.017	.077	.027	.027	-.025	.057	-.017	-.013	-.110	.062
Coping - 5.	-.024	.158	-.076	**.054**	.153	-.002	**.738**	-.078	.086	.001	.010	.121	.048	.043	.109	.020	.162	.107	.031
Coping - 6.	.029	.090	.027	**.136**	.131	.104	**.808**	.074	-.070	.075	-.062	.052	-.067	-.020	-.114	.053	-.018	-.065	-.187
Threat - 7.	.068	.679	.051	.028	-.011	.207	.132	-.079	.156	-.035	-.051	.027	-.174	.048	.223	-.020	-.040	-.006	.259
Theat - 8.	.111	.795	-.073	.004	.024	.249	.082	-.067	.030	-.038	-.022	.162	-.039	-.035	-.070	.045	-.007	-.031	.079
Threat - 9.	.094	.776	-.062	.072	.056	.013	.107	.076	-.070	.006	-.100	.071	.225	.008	-.085	-.010	.059	.080	.035
Threat - 10.	.262	.643	.048	.128	.042	.168	.006	-.128	-.074	.165	.134	-.093	.091	.020	.010	.148	.067	-.018	-.037
Threat - 11.	.297	.767	.053	.109	.091	.074	.093	-.055	-.199	-.040	.075	-.100	.081	-.047	.025	.046	.052	-.033	-.105
Threat – 12.	.292	.820	.036	.115	.030	.125	-.001	-.123	-.156	.028	.085	-.067	.010	-.052	.005	.059	.051	-.082	-.060
PCE - 1.	-.035	.111	-.058	**.597**	.194	.117	-.059	.088	-.188	-.072	-.080	-.063	-.145	-.140	-.054	-.392	.049	.037	-.010
PCE - 2.	.059	-.073	.019	**.782**	.028	.088	.156	.039	-.073	.055	-.046	.061	-.082	.147	.019	-.054	.063	.060	.009
PCE - 3.	.109	.117	.118	**.686**	.040	-.004	.208	.058	-.192	.019	.084	.078	.038	.086	-.020	-.131	-.006	-.220	.121
PCE - 4.	.012	.034	.075	**.669**	.091	.030	.167	.011	-.013	.280	-.137	.103	.132	.095	.001	-.049	-.229	.156	.064
Collectivism - 1.	.103	.219	-.151	.121	.050	.776	.085	-.013	.005	.130	.082	.022	-.057	-.002	.012	-.051	-.002	-.006	-.046
Collectivism - 2.	.081	.179	.049	.202	.058	.741	-.053	.047	-.059	-.033	-.162	-.074	-.011	-.126	.065	.122	-.004	.018	.020
Collectivism - 3.	-.070	.225	-.067	.154	.126	.758	.097	-.009	-.048	.035	.040	.134	.106	.098	-.032	.034	.020	-.073	.047
Resistancetochange - 1.	-.139	-.167	.437	-.027	.236	-.161	-.021	.043	.365	-.234	.137	-.102	-.213	-.091	-.025	-.066	.034	-.017	-.032
Resistancetochange - 2.	.094	-.132	.394	-.053	.119	-.050	-.066	.023	.602	.023	-.017	-.114	.106	-.024	-.153	-.339	-.035	-.025	-.009
Resistancetochange - 3.	-.067	.016	.492	-.098	.003	.020	.025	.075	.495	-.129	.140	-.217	.025	.015	-.182	.005	-.019	.174	-.095
Resistancetochange - 4.	-.046	.247	.271	-.139	-.078	-.024	-.065	.085	.251	-.116	.036	-.036	.017	-.228	-.553	.132	.208	.245	.032
Resistancetochange - 5.	-.106	-.128	.321	-.033	.013	-.034	.054	.053	.721	-.204	.030	-.035	-.124	.067	.083	.067	.016	-.115	-.002
Resistancetochange - 6. If	.054	.053	.753	.107	.103	-.119	-.017	.041	-.038	.046	.077	.159	.030	-.263	-.093	.105	-.028	.059	-.092

Resistancetochange - 7.	.022	-.179	.786	.114	-.053	.052	.059	.046	.003	.142	.055	.026	-.086	-.054	-.094	-.010	-.136	-.065	.003
