



# Alignment of values and political orientations amplifies climate change attitudes and behaviors

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## Abstract

Anthropogenic climate change presents an immediate threat, necessitating a rapid shift in climate change relevant behaviors and public policies. A robust literature has identified a number of individual-level determinants of climate change attitudes and behaviors. In particular, political orientations and self-transcendent values are amongst the most consistent and substantive predictors. But, political orientations and individual values do not operate in isolation of each other, and rather are deeply related constructs. Accordingly, this analysis focuses on identifying the direct and interactive effects of political orientations and human values on climate change attitudes and behaviors. Adopting cross-national data from 16 Western European states (2016 ESS), we find that when in alignment, the effect of human values on climate change concern and policy support is amplified by political orientations. The moderating effect of political orientations is most substantive for self-transcendence (positive) and conservation (negative) values.

**Keywords** Climate attitudes · Political polarization · Human values · Energy preferences · Cross-national data

## 1 Introduction

Anthropogenic climate change presents one of the greatest challenges facing the global community and necessitates fundamental changes in individual and collective relationships with the environment. International agreements, such as the 2017 Paris Accords, have set ambitious greenhouse gas reduction targets, largely aimed at limiting global mean temperature growth to under 2°. To meet such goals, rapid interventions are necessary to shift away from carbon-based schemes (Farmer et al. 2019). Public support plays a crucial role in facilitating the political and institutional changes necessary to shift to post-carbon, or reduced carbon-emissions, states (Baumgartner and Jones 2010). Increased concern and activism about the effects of climate change can further spur new social and political coalitions aimed at mobilizing change and shift the priorities of existing coalitions (Sabatier

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1988; Weible and Sabatier 2017). As such, understanding the social mechanisms that promote climate change concern and action remains pivotal to mobilizing the mass support needed to mitigate the existential threat climate change poses.

Political orientation is routinely found to be an important mechanism shaping climate change support. People with left-leaning political attitudes are comparatively more likely to be concerned about climate change, believe in anthropogenic climate change, be willing to support climate change policies than their counterparts (McCright et al. 2016b; Hamilton 2011). Political polarization has further exacerbated this divide (McCright et al. 2016a; Lewis et al. 2018; Marquart-Pyatt et al. 2019), although the effects of polarization are more salient in the English-speaking states than Western European states (Smith and Mayer 2018a).

A separate literature addresses the role of human values in shaping climate change attitudes and behaviors (Dietz et al. 2007; Poortinga et al. 2011, 2019). Broadly, individuals are found to vary on whether they view ‘the environment’ as having intrinsic value (as an end in itself), relational value (as something we are committed to and responsible for), or simply as having instrumental value (as a means to an end). People with more self-transcendent values are found more likely to engagement pro-environmental behaviors while those prioritizing self-enhancement values are less likely (Dietz et al. 2005; Katz-Gerro et al. 2017; Nordlund and Garvill 2002; Steg and De Groot 2012).

In brief, both human values and political orientations are found to be among the most important predictors of climate change concern (Hornsey et al. 2016). To date, however, the multiplicative relationship between human values and political orientations on climate change attitudes and behaviors remains largely unexplored. This is a surprising omission given that human values and political orientations are thought to be deeply interrelated constructs, since values act as core building blocks of a person’s political attitudes and behaviors (Rokeach 1973; Converse 1964; Piurko et al. 2011).

We address this omission here. The current study examines the independent and interactive effects of human values and political orientations on climate change concern, behaviors and policy support in Western European states using 2016 European Social Survey data and multilevel modeling approaches. We find that when values and political attitudes are in alignment, this consistency leads to an amplification in the effect on climate change attitudes and behaviors. That is, there is a multiplicative effect of values and politics.

The study makes an important contribution to the growing body of literature on cross-national climate change attitudes and behaviors, particularly within Western European states (McCright et al. 2016a; Lewis et al. 2018; Marquart-Pyatt et al. 2019; Poortinga et al. 2019; Smith and Mayer 2018a) by identifying and advancing understanding of the relationship between two key social mechanisms in climate change support.

## 2 Theoretical background

### 2.1 Human values

Issues such as climate change “invoke fundamental question on how we ought to live and how humans should value and relate to each other and non-human nature” (Wardekker et al. 2009 p.513). Such questions direct attention to the sources of and patterns in underlying values and reasoning people use as they develop, evaluate, and justify responses to climate change (Feinberg and Willer 2013; Gardiner 2006). Values are thought of as

internalized schemas that individuals draw upon to set the boundaries for what they consider acceptable (Hitlin and Piliavin 2004). They structure and guide how people interpret and experience the social world and act within it Joas (2000). They also shape how an individual prioritizes what is important and what needs to be acted on in their lives. In short, values provide a framework for organizing actions and beliefs about climate change (Milfont et al. 2015).

The role of human values in shaping climate change attitudes and behaviors has been the subject of extensive previous research (see Poortinga et al. 2019; Corner et al. 2014; Dietz et al. 2007). However, researchers conceptualize and measure human values in different ways. Post-materialist perspectives, for example, suggest that as the socio-economic conditions shift towards greater prosperity, individual values increasingly focus on non-material goals, such as equality or environmentalism (Inglehart 1977, 1995; Gelissen 2007). A robust literature has also identified environmentally specific values, such as the E-SVS (Stern et al. 1998; De Groot and Steg 2009; Steg et al. 2014), and the more recently E-PVQ (Bouman et al., 2018), noting that altruistic and biospheric values are positively related to pro-environmental behaviors and attitudes, while egoistic and hedonic values are negatively associated. The Values-Beliefs-Norms (VBN) literature identifies the role that altruistic, egoistic, and biospheric values play in shaping environmental attitudes and behaviors (Stern et al. 1999; Dietz et al. 2005).

The Schwartz value schema is the most widely used approach within the literature (Poortinga et al. 2019; Corner et al. 2014), largely due to the availability of robust measurement items and comparability across socio-cultural settings (Davidov et al. 2008; Davidov 2008). Schwartz (1992) identified ten, broad, universal human values, which are each defined by the specific motivational goals that they represent. These values can be arranged into a circular continuum (Schwartz 1992, 2012), in which the values are ordered by their compatibility/conflict.

Further, the ten values are organized into four higher order dimensions. Self-enhancement values (power and achievement) promotes self-interest, which is in opposition to self-transcendent values (universalism and benevolence), which prioritize the concern and welfare of others. Openness to change values (self-direction and stimulation) encourage change and openness to new ideas are in opposition to conservatism values (tradition, conformity and security), which emphasize maintenance of the status quo and stability.

Previous studies adopting Schwartz's framework find that the four dimensions vary in their relationship to climate change support. Self-transcendent values have a strong positive relationship to climate change concern (Dietz et al. 2007; Corner et al. 2014), and are less associated with climate change skeptical beliefs (Steg and De Groot 2012). In contrast, self-enhancement values are positively related to climate change skeptical views (Poortinga et al. 2011), and function to decrease the likelihood that a person will view climate change as dangerous (Poortinga et al. 2019). Openness to change values are also found to be negatively related to climate change skepticism, and increase the likelihood of negatively viewing the impact of climate change (Poortinga et al. 2019; Milfont et al. 2015), while conservation is found to be positively related to climate change skeptical beliefs (Poortinga et al. 2011).

Drawing upon this previous literature, we expect that:

**Hypothesis 1 :** The Schwartz human value dimensions of self-transcendence and openness to change will be positively related to climate change concern (1a), reducing energy usage (1b) and support for increased fossil fuels taxes (1c). While, alternatively, the value dimensions of self-enhancement and conservation will be negatively related.

## 2.2 Political orientations

Political factors, such as orientation and party identification, have received substantial interest from previous scholarship for the role they play in shaping climate change attitudes, behaviors and policy support (McCright et al. 2016b). Political factors are broadly found to have a polarizing effect, where those on the political left are more likely to be concerned about climate change or be willing to support climate change policies than those on the right (McCright and Dunlap 2011; Hoffman 2011).

