



Second-Order Beliefs and Pro-Environmental Policy

Support: The Mediating Role of Collective and

Participative Efficacy Beliefs

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Abstract

Ambitious climate action is urgently needed. Previous research demonstrates that public support for pro-environmental policies depends upon people's perceptions of what other actors believe and do, so-called second-order beliefs. In the current research, I investigated whether beliefs about the collective efficacy of humanity and the participative efficacy of one's home country serially mediate the relationship between second-order beliefs about other nations (i.e., the US and China) and pro-environmental policy support among citizens of the European Union. Global identity and perceived national responsibility were included as moderators in the model. An online questionnaire survey was conducted (N = 669) and the responses were analyzed using Hayes' bootstrapping approach. The results indicate that the indirect effect of second-order beliefs about other nations on pro-environmental policy support via collective and participative efficacy beliefs was indeed significant. However, the moderation analyses were not significant. Furthermore, people generally underestimated others' support for pro-environmental policies. Hence, to promote pro-environmental policy support, campaigners and policymakers should aim to foster efficacy beliefs and resolve misperceptions. Further implications as well as limitations and areas for future research are discussed.

Keywords: second-order beliefs, pro-environmental policy support, efficacy beliefs, collective action, renewable energy transition

Second-Order Beliefs and Pro-Environmental Policy Support: The Mediating Role of Collective and Participative Efficacy Beliefs

In its recent report, the Intergovernmental Panel on Climate Change (IPCC) emphasizes the ‘unequivocal’ influence of human activity on climate systems. Without deep cuts in greenhouse gas emissions, global warming of 1.5°C and 2°C compared to pre-industrial levels will be exceeded during this century (IPCC, 2021). The urgency to act is overwhelming, yet current global policies do not suffice, and the climate crisis unrelentingly continues (Department of Economic and Social Affairs, n.d.; Ritchie et al., 2020a). The climate crisis can be understood as a *collective action problem* which means that, just as it is the result of collective behaviour, it can also only be solved on a collective level (Fritsche et al., 2018). The actions of an individual person by themselves barely have an impact on the overall system. Instead, national and international collaboration of many different actors will be needed to find and implement solutions that will effectively slow down global warming. It is only if all actors jointly work together to reach the collective goal that the climate crisis can be solved (Rydge & Bassi, 2014). Consequently, beliefs about the opinions, intentions, and behaviours of other actors, so-called ‘second-order’ beliefs, might influence one’s own willingness to act in the collective interest, that is support pro-environmental policies that do not usually result in any immediate personal benefits (Schuitema & Bergstad, 2019). Indeed, recent research has shown that second-order beliefs are important predictors of support for pro-environmental policies (Goldberg et al., 2020; Mildemberger & Tingley, 2019; Schuldt et al., 2019) as well as energy conservation behaviour (Jachimowicz et al., 2018).

At present, no research has investigated the underlying mechanisms or the boundary conditions of the effect of second-order beliefs on pro-environmental policy support. In this study, by drawing upon the literature on collective action (Fritsche et al., 2018; van Zomeren et al., 2008; van Zomeren et al., 2018), a theoretical model of the effect of second-order

beliefs about other nations on pro-environmental policy support is proposed and examined. Specifically, it is suggested that second-order beliefs concerning other nations influence pro-environmental policy support through collective and participative efficacy beliefs in a serial manner. Thereby, I propose that if people assume that other countries do not contribute to the collective goal, it lowers expectations of achieving the common goal, consequently reducing the perceived effectiveness of own national contributions to the goal, and thus decreasing pro-environmental policy support. Furthermore, it is examined whether individuals' global identity¹ and perception of national responsibility moderate the indirect relation between second-order beliefs and pro-environmental policy support. In the following paragraphs, the rationale of this moderated mediational model will be elaborated in more detail and relevant empirical evidence will be discussed.

Second-Order Beliefs in the Context of Collective Environmental Goals

In their study among Chinese and American citizens, Beiser-McGrath and Bernauer (2019) demonstrated that people care about other countries' contributions to the global effort of limiting global warming to 1.5°C, as indicated in the Paris Agreement. In fact, public support for climate agreements decreased if the citizens were told that another country had increased its emissions. In another study, it was shown that both Chinese and American citizens held inaccurate second-order beliefs, thereby systematically underestimating pro-environmental policy support within the other nation, respectively. Correcting these misperceptions led to an increase in the individual-level support for pro-environmental policies in one's home country (Mildenberger & Tingley, 2019). Thereby, the effect of second-order beliefs on pro-environmental policy support, or related behaviours, goes over-and-above personal, 'first-order' beliefs (e.g., one's personal belief that it is important to

¹ Different terms are used in the literature to describe the concept of identification with the global community, humans all over the world or all of humanity. In line with most previous research, this study uses 'global identity' as a label for that concept.

support climate action; Jachimowicz et al., 2018; Schuldt et al., 2019). Since progressive climate action in democratic societies strongly depends on the public support (i.e., acceptance) of pro-environmental policies, understanding the factors that drive policy support is of key importance. As the aforementioned studies demonstrate, second-order beliefs might be a promising, yet little researched influencing factor of pro-environmental policy support. Therefore, in this paper, second-order beliefs about other nations are investigated.