Resistancetochange - 8.	.130	.137	.752	-.030	-.068	-.006	-.002	-.004	.064	.021	-.030	-.020	.064	-.062	-.011	.025	.146	-.006	.072
Resistancetochange - 9.	-.054	.083	.657	.089	-.071	-.014	-.012	-.004	.011	.019	.031	-.081	-.103	.344	.110	-.144	-.075	.077	-.002
Resistancetochange - 10.	-.103	-.050	.744	-.017	.034	-.127	.013	-.008	.205	-.056	.083	.074	.005	.061	.090	-.149	.121	-.021	.021
Resistancetochange - 11.	.052	.031	.628	-.057	-.020	.085	-.203	-.071	.152	-.082	.397	-.098	.074	.120	.001	.044	-.003	-.157	-.073
Resistancetochange - 12.	-.002	-.006	.390	-.069	-.077	-.055	.035	.025	-.021	.019	.630	-.060	.125	.100	-.011	-.278	-.205	-.112	.155
Resistancetochange - 13.	-.031	.068	.286	-.010	.024	-.005	.054	.045	.078	-.123	.751	.012	-.045	-.068	-.068	.038	.049	.204	-.037
Resistancetochange - 14.	-.019	-.074	-.051	-.009	-.086	.016	.036	.870	-.049	.023	-.026	.043	.038	.029	-.031	.027	.045	-.118	-.052
Resistancetochange - 15.	-.090	-.092	.053	.051	-.024	-.012	-.012	.891	.106	.011	.058	-.022	-.113	-.042	.000	-.015	.044	-.049	-.044
Resistancetochange - 16.	.063	-.141	.160	-.053	.029	-.045	.110	.494	.134	-.102	.001	-.150	.082	-.143	.025	-.508	-.001	.055	-.025
Resistancetochange - 17.	-.058	-.146	.079	.080	.016	.062	.201	.373	-.011	.004	-.015	.013	-.065	.004	.141	-.134	.064	.161	-.644
Trustinscience - 1.	.295	.253	-.103	-.069	.090	.155	.147	.069	-.082	-.037	-.132	-.044	.150	-.144	-.030	.641	-.108	-.055	.179
Trustinscience - 2.	.562	.022	.042	-.035	.081	-.155	.132	.153	-.152	-.165	.048	.116	.047	.074	-.011	.172	.063	.097	.311
Trustinscience - 3.	.476	.119	-.167	-.040	.000	-.013	-.067	-.007	-.201	-.131	.178	.049	.472	-.111	.101	.144	.174	.041	.069
Trustinscience - 4.	.544	.102	-.064	-.125	.060	.035	-.046	-.131	-.035	.038	-.023	.044	.575	.077	-.083	.045	-.135	-.044	-.063
Trustinscience - 5.	.612	.120	-.049	.136	-.021	-.024	-.089	.003	.000	-.111	.007	-.124	.220	.188	.010	.031	-.335	.110	-.036
Trustinscience - 6.	.472	.236	-.113	.024	.168	.366	-.071	-.112	-.080	-.095	.127	.334	.026	-.157	-.115	.012	.126	-.186	-.127
Trustinscience - 7.	.742	.220	.077	.082	.089	.062	-.085	.080	.036	.059	.033	.093	.087	-.129	.096	-.117	-.065	.023	.112
Trustinscience - 8.	.263	-.012	-.026	.023	.057	.073	.147	-.078	-.255	-.146	-.007	.621	-.054	.048	-.007	.048	-.099	-.113	-.131
Trustinscience - 9.	.802	.170	.077	.143	.159	-.003	.025	-.047	-.067	.018	-.040	.010	-.075	-.058	.056	.070	-.037	.108	-.094
Trustinscience - 10.	.796	.132	-.002	.156	.035	-.044	.035	.034	-.013	.101	-.002	-.030	-.174	.201	-.069	.033	-.143	.041	.038
Trustinscience - 11.	.680	.083	-.060	.105	.000	.222	-.013	-.050	.071	.131	.073	.180	-.363	.219	-.147	.028	-.194	-.109	.025
Trustinscience - 12.	.651	.035	.045	-.173	-.036	.210	.138	-.053	-.007	.073	.031	-.052	.059	-.093	.108	.009	.223	.003	.062