The theoretical causes of political polarization appear to be both individual and contextual. On the individual-level, the 'anti-reflexivity' hypothesis posits that individuals, groups, and politically-motivated organizations on the political right are more likely to be supportive of liberal, 'free-market' economic systems (McCright and Dunlap 2010). Accordingly, those on the political right are more likely to reject the problems caused by the economic system, such as global climate change. The solution aversion hypothesis similarly suggests that those on the political right may be more likely to resist potential solutions to climate change, as they are likely to involve undesirable governmental intervention into previously unfettered markets (Campbell and Kay 2014).

At the group-level, political party identification can be understood as a form of social identity, setting boundaries for who is 'in' and 'out' of their group (Iyengar et al. 2012; Colvin et al. 2015). People develop a sense of belonging to an in-group (Tajfel 1978) and adopt group norms and attitudes (Weisberg and Greene 2003; Brewer and Brown 1998; Turner et al. 1994) - especially on salient issues (Unsworth and Fielding 2014). Such inter-group processes generate greater concordance on salient issues as individual harmonize attitudes within the party. Furthermore, individual political attitudes are often shaped by elite members' cues (Cohen 2003; Malka and Lelkes 2010; Tesler 2017). Elite conservatives and groups, most notably in English-speaking states, have engaged a decades long messaging campaign to shifting public opinion against climate change policies and measures (McCright and Dunlap 2003, 2011; Oreskes and Conway 2011) which has been amplified by media outlets (Feldman et al. 2012; Hmielowski et al. 2014). Recent studies empirical studies have found a substantive effect of elite cues driving attitudes towards climate change in the US (Brulle et al. 2012; Farrell 2016). People are responsive to elite cues from party elites and shape their attitudes to be in line with the in-group, a process that has been called 'identity protective cognition' (Kahan 2015, 2017).

The climate change skeptic counter-movement largely originated in English-speaking states (McCright and Dunlap 2003; Oreskes and Conway 2011), however recent literature has begun to question whether political polarization of climate change attitudes and behaviors is a global phenomenon, or rather one limited to Anglophone states where processes of political polarization and elite mobilization against climate change measures are more pronounced. While there does appear to be political polarization in climate change concerns and policy support in Western European states, the substantive effect is more pronounced in English-speaking states (Smith and Mayer 2018a; Lewis et al. 2018).

Based upon these recent findings, we expect that:

**Hypothesis II :** People with left-leaning political orientations will be more likely than those with politically right-leaning orientations to be concerned about climate change (2a), willing to reduce their energy usage (2b) and support increased fossil fuels taxes (2c) (see McCright et al. 2016a; Smith and Mayer 2018a).

### 2.3 Human values and political orientations

Human values are found to play a central role in shaping an individual's political orientations and beliefs (Caprara and Zimbardo 2004; Feldman 1988). Values act as the building blocks of political orientations and dispositions (Rokeach 1973; Converse 1964), where they are drawn upon to organize and prioritize political beliefs and decisions (Piurko et al. 2011). People prefer political ideologies, parties and policies that align with their core values, as well as those that protect their values against perceived threats (Barnea and Schwartz 1998; Schwartz et al. 2010). For example, people that prioritize openness to change values are found to be more supportive of individual freedoms and civil rights, while those that prioritize self-enhancement values prefer non-egalitarian policies and are against government interventions (Piurko et al. 2011). As such, political factors and human values are thought not to exist in isolation of each other, but rather to be closely entwined.

Several studies provide correlational evidence of the close relationship between values and political orientation. Caprara and colleagues, for example, observe that self-transcendence values (namely universalism) are associated with political left orientations, while conservation values (security and tradition) are closely linked with right orientations (Caprara et al. 2017). Politically left ideologies can be characterized by open-mindedness, mental flexibility, and commitment to social and economic equality, while politically right ideologies commonly stress the importance of resistance to change as well as work towards justifying inequalities (Jost et al. 2003). Using data from the European Social Survey, Aspelund et al. (2013) and Piurko et al. (2011) also find that conservation and self-enhancement values are positively related to right-leaning ideologies in Western European states, while self-transcendence is linked to politically left orientations, while the relationship between openness to change values and specific political orientations is less clear. Using cross-national data from 15 states, Caprara et al. (2017) report a similar pattern in the relationship between human values and political orientations.

The relationship between political orientation and human value likely reflects people's strong desire for cognitive consistency; that is, people want their beliefs, opinions, and attitudes to be congruent (Festinger 1957). Cognitive (in)consistency serves as a cue about the correctness of a person's belief system (Gawronski 2012; Quine and Ullian 1978): the more congruent, the more correct people perceive their views to be. We argue that when an important value aligns with a person's political orientation, this acts as a reinforcing mechanism on the validity of one's beliefs. The alignment of personal values and political orientation amplifies climate change support by reinforcing confidence in the correctness of their position. Conversely, when values and political orientations are not in alignment, there may be uncertainty and ambiguity about the correctness of a position, or act as barriers towards climate change attitudes and behaviors (cognitive inconsistency).

Perceptions of group values also play a vital role in motivating environmental behavioral action (Bouman and Steg 2019). In general, people are more likely to associate left-leaning parties with more stringent policy approaches towards climate change. The stronger that a person believes that a group they belong to also shares their values, the more likely they are to act (Bouman et al. 2020). For example, if a person with self-transcendence values (i) believes that other people with self-transcendence are more likely to act or support climate change policies, (ii) believes that self-transcendence values are more prevalent for people with left-leaning political orientations, and (iii) themselves identify with left-leaning political orientations as social in-group, the more likely they are to act with regard to climate change. The same example applies for those with self-enhancement values, right of center political orientations, and decreased likelihood to act with regard to climate change or to support climate change policies.

As such, we anticipate that when an individual's values and political attitudes are in alignment towards a specific social issue, they can interact, and even amplify, the person's attitude or response towards this issue. For example, self-enhancement values have a positive relationship with climate change skeptical views (Dietz et al. 2005; Poortinga et al. 2019), as well as with right leaning political orientations (Caprara et al. 2006; Schwartz et al. 2010), while further, right leaning political orientations is also positively related to climate change skepticism (Smith and Leiserowitz 2012; McCrea et al. 2016). In this exemplary case, a person's values and politics would be in alignment with their climate change skeptic belief, and through this self-reinforcement could interact to amplify their beliefs. Similarly, individuals with self-transcendence values are more likely to have left-leaning political orientations and, along with people who identify on the political left, are more likely to be supportive of climate change policies and willing to engage in "pro"-climate change behaviors. In this case, we would also find these values, political orientations, and climate change attitudes and behaviors to be in alignment, and could therefore amplify these beliefs. Alternatively, if a person's values and politics are not in alignment, they could act as a dampening effect. We therefore expect that:

**Hypothesis III :** When value dimensions and political orientations are in alignment (such as self-transcendence and left-leaning political orientations and self enhancement and right-leaning political orientations), the interactive effect will be amplified on concerns for climate change (3a), willingness to reduce energy usage (3b) and support for increased fossil fuels taxes (3c).

### 3 Data

For this analysis, we adopt recent survey data from the 2016 European Social Survey (ESS), Wave 8 European Social Survey (2016). This wave includes a special module on public attitudes towards climate change. Further, the ESS contains the Portrait Values Questionnaire (PVQ) indicators as part of its core module indicators, capturing the Schwartz Values Schema. As such, the 2016 ESS presents an entirely unique data set, allowing for cross-national comparisons to be made of the effect of values on climate change attitudes.

Data was collected in the latter half of 2016, primarily using CAPI and face-to-face interviews. The 2016 ESS covers the following 16 Western European states: Austria, Belgium, Finland, France, Germany, Great Britain, Iceland, Ireland, Israel, Italy, Netherlands, Norway, Portugal, Sweden, Spain, Switzerland. Within country response rates ranged from 30.6% in Germany to 73.4% (Israel). The smallest number of completions was 880, in Iceland, while for most nations over 1,500 respondents completed the survey (European Social Survey 2016b). The 2016 ESS contains as special module, 'Public Attitudes to Climate Change, Energy Security, and Energy Preferences' including several items assessing components related to climate change.

While political polarization is amongst the strongest, and most studied determinants of climate change attitudes (Hornsey et al. 2016; McCright et al. 2016b), the effect of political polarization appears to be concentrated within English speaking and Western European states (Lewis et al. 2018; McCright et al. 2016a; Marquart-Pyatt et al. 2019). Further, Smith and Mayer (2018a) suggest that the effects of political polarization, while smaller, may be in the opposite direction in transition states. That is, individuals on the political right are more likely to perceive climate change as a danger than those on the

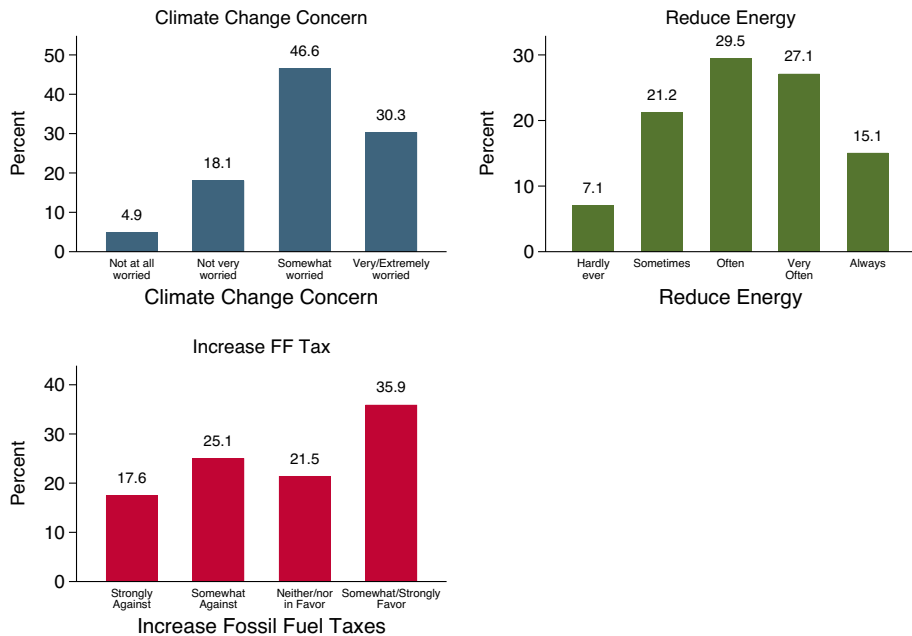
left. This suggests that there may be “differing meanings” of political left-right placement in transition states (McCright et al. 2016a). In Western European states, right of center parties often support policies that limit government intrusion into markets and are deregulatory in nature, while the opposite is true in transition states. In transition states, right leaning parties often support economic liberalization and free-market policies, while those on the political left are often more closely associated with previous state socialist policies and regimes. As such, while the ESS also contains data from transition states, our analysis focuses primarily on the more established effects of political attitudes within these 16 Western European states.

### 3.1 Outcome variables

Climate change attitudes and behaviors encompass multiple diverse constructs, such as skepticism (a specific belief), concern (a measure of risk perception), individual or collective behaviors and policy support. While these constructs may be interrelated – i.e. climate skepticism is negatively related to climate change concern (Engels et al. 2013; Tranter and Booth 2015), concern is positively related to climate change policy support (Spence et al. 2011; Drews and Bergh 2016; Egan and Mullin 2017) – each contains their own unique components and subdimensions, and often have their own unique set of theoretical drivers (McCright et al. 2016b; Smith et al. 2018). Climate skepticism has multiple components, such as disbelief in the trends, attribution and impact of climate change (Roser-Renouf and Nisbet 2008). Environmental concerns result from a complex combination of individual experiences and structural forces, such as cultural factors, media framing and political activism (Auyero and Swistun 2008; Kasperson et al. 1988; Malin 2015). Similarly, van der Linden (2015) suggests that climate change risk perceptions are products of cognitive factors (knowledge), experiential processing (such as emotions and personal experiences), sociocultural influences (norms, value orientations) and socio-demographics. While Stern (2000) defines ‘environmentally significant’ behaviors as actions that have an impact on the environment, in one form or another, which can be separated into four distinct types: environmental activism (participation in social movements), non-activist behaviors in the public sphere (policy support, petitions), private-sphere environmentalism (individual, ‘pro-environmental’ actions), and other environmentally significant behaviors (actions in the workplace). For this analysis, we adopt a multiple indicator approach, to best capture three different dimensions of climate change attitudes and behaviors: climate change concern, individual behaviors and policy support.

First, climate change concern is measured by respondents ranking their worry for climate change from 1 ‘not at all worried’ to 4 ‘very/extremely worried’. This item is originally coded from 1 to 5, but we collapsed values 4 ‘very’ and 5 ‘extremely’ together due to concerns about data sparsity for the ‘extremely worried’ response (5% of responses). Second, individual behaviors is measured by an indicator of environmental action, reduce energy, which measures how often the respondent does things to reduce energy usage, from 1 ‘never’ to 6 ‘always’. Third, we include an indicator of climate change policy support, increase fossil fuel taxes, where the respondent rates their favor of increase taxes on fossil fuels to reduce climate change from 1 ‘strongly against’ to 4 ‘somewhat/strongly favor’. This item is originally coded from 1 to 5, but we collapsed values 4 ‘somewhat’ and 5





**Fig. 1** Distribution of Responses for Dependent Variables

'strongly' together due to concerns about data sparsity for the 'strongly favor' response (8% of responses)<sup>1</sup>. Distributions for these variables are displayed in Fig. 1<sup>2</sup>.

### 3.2 Predictor variables

The analysis focuses on identifying the independent and interactive effect of human values and political orientation on the three components of climate change concern, behavior and policy support. First, human values are identified using the modified 21-item version of the Portrait Values Questionnaire (PVQ) adapted for the ESS (Schwartz 2003). To measure the 10 Schwartz values, each item presents a short sentence, a portrait, of a gender-matched person. Then, the respondent is tasked with ranking how much this person is 1 'not like me at all' to 6 'very much like me'. Due to concerns of multicollinearity and parsimony, these 10 values are collapsed into scales representing the 4 higher-order dimensions. The items for universalism and benevolence are combined into

<sup>1</sup> Supplementary analyses were also performed to test for substantive differences based upon this recoding scheme. We performed similar analyses using non-recoded values for each of these dependent variables. We find no substantive differences in the main effects of human values or political orientation (see Figure S1), nor do we find substantive differences in the interactive models (see Figures S2 - S4)

<sup>2</sup> Furthermore, other items related to climate change policy support are available in the ESS Wave 8, in particular support for 'banning the sale of the least energy efficient household appliances' and 'Using public money to subsidize renewable energy such as wind and solar power'. For parsimony, we have only included the analyses of the three main dependent variables in the main text, but we include analyses for these items as well in the Supplementary Materials (please see Figures S5 and S6). We find similar patterns in these supplementary analyses as those noted in the findings presented in the main text



the ‘self-transcendence’ dimension ( $\alpha = 0.72$ ), while the items for power and achievement are included in the scale for ‘self-enhancement’ ( $\alpha = 0.72$ ). Next, ‘conservation’ is derived from the items for conformity, tradition and security ( $\alpha = 0.70$ ) and lastly, stimulation and self-direction are combined into the dimension ‘openness to change’ ( $\alpha = 0.63$ ) (see Supplementary Table S1).