Trustinscience - 13.	.375	-.033	.092	-.126	.014	.038	.170	.088	.004	.012	-.119	.612	.109	-.067	.030	-.012	.080	.166	.147
Trustinscience - 14.	.493	.038	-.123	-.121	-.103	-.011	-.051	-.074	.144	.094	.354	-.170	.051	-.076	.181	.222	.201	-.041	-.064
Trustinscience - 15.	.517	.115	.045	.008	-.059	.082	.074	.039	-.014	-.091	.017	-.028	.192	-.098	.593	.095	.049	.093	-.047
Trustinscience - 16.	.450	.260	-.026	.037	-.278	.263	.105	-.016	-.067	.118	-.172	-.066	.109	-.113	.336	-.075	.000	.109	.022
Trustinscience - 17.	.683	.090	-.044	.103	.029	-.120	.032	-.060	-.030	-.023	.015	.257	.146	-.113	.117	-.036	.258	-.036	-.114

Trustinscience - 18.	.481	.127	.056	-.159	.016	-.121	.034	.080	-.380	-.143	-.200	.075	.175	.184	-.227	.127	.042	-.039	-.180
Trustinscience - 19.	.670	.083	.020	-.073	-.152	.015	-.010	-.091	-.088	-.053	-.171	.132	.163	.120	.033	-.083	.097	-.033	.036
Trustinscience - 20.	.542	.107	-.020	-.004	-.103	.085	-.027	-.113	.079	.147	-.005	.334	.064	.032	-.187	.055	.050	-.313	.012
Trustinscience - 21.	.419	.299	.108	.006	-.159	.097	.132	-.027	-.063	.142	.039	.028	.525	-.053	.150	.003	-.002	.040	.075
Energysavingbehaviour - 1.	.009	-.073	.078	.133	.231	.125	.078	.031	-.081	.546	-.123	-.044	.006	.047	.040	-.048	.121	-.006	.383
Energysavingbehaviour - 2.	.014	.066	-.026	.047	.507	.149	.046	.100	-.103	.234	.130	-.050	-.098	.035	.139	.049	.096	-.036	.453
Energysavingbehaviour - 3.	-.086	.071	-.081	.163	.492	.084	.178	.185	-.070	.497	.111	.097	-.009	.162	-.171	.071	-.020	-.067	.002
Energysavingbehaviour - 4.	.044	.026	-.063	.025	.786	.132	.096	-.063	.134	.051	-.058	.093	-.057	.178	-.043	-.090	-.050	.030	.072
Energysavingbehaviour - 5.	.014	.120	.068	.000	.752	.072	.148	-.153	-.070	.173	-.025	-.050	.101	-.006	.030	.057	.135	-.169	-.069
Energysavingbehaviour - 6.	.145	-.131	-.003	.136	.374	-.035	-.024	-.075	-.059	.075	-.024	-.004	-.007	.736	-.004	-.006	.116	-.077	.034
Energysavingbehaviour – 7.	.102	.009	.030	.077	.160	.031	-.044	-.069	-.098	.740	-.066	-.093	.023	-.017	.054	.017	.141	-.122	-.053
Energysavingbehaviour - 8.	-.113	.297	-.113	.227	.135	-.132	.065	.126	.155	.411	.125	.391	-.043	.386	.191	.115	.045	.045	-.083
Energysavingbehaviour - 9.	.098	.189	.051	.058	.100	.035	.143	.156	-.049	.280	-.047	-.008	.008	.151	-.114	-.067	.732	-.019	.011
Energysavingbehaviour - 10.	.018	.143	-.004	.229	.438	-.134	-.062	.026	.123	.277	-.166	.105	-.105	.072	.432	.045	-.182	-.129	-.053
Energysavingbehaviour - 11.	.104	-.039	-.045	-.068	-.195	-.052	-.078	-.189	-.040	-.130	.100	.003	.027	-.044	-.053	-.047	-.022	.760	-.101
Political orientation - 1	-.178	-.237	-.116	-.225	-.212	-.303	-.081	.107	.450	.099	.032	.073	-.097	-.231	-.112	.041	-.163	.013	-.113

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 19 iterations.