Recent cross-national literature on the role of political and environmental attitudes has operationalized political orientation in several different ways - most commonly as a measure of left-right self-placement (McCright et al. (2016a); Hornsey and Harris (2018); Smith and Mayer (2018a); Marquart-Pyatt et al. (2019)), but also as coding party affiliation into a comparable scale (Lewis et al. 2018) and individual free-market ideology (Smith and Mayer 2018a). For each of these operationalizations, a common pattern is noted for Western European states, where those on the political left are more likely to have higher pro-environmental attitudes and behaviors. In the case of this paper, we adopt the common approach of measuring political orientation based upon self-placement on a political right to left scale. Respondents are ranked from holding view that range from 1 ‘strong right’ to 3 ‘moderate’ to 5 ‘strong left’. Political orientation is adopted over other alternative measures, such as party identification, to allow for better cross-national comparability of political beliefs.

### 3.2.1 Control variables

Prior cross-national research has noted multiple correlates of climate change attitudes and behaviors on the individual and contextual-level, which we accordingly adopt as control variables for this analysis. Recent literature suggests that climate change attitudes and behaviors are affected by different constructs of trust (Fairbrother et al. 2019; Smith and Mayer 2018b; Harring 2014). For this analysis, we include two constructs of trust, social trust and a scale for political trust ( $\alpha = 0.88$ ). Beliefs in adaptive capacity, that is the likelihood that individuals or groups will work to resolve climate change, is also noted as an important predictor of climate change behaviors and policy support (Mayer and Smith 2018; Feinberg and Willer 2011). We therefore include indicators for Individual Efficacy and Group Efficacy (Meinhold and Malkus 2005; Hanns and Bohm 2010; Homburg and Stolberg 2006; Steg and De Groot 2010). Further, religious belonging has been found to be related to cross-national climate change attitudes (Lee et al. 2015). As such, we include indicators for religious belonging and religious service attendance. Lastly, we include indicators for socio-demographic variables common to studies of climate change, gender, age, educational attainment, and household income (Pampel 2014; Xiao and McCright 2012; Strapko et al. 2016).

On the contextual level, we include GNI per capita (World Bank, Atlas method 2016) to measure country wealth (Summers and VanHeuvelen 2017; Mayer and Smith 2017), an indicator for coal as a percentage of the total primary energy supply for each country (International Energy Agency, 2016), and a measure of freedom of expression (Dominick 1998; Kirchhof and McNeill 2019), adapted from the Varieties of Democracy Index (Coppedge et al. 2021).

The descriptive statistics, original items, and variable coding for all the variables are presented in Table 1. Potential forms of multicollinearity were investigated in supplementary analyses, with all key predictors and control variables having a VIF of under 1.6.

**Table 1** Descriptive statistics and variable coding

Variable	Original Item	Coding	Mean	Std. Dev.
<i>Dependent Variables</i>				
Climate Change Concern	<i>wrclmch</i>	1 'Not at all' to 4 'Very/Extremely Worried'	3.02	0.83
Reduce Energy	<i>rdcenr</i>	1 'Never' to 6 'Always'	3.22	1.15
Increase Fossil Fuel Taxes	<i>inctxf</i>	1 'Strongly against' to 4 'Somewhat/Strongly favour'	2.76	1.12
<i>Independent Variables</i>				
Self Transcendence	<i>see SI</i>	1 'Not at all like me' to 6 'Very much like me'	4.92	0.67
Self Enhancement			3.69	0.87
Openness			4.14	0.89
Conservation			4.29	0.83
Political Orientation			2.95	1.22
<i>Individual Level Control Variables</i>				
Social Trust	<i>ppltrst</i>	0 'Lowest Trust' to 10 'Highest'	5.47	2.32
Political Trust	<i>see SI</i>	0 'Lowest Trust' to 10 'Highest'	4.94	2.00
Individual Efficacy	<i>ownrdcc</i>	0 'Not at all likely' to 10 'Extremely Likely'	4.54	2.64
Group Efficacy	<i>lkredcc</i>	0 'Not at all likely' to 10 'Extremely Likely'	5.83	2.26
Female	<i>gnr</i>	0 'Male' 1 'Female'	0.51	0.50
Age	<i>age</i>	15-100	49.5	18.7
Educational Attainment	<i>eduvlrb</i>	1 'Primary or less' to 8 'PhD'	3.73	1.93
Household income, Country Deciles	<i>hincmta</i>	1 '1st decile' to 10 '10 decile'	5.20	2.74
Religious Belonging	<i>rlgblg</i>	0 'Does not belong' 1 'Belongs to religious group'	0.61	0.49
Religious Service Attendance	<i>rlgamd</i>	1 'Never' to 6 '> Weekly'	2.46	1.52
<i>Country Level Control Variables</i>				
GNI per capita, in 1000s	<i>World Bank 2016</i>	9,200 to 81,100	45.0	14.2
Freedom of Expression	<i>2016 V-Dem V.10</i>		0.94	0.042
Coal as % of TPES	<i>IEA (2016)</i>		0.11	0.075

## 4 Methods

Given the ordered nature of the three dependent variables, we adopt an ordered logistic regression approach appropriate to these indicators. The data is structured where individuals are nested within 16 diverse countries. As these observations are not considered to be independent, traditional regression approaches are not appropriate. As such, we adopt multi-level logistic modelling techniques which allow the intercepts to randomly vary across the countries (also known as random effect or mixed models). We estimate two regression models for each of the dependent variables. First, with the ‘main effects’ of the higher-order value dimensions and political orientation, and second with the interaction product term included.

Coefficients on the logistic scale are notoriously difficult to interpret. Further, focusing solely on statistical significance can lead to false conclusions or misinterpretation of results (Amrhein et al. 2019). We adopt an approach focusing on predicted probabilities (Long and Freese 2014; Mood 2010). For the ‘main effects’ models, we calculate predicted probabilities for the effects human values and political orientations holding control variables at their observed values and averaging the probabilities for each score of the focal predictor variables (Hypotheses 1 and 2). Given that human values are continuous scales with non-inherently substantive quantities, we predicted values at the 5th percentile (‘low’), median (‘moderate’) and 95th percentile (‘high’) for each of the four human value dimensions. For political orientation, predicted probabilities are calculated for all five ordered values of this item.

Lastly, we address how the effects of political orientation may be amplified by the human values dimensions (Hypothesis 3) via adoption of a product-term interaction. The interaction analyses focus on identifying potential amplifying, moderating effect, which investigates if and how the strength and direction of relationship between  $x$  and  $y$  changes due to a third variable,  $z$ . To identify patterns of amplification, the same values are used to calculate the human values\*political orientation predictions in the ‘interaction models’ (Hypothesis 3). All probabilities predict the highest outcome for each of the dependent variables. In order to understand the effect of an interaction term with non-linear outcomes, coefficients of the product term do not provide sufficient information on the significance, magnitude of direction of this interaction (Mize 2019). As such, we again adopt predicted probabilities to determine the nature of these interactive effects (Brambor et al. 2006).

## 5 Results

The following sections presents the results from the multilevel ordered logistic regression analysis separately for the effects of human values dimensions and political orientations on climate change concern, reducing energy and increase fossil taxes. We first test for the effects of human values dimensions and political orientations on climate change concern, reducing energy and increase fossil taxes, where we anticipate that dimensions of self-transcendence and openness to change will be positively related to these outcomes and the value dimensions of self-enhancement and conservation will be negatively related (Hypothesis 1). Further, people with politically left orientations are expected to have greater climate change concern, reduce energy usage for climate change and support increasing fossil fuel taxes more than those on the political right (Hypothesis 2). The regression results for the analysis are presented in Table 2, while the predicted probabilities for the main effects of the key predictors are displayed in Fig. 2.

**Table 2** Multilevel ordered logistic regression results

	Climate Change Concern		Reduce Energy		Increase Fossil Fuel Taxes	
	<i>Base</i>	<i>Int.</i>	<i>Base</i>	<i>Int.</i>	<i>Base</i>	<i>Int.</i>
Self Transcendence	0.63** (0.03)	0.39** (0.06)	0.53** (0.02)	0.51** (0.06)	0.13** (0.02)	−0.04 (0.06)
Self Enhancement	−0.12** (0.02)	0.00 (0.05)	−0.27** (0.02)	−0.26** (0.05)	0.02 (0.02)	0.05 (0.05)
Openness	0.06** (0.02)	−0.03 (0.05)	0.16** (0.02)	0.04 (0.05)	0.00 (0.02)	−0.07 (0.05)
Conservation	−0.12** (0.02)	0.08 (0.05)	0.06** (0.02)	0.07 (0.05)	−0.20** (0.02)	0.07 (0.05)
Political Orientation	0.13** (0.01)	0.00 (0.10)	0.03** (0.01)	−0.15 (0.09)	0.14** (0.01)	0.16 (0.09)
Social Trust	−0.04** (0.01)	−0.04** (0.01)	−0.03** (0.01)	−0.03** (0.01)	0.03** (0.01)	0.03** (0.01)
Political Trust	−0.01 (0.01)	−0.01 (0.01)	−0.03** (0.01)	−0.03** (0.01)	0.14** (0.01)	0.14** (0.01)
Individual Efficacy	0.10** (0.01)	0.10** (0.01)	0.04** (0.01)	0.04** (0.01)	0.09** (0.01)	0.09** (0.01)
Group Efficacy	0.17** (0.01)	0.17** (0.01)	0.06** (0.01)	0.06** (0.01)	0.10** (0.01)	0.10** (0.01)
Female	0.09** (0.03)	0.09** (0.03)	0.05* (0.03)	0.05* (0.03)	0.04 (0.03)	0.04 (0.03)
Age	−0.00** (0.00)	−0.00** (0.00)	0.01** (0.00)	0.01** (0.00)	−0.00** (0.00)	−0.00** (0.00)
Educational Attainment	0.07** (0.01)	0.07** (0.01)	0.08** (0.01)	0.08** (0.01)	0.11** (0.01)	0.10** (0.01)
Household income, Country Deciles	0.01 (0.01)	0.01 (0.01)	−0.02** (0.01)	−0.02** (0.01)	0.03** (0.01)	0.03** (0.01)
Religious Belonging	−0.06 (0.03)	−0.06 (0.03)	−0.05 (0.03)	−0.05 (0.03)	−0.15** (0.03)	−0.14** (0.03)
Religious Service Attendance	0.01 (0.01)	0.01 (0.01)	−0.00 (0.01)	−0.01 (0.01)	0.05** (0.01)	0.05** (0.01)
GNI per capita, in 1000s	−0.02** (0.01)	−0.02** (0.01)	−0.01* (0.00)	−0.01* (0.00)	0.01* (0.01)	0.01* (0.01)
Freedom of Expression 2016	4.89 (2.89)	4.96 (2.86)	4.67** (1.41)	4.74** (1.40)	−0.81 (2.15)	−0.78 (2.19)
Coal as % of TPES	−0.25 (1.67)	−0.25 (1.66)	0.87 (0.81)	0.87 (0.80)	0.00 (1.24)	−0.01 (1.27)
Self Transcendence × Political Orientation		0.08** (0.02)		0.01 (0.02)		0.06** (0.02)
Self Enhancement × Political Orientation		−0.04** (0.02)		−0.00 (0.01)		−0.01 (0.02)

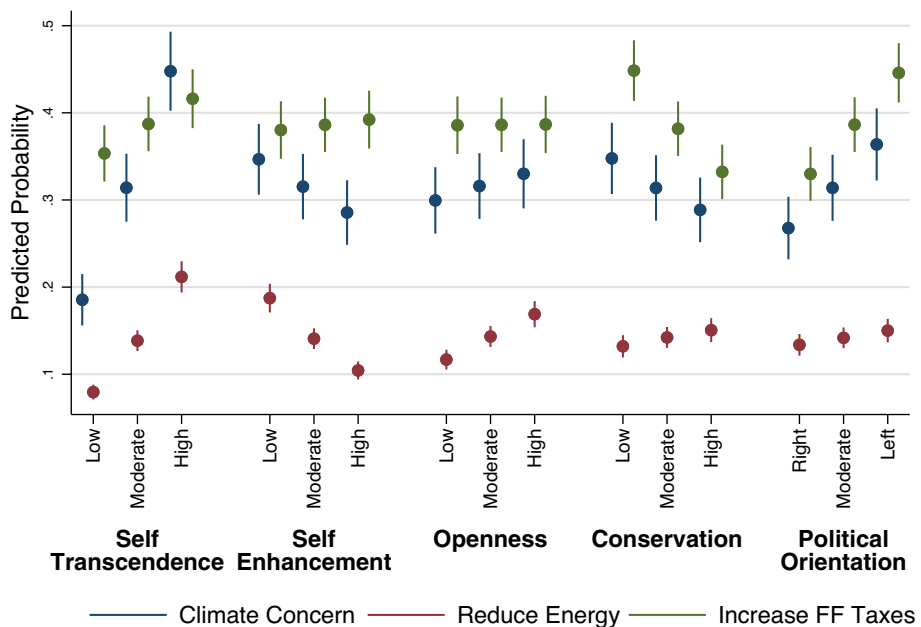
**Table 2** (continued)

	Climate Change Concern		Reduce Energy		Increase Fossil Fuel Taxes	
	<i>Base</i>	<i>Int.</i>	<i>Base</i>	<i>Int.</i>	<i>Base</i>	<i>Int.</i>
Openness $\times$ Political Orientation		0.03*		0.04**		0.02
		(0.02)		(0.01)		(0.02)
Conservation $\times$ Political Orientation		-0.06**		-0.00		-0.09**
		(0.02)		(0.01)		(0.01)
Variance Component	0.15**	0.15**	0.03**	0.03*	0.08**	0.09**
Observations	21,337	21,337	21,305	21,305	21,182	21,182
AIC	44078.5	44041.2	61117.4	61112.9	52463.5	52424.5
BIC	44253.8	44248.3	61300.7	61328.0	52638.6	52631.5

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ 

Next, we investigate whether the human values dimension potentially moderate or mediate the effect of political orientation on climate change concern, reducing energy and increase fossil taxes. To investigate for amplification, we adopt an interaction product term approach, with the predicted probabilities for the interaction plotted in Fig. 3.



**Fig. 2 Predicted Probabilities of Values by Political Orientation Interaction.** Predicted probability calculated at highest value of dependent variables. Fixed effects only, calculated holding all other predictors in Table 2 at their means

## 5.1 Climate change concern

### 5.1.1 Main effects

The regression coefficients of the multilevel ordinal logistic regression are displayed in Table 2. The four human values dimensions all have significant effects on climate change concern. Self-transcendence ( $b = 0.63, p \leq 0.05$ ) and openness to change values ( $b = 0.06, p \leq 0.05$ ) have a positive significant effect on climate change concern, while self-enhancement ( $b = -0.12, p \leq 0.05$ ) and conservation ( $b = -0.12, p \leq 0.05$ ) have significant, negative effects. While political orientation ( $b = 0.13, p \leq 0.05$ ) also has a significant, positive effect, meaning that people become more concerned about climate change as they move from the political right to left. All of these results are in the expected directions, providing support for Hypotheses 1a and 2a.

Figure 2 displays the predicted probabilities that people are ‘extremely worried’ about climate change. Self-transcendence appears to have the largest substantive effect. People at the lowest levels of self-transcendence values have a predicted probability of 0.19 of being extremely worried about climate change, while this increases to 0.45 for people at the highest levels of self-transcendence. Self-enhancement and conservation also appear to have moderate, negative effects. Political orientation also appears to be a substantive predictor of climate change concern, with people on the right having a predicted probability of 0.27 of being extremely worried, compared to a predicted probability of 0.36 for those on the political left.

### 5.1.2 Amplification

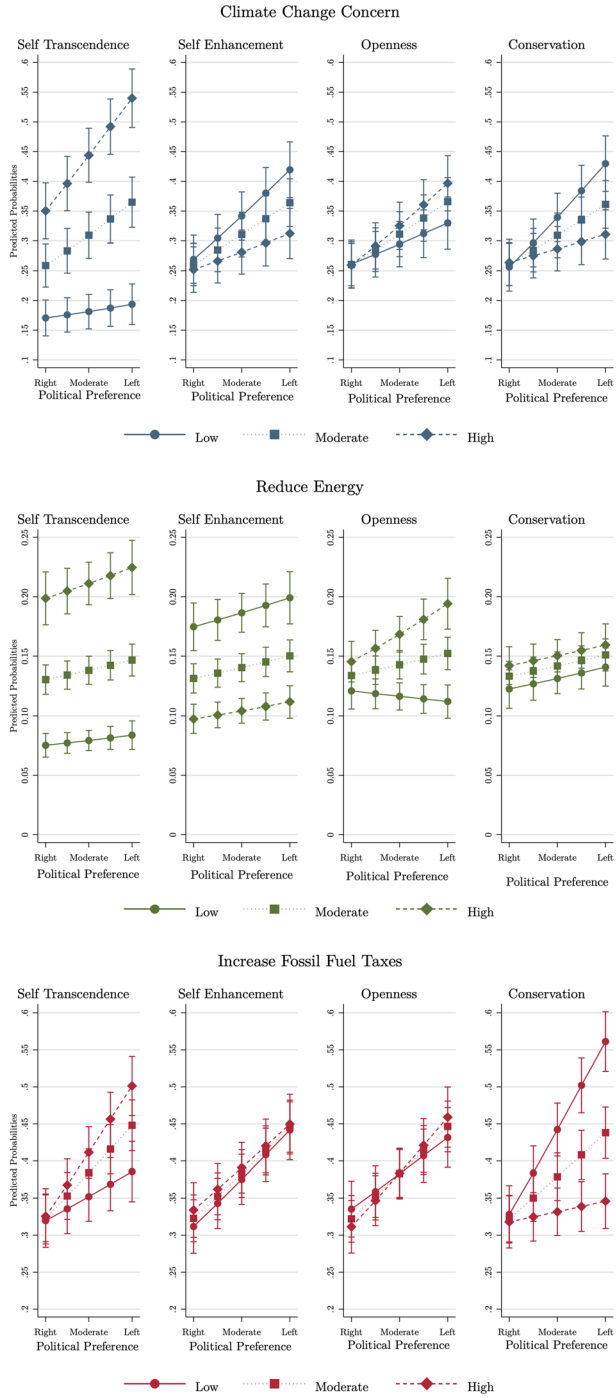
To identify forms of amplification of human values and political orientation, we turn to Fig. 3. The effect of the four human values dimensions all appear to be moderated by political orientation. The greatest amplification appears to be for self-transcendence, where the effect of this value is greatly amplified as people move from the political right to left. These findings appear to indicate that when self-transcendence values are in alignment with left leaning political ideologies, there is an amplification effect in the levels of climate change concern. Similar patterns are also evident for openness to change, but the effect size appears to be comparatively smaller. For self-enhancement and conservation, the amplification effect appears to be most noticeable at lower levels of the values. Given that these value dimensions are generally in opposition to political left leaning preferences, this finding means that for people who have lower levels of self-enhancement and conservation there is an amplifying effect. We therefore find evidence in support of Hypothesis 3a.

## 5.2 Reduce energy

### 5.2.1 Main effects

Next turning to the frequency that an individual reduces their energy usage, all four of the human values dimensions are found to have significant effects (again see Table 2). The coefficients of self-transcendence ( $b = 0.53, p \leq 0.05$ ), self-enhancement ( $b = -0.27, p \leq 0.05$ ) and openness to change ( $b = 0.16, p \leq 0.05$ ) are all in the expected direction, providing evidence in support of Hypothesis 1b. But, the coefficient for conservation values is positive ( $b = 0.06, p \leq 0.05$ ), a surprising finding as these values are theorized to be in opposition to openness to change (which

**Fig. 3 Predicted Probabilities of key predictors, main effects.** Predicted probability calculated at highest value of dependent variables. Fixed effects only, calculated holding all other predictors in Table 2 at their means





also has a positive coefficient). Lastly, the effect of political orientation is significant and positive ( $b = 0.03, p \leq 0.05$ ), providing evidence in support of Hypothesis 2b.

While all the effects of these key predictors are significant, not all appear to have substantive effects (see Fig. 2 for the predicted probabilities). The largest substantive effects are resultant of self-transcendent values, where there is a 0.13 difference in the predicted probability between between high (0.21) and low (0.08) levels of self-transcendent values. Self-enhancement also appears to have a moderate substantive effect, where people with high quantities of this value have a 0.10 predicted probability of always reducing their energy usage, compared to 0.19 for those with lower quantities of self-enhancement values. But, while conservation and political orientation both have significant coefficients, the substantive effect of these predictors on an individual always reducing their energy use appears to be limited.

### 5.2.2 Amplification

Figure 3 displays the interactions between human values dimensions and political orientation. Of these interactions, only the effect of openness to change appears to be moderated by political orientations on a person always reducing their energy usage. There are minimal differences between people on the political right, but these differences increase substantially as people more politically left leaning. This provides evidence of an amplifying effect when political orientations are in alignment with openness to change values. There is little visual evidence of a moderating effect for the other human values dimensions. Accordingly, we find limited evidence in support of Hypothesis 3b

## 5.3 Increase fossil fuel tax

### 5.3.1 Main effects

Returning to the regression coefficients of the multilevel ordinal logistic regression in Table 2, We find that self-transcendence has a positive, significant effect on support for increased fossil fuel taxes ( $b = 0.13, p \leq 0.05$ ), while conservation has a negative effect ( $b = -0.20, p \leq 0.05$ ). But neither self-enhancement ( $b = 0.02, n.s.$ ) or openness to change ( $b = 0.00, n.s.$ ) have a significant effect. As such, we find limited evidence in support of Hypothesis 1c. Political preference was again found to have a positive, significant on support for increased fossil fuel taxes ( $b = 0.14, p \leq 0.05$ ), and we therefore find support for Hypothesis 2c.

Turing to predicted probabilities, the most substantive predictors appear to be political orientation and conservation. People on the political left have a 0.45 predicted probability of strongly supporting increasing fossil fuel taxes, compared to 0.33 for those on the right. While people with high quantities of conservation values have a 0.45 predicted probability, compared with 0.33 for those with low quantities. Self-transcendence values also appear to have positive effect, albeit substantively more moderate. Lastly, neither self-enhancement nor openness to change appear to have a substantive effect on a person somewhat or strongly supporting increasing fossil fuel taxes.

## 5.4 Amplification

Figure 3 provides visual evidence of an amplifying effect of political orientation for self-transcendence and conservation values. For conservation values, there are no differences in the likelihood of somewhat or strongly favoring increased fossil fuels taxes between people on the political right, but this substantively increases as people move to the political left, particularly for those with small quantities of conservation values. Similarly, for self-transcendence values, there are greater differences for people on the political left than on the political right, providing evidence of an amplifying effect when values and political orientations are in alignment. As such, we find some evidence in support of Hypothesis 3c.

## 6 Robustness checks

### 6.1 Mediation analyses

An alternate model to consider is that political orientation mediates the effects of values rather than moderates them. Interaction-based moderation analysis investigates if the effect of  $x$  on  $y$  changes due to a third variable  $z$  whereas mediation analysis aims to understand if and how the effect of  $x$  on  $y$  is due to political orientation itself. Within mediation analyses, the ‘total effects’ of  $x$  on  $y$  is commonly decomposed into the ‘indirect effects’ of  $x$  on  $y$  via  $z$ , to see how much of the effect is directly and indirectly attributable to each variable. Due to scaling issues, standard mediation techniques cannot be directly translated to non-linear regression models. A relatively new approach, commonly known as *khb*, resolves many of these issues, allowing for decomposition of direct and indirect effects in logistic regression models (Karlson et al. 2012; Breen et al. 2013, 2018). Performance analyses of the *khb* method suggest that the *khb* routine produces a reasonable approximation of mediation effects under almost all conditions (Smith et al. 2019). Therefore, we investigate for mediating effects by decomposing the direct and indirect effects separately for political orientation by human values on each of the three dependent variables as a robustness check, displayed in Table 3.

Overall, there is very minimal evidence of a mediating effect of any of the human values dimensions by political orientation on climate change concern. The most substantial effect appears to be for openness, where 22% of the direct effect is confounded by political orientation, but this is largely due to the relatively small size of the effect of openness, where the difference in coefficients before and after the inclusion of political orientation is minimal ( $b=-0.01, n.s.$ ). Furthermore, we find little evidence of a mediating effect of any of the human values dimensions by political orientation for reducing energy. Lastly, we find limited evidence of political orientation as a mediator of self-transcendence values on support for increased fossil fuel taxes. Roughly 28% of the effect of self-transcendence is mediated by political orientation, a substantive amount, but the difference in coefficients is not significant ( $b=0.05, n.s.$ ). Accordingly, we find little evidence that values are mediated by political orientations. Rather, the effect of values appears to be direct on climate change attitudes and behaviors.

**Table 3** Decomposition of value dimensions by political orientation

	Climate Change Concern	Reduce Energy	Increase Fossil Fuel Taxes
Self-Transcendence			
<i>Reduced</i>	0.68** (0.03)	0.54** (0.02)	0.19** (0.02)
<i>Full</i>	0.63** (0.03)	0.53** (0.02)	0.13** (0.02)
<i>Difference</i>	0.05 (0.04)	0.01 (0.01)	0.05 (0.04)
Self-Enhancement			
<i>Reduced</i>	-0.12** (0.02)	-0.27** (0.02)	0.02 (0.02)
<i>Full</i>	-0.12** (0.02)	-0.27** (0.02)	0.02 (0.02)
<i>Difference</i>	-0.00 (0.03)	-0.00 (0.01)	-0.00 (0.04)
Openness			
<i>Reduced</i>	0.05* (0.02)	0.16** (0.02)	-0.01 (0.02)
<i>Full</i>	0.06** (0.02)	0.16** (0.02)	0.00 (0.02)
<i>Difference</i>	-0.01 (0.03)	-0.00 (0.01)	-0.01 (0.04)
Conservation			
<i>Reduced</i>	-0.14** (0.02)	0.05** (0.02)	-0.23** (0.02)
<i>Full</i>	-0.12** (0.02)	0.06** (0.02)	-0.20** (0.02)
<i>Difference</i>	-0.03 (0.04)	-0.01 (0.01)	-0.03 (0.04)
Confounding Percentage			
<i>Self-Transcendence</i>	7.1	2.5	27.8
<i>Self-Enhancement</i>	2.4	0.3	-17.6
<i>Openness</i>	-22.5	-1.9	115.5
<i>Conservation</i>	18.2	-13.7	12.1

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ 

## 6.2 Sensitivity analyses

Next, as a robustness check against potential forms of bias, we adopt a methodology developed by Frank (2000) and Frank et al. (2013) to estimate how much bias is required in the estimate of a coefficient to invalidate an inference. For these analyses, we will only focus on the robustness of significant indicators displayed in Table 4.

**Table 4** Impact of a Confounding Variable on Key Predictors

	Climate Change Concern	Reduce Energy	Increase Fossil Fuels Tax
<i>Self-transcendence</i>	92.7%*	91.5%*	71.6%*
<i>Self-enhancement</i>	53.6%*	89.2%*	34.9%
<i>Openness</i>	41.1%*	75.9%*	32.8%
<i>Conservation</i>	74.8%*	62.6%*	82.4%*
<i>Political Orientation</i>	68.6%*	28.9%*	83.9%*

\*Regression coefficient has  $p < 0.05$  (see Table 2)

To render the effect of self-transcendence on climate change concern non-significant roughly 92% of the cases would have to be replaced with a case of no effect. As such, the ESS would have to contain an enormous amount of measurement error for this effect to be erroneous.

In contrast, the comparatively smaller effect of openness to change values on climate change concern would have to have roughly 41% of the cases replaced with no effect to become non-significant. This finding suggests, the effect of openness is comparatively more vulnerable to measurement error. This also matches with the findings of comparatively diminished substantive effect openness to change values as well, where there are minor differences between low and high quantities of this value on climate change concern.

In sum, the larger substantive effects all appear to be very robust, while some of the smaller substantive effects of values may be more vulnerable. As such, caution should be taken when making inferences about values with comparatively smaller effects sizes.

Furthermore, as a robustness check on the interaction product term for the relationship between the four human values dimensions and political orientations, we performed supplementary analyses included models where the four values dimension were further interacted by all control variables (see Hastings and Roeser 2020). In all the supplementary models, the substantive effect of the interactions remains unchanged, providing evidence that these are not the product of another moderation. Therefore, we find evidence of robustness in these effects.

## 7 Conclusion

This paper explores how human values and political orientations combine to pattern climate change attitudes and behaviors in Western European states. We build upon the long-standing literature of cross-national climate change attitudes and behaviors to develop a richer understanding of the direct effects of human values and political orientations (McCright et al. 2016b; Lewis et al. 2018; Poortinga et al. 2019; Smith and Mayer 2018a; Marquart-Pyatt et al. 2019). Further, we uniquely contribute an analysis of the interactive role of human values and political orientations shaping climate change attitudes and behaviors, exploring patterns of amplification. The findings demonstrate the deeply interrelated nature of human values and politics and how their alignment can amplify individual perceptions and actions in relation to climate change.

We show that human values dimensions have a direct effect on climate change concern, behaviors and policy support. Self-transcendence values have the most substantive (positive) effect on climate change concern and energy reducing behaviors, while being comparatively less effective in shaping support for increased fossil fuel taxes. Rather, conservation values appear to be stronger substantive (negative) drivers of this measure of policy support. These findings are consistent with the prior literature (Poortinga et al. 2019; Dietz et al. 2007). Furthermore, we find that political orientation (moving from right to left) has a substantive positive effect on climate change policy support and concern, but not on individual energy behaviors. These findings provide additional evidence of differences based upon political orientation (McCright et al. 2016b; Lewis et al. 2018; Smith and Mayer 2018a), but also demonstrate how the effect varies substantially across types of climate change attitudes and behaviors in Western European states.

The principal contribution of this analysis is an exploration of the interactive relationship between human values and political factors. Given that human values and political factors are both substantive predictors of climate change attitudes and behaviors (Hornsey et al. 2016), and deeply related constructs (Caprara and Zimbardo 2004; Feldman 2003), we anticipated these factors interact and strengthen support for, or opposition to, climate change concern and behaviors. We find strong evidence of an interactive effect between human values and political orientation. The moderating effect of political orientation was most evident for self-transcendence, where the effect of this value was amplified as people move from the political right to left and greatly increased the likelihood of climate change concern and support for policies that mitigate climate change and support increasing fossil fuel tax to reduce climate change. Openness to change was also moderated by political orientations for climate change concern and policy support as well as support for reducing their energy in a similar direction, but this effect was less pronounced.

Given the adoption of an interactive product term, these findings are reflective of the multiplicative property of positive relationships. They are also consistent with literature on cognitive consistency which posits that individuals have a strong desire for their beliefs, opinions, and attitudes to be congruent (Gawronski 2012; Quine and Ullian 1978). As such, when human values aligns with a person's political orientation, this acts as a fortifying mechanism on the validity of one's beliefs, amplifying their attitudes towards climate change via increased, mutually reinforced confidence in the correctness of their position.

In sum, the effects values and political factors on climate change attitudes and behaviors is best represented within an multiplicative interactive relationship, and not an additive one, where these moderating factors can strongly amplify climate change support.

The findings have a number of important implications for climate change advocates and policy stakeholders. Advocacy efforts are found to be more effective in increasing problem awareness when they connect with salient values. Frames play an important role in this as they can align values with specific issues. Frames are principles of cognition that function to organize experience and guide action (Benford and Snow 2000; Goffman 1974). They do so in part by making "certain aspects of perceived reality more salient in such a way as to promote a particular problem definition, causal interpretation, moral evaluation and treatment recommendation" (Entman 1993 p.52). Framing efforts are found to be most effective in mobilizing actors when they resonate with a person's values and political ideologies (Chong and Druckman 2013; Jasper 1997). Left-leaning political stakeholders could potentially motivate greater support and action by framing their climate change efforts directly in relation the self-transcendence value dimensions. By bringing values, political ideologies and climate change attitudes and behaviors into alignment, there is great potential to shift attitudes and behaviors towards greater climate change support.

There is also greater potential for changing the priorities of existing institutions. Political actors are particularly responsive to shifting public opinions (Soroka and Wlezien 2010). Substantive, rapid shifts in attitudes have the potential to punctuate “sticky” institutions resulting in shift to policy regimes (Baumgartner and Jones 2010). In times where climate change becomes a salient political issue, shifting public opinion dynamics presents a “policy window”, where climate policy entrepreneurs are provided the opportunity to promote their preferred policy instruments (Kingdon 1995). Accordingly, the individual-level amplification of climate change attitudes presents an opportunity to shift existing policy structures.

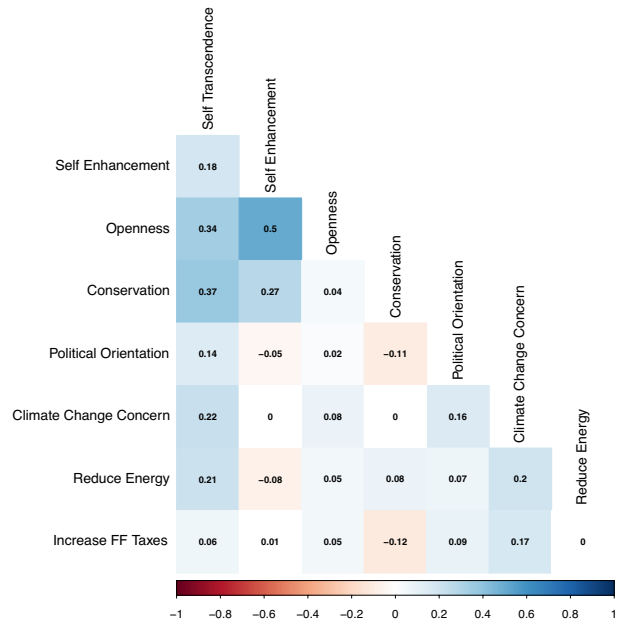
In addition to highlighting potential social mechanisms for promoting climate change concern and action, this study also contributes to the relevant literature by adopting multiple measures approach towards understanding different forms of climate change attitudes and behaviors (Stern 2000). The effect of human values dimensions and political factors are found to vary substantially across the three dimensions included in this analysis. Political orientation appears to be most effective in shaping support for climate change policies, where people on the political left have a 0.12 higher predicted probability of supporting increases to fossil fuel taxes than those on the right. This effect does appear to be more moderate for climate change concerns (a difference in predicted probability of 0.09) and substantively null for energy reducing behaviors. These results suggest that while differences emerge as a result of political orientations, these factors are more closely related to matters of policy, but not to individual environmental behaviors. Using the 2016 ESS, but relying upon different indicators, Marquart-Pyatt et al. (2019) similarly report differences in energy policy support but in energy behavioral intentions. As such, we argue future research needs to pay closer attention to how the effects of key predictors can vary across different forms of climate change attitudes and behaviors (Smith et al., 2018).

The theory underlying the amplification of social attitudes and behaviors by human values and political orientations is not limited to climate change, or environmentally relevant fields of study, but rather is potentially generalizable to a broader set of policy areas. We conducted preliminary analyses using the same data (ESS Wave 8) and methodology to understand patterns of support for welfare state policies. We found a similar amplification of support for basic income for all and EU-wide social benefits scheme policy measures (see Supplementary Materials, Figures S7 and S8). Further research could explore the generalizability of the interrelationship of values and political orientation across an array of social policies.

Additionally, while these findings establish the association between values and political orientation on climate change attitudes and behaviors, further work could investigate the theoretical and empirical mechanisms behind the role [mis]alignment of factors. Such work could involve qualitative research to explore the conditions under which values are aligned and misaligned with political orientations, as well as other factors which can further amplify or dampen this relationship on political attitudes and behaviors (such as political interest).

The results of this study are limited by several factors. First, while values are comparatively stronger predictors of political orientation in Europe than other common factors, such as socio-demographic characteristics (Piurko et al. 2011), they are still limited in their explained variance (see Fig. 4). As such, divergent, and more specific indicators of political factors (e.g. country-specific party affiliations, populist attitudes, expressive or negative partisanship) could provide further insight into the interactive role of politics and human values structuring climate change attitudes and behaviors (Mason and Wronski 2018; Abramowitz and Webster 2019; Mayer 2019; Huber 2020). Furthermore, this interactive relationship could be further explored

**Fig. 4** Correlation Matrix of Dependent and Predictor Variables



in other areas of climate change attitudes and behaviors, particularly those involving behaviors and policies that are perceived to be more costly (Dickmann and Preisendorfer 2003).

Lastly, the 2016 ESS presents a unique, cross-national dataset, allowing for such comparisons to be made within these states. To better understand the inter relationship between human values and political factors, items for human values

should be included in other major cross-national surveys to validate these findings. These results should also be compared to other regions, such as English-speaking states, where there is a strong effect of political factors have been identified, but also in states where political factors have been noted as not being as effective, such as post-Communist, transition states. Moreover, heterogeneities within Western European states could be explored to understand whether this interactive relationship is more prominent within certain states than others. This is certainly possible, as the effect of political orientation does appear to vary within Western European states (Marquart-Pyatt et al. 2019), as well as does the direct effects of values (Poortinga et al. 2019). Such an analyses would incorporate ideal case studies to identify unique patterns within these Western European states. Lastly, the role of other contextual factors, such as media influence, climate vulnerability, and socio-political histories, should be included in subsequent analysis.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s10584-022-03348-5>.

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**Author Contributions** KS designed the project, analyzed all data. KS and LMH drafted the manuscript.

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**Data Availability Statement** This project adopts data collected and made publicly available from the European Social Survey (2016, Wave 8). All ESS data is available at: <https://www.europeansocialsurvey.org/data/round-index.html>

**Replication Materials** Stata code to replicate these analyses is available in Keith Smith's github repository [https://github.com/edksmith/Replication\\_data/tree/main/Values\\_politics](https://github.com/edksmith/Replication_data/tree/main/Values_politics).

## Declarations

**Conflicts of interest** The authors declare that they have no conflict of interest.

**Ethical standard** This analysis relies upon publically available secondary survey data, sourced from the European Social Survey. Information on the European Social Survey's research ethics are available at <https://www.europeansocialsurvey.org/about/ethics.html>. As this research did not involve human subjects, we did not seek ethics approval for this project.

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