Taddicken and colleagues (2019) demonstrated how second-order beliefs regarding other nations are influenced by social identity processes. Participants rated their own nation's climate crisis awareness as much higher than that of other nations. Additionally, other nations, establishing the 'out-group', were rated similarly to each other despite considerable differences in their climate crisis awareness (Taddicken et al., 2019). Though second-order beliefs regarding one's own nation and other nations can increase the salience of group membership in terms of nationality, that does not automatically have to result in the categorization of an 'in-group' and 'out-group'. Instead, the Common Ingroup Identity Model proposes that if two groups share the same goals, it can lead to the development of a *superordinate* group identity that unites both the former in- and out-group members (Gaertner et al., 1993). As the climate crisis represents a global crisis in which all humans and nations share the same goal of limiting global warming to 1.5°C, a common superordinate group can thus evolve. An evident superordinate group in the context of the climate crisis is the 'global community' to which all humans belong as 'global citizens', or rather 'all humanity' as proposed by McFarland and colleagues (2012).

In line with this idea of humanity as one superordinate in-group, this study will examine superordinate collective efficacy beliefs referring to *humanity's* perceived capability to limit global warming to 1.5°C. Nations are understood as members of this group, contributing to humanity's collective goal.

Mediators

Collective Efficacy Beliefs

According to the Social Identity Model of Collective Action (SIMCA; van Zomeren et al., 2008; van Zomeren et al., 2018) and the Social Identity Model of Pro-Environmental Action (SIMPEA; Fritsche et al., 2018), collective efficacy beliefs are an important predictor of collective action, particularly pro-environmental action. Collective efficacy beliefs refer to people's shared beliefs that their group is capable of performing certain actions and reaching desired outcomes through collective action (Bandura, 2000).² It has been shown that collective efficacy beliefs are associated with green voting decisions, willingness to sign pro-environmental petitions and other public sphere as well as activist pro-environmental behaviour (PEB; Homburg & Stolberg, 2006; Lee, 2006; Roser-Renouf et al., 2014; van Zomeren et al., 2010). Enhancing collective efficacy leads to increased PEB intentions, thereby establishing a stronger effect than enhanced self-efficacy, that is beliefs in one's capabilities to reach the desired outcome (Bandura, 1997; Chen, 2015, 2016). Furthermore, a study by Doherty and Webler (2016) demonstrated that 'beliefs that similar others took action' reinforced collective efficacy beliefs and, in turn, increased public sphere PEB among alarmed individuals. Thus, similarly, I argue that the influence of second-order beliefs about other nations on pro-environmental policy support is mediated by collective efficacy beliefs. If one believes that other nations are taking action to limit global warming to 1.5°C, the perceived capability of humanity to reach this goal should be higher which, subsequently, increases support for pro-environmental policies contributing to this goal. Conversely, if it is

² Recent literature has further distinguished between collective efficacy and collective *response* efficacy to differentiate between beliefs about the group's capability to act together and beliefs about the results of these actions (see Doherty & Webler, 2016 for more information). In this study, I stick to the popular, widely used definition by Bandura (2000), thereby encompassing both types of these beliefs within 'collective efficacy beliefs'.

believed that other nations are not taking action, collective efficacy beliefs should be weaker, thus resulting in less support for pro-environmental policies.

Participative Efficacy Beliefs

Classical approaches to collective action propose that rational actors will free ride instead of contributing to the achievement of the collective goal if they think that their group can reach its goals through collective efforts (i.e., if their collective efficacy beliefs are high; Olson, 1968; Stroebe & Frey, 1982). However, as outlined in the previous paragraph, the opposite has been found. A possible explanation for this observation is participative efficacy beliefs which refer to the ‘belief[s] that one’s own contribution to [the collective goal] makes a difference’ (van Zomeren et al., 2012, p. 620). In their study, van Zomeren and colleagues (2012) demonstrated that participative efficacy beliefs predicted collective action independently of other variables and over-and-above collective efficacy beliefs. Additionally, collective and participative efficacy beliefs were positively correlated. Furthermore, it has been found that the effect of collective efficacy on individual PEB is mediated by self-efficacy. Higher collective efficacy predicted higher self-efficacy which, ultimately, predicted PEB intentions (Jugert et al., 2016). However, while self-efficacy beliefs are useful for predicting private PEB, participative efficacy beliefs have been shown to be the better predictor for public, or activist, PEB, such as joining protests or supporting policies (Hamann & Reese, 2020). Therefore, in the context of collective action, I propose that higher collective efficacy beliefs of humanity are positively associated with pro-environmental policy support through higher *participative* efficacy beliefs. Deviating from classic research, in this study, participative efficacy beliefs will be conceptualized on a collective, namely national, instead of on an individual level, meaning that nations are understood to contribute to the collective goal of humanity to limit global warming to 1.5°C.

To summarize, if it is believed that other nations are taking action to limit global warming to 1.5°C (positive second-order beliefs), collective efficacy beliefs regarding humanity should be higher. Consequently, the belief that the contribution of one's own nation matters for the achievement of humanity's collective goal to limit global warming to 1.5°C (i.e., participative efficacy beliefs) should increase, which will ultimately result in higher support for corresponding national pro-environmental policies; and vice versa.

Moderators

Global Identity

Both the SIMCA (van Zomeren et al., 2008) and SIMPEA (Fritsche et al., 2018) highlight the importance of social identities (i.e., people's sense of self that is defined by their group memberships; Tajfel & Turner, 1979) for collective action (Fritsche et al., 2018). A social identity that seems to be particularly relevant for pro-environmental collective action is one's global identity, that is the extent to which one identifies with 'all humanity' (McFarland et al., 2019). Indeed, people with stronger global self-definitions are more likely to support climate policies, buy environmentally friendly products and engage in (activist) PEB (Loy & Reese, 2019; Ng & Basu, 2019; Renger & Reese, 2017; Reysen & Katzarska-Miller, 2013). Furthermore, global identity is positively associated with the personal and societal relevance attributed to the climate crisis (Loy et al., 2022). Generally, a global identity seems to be positively associated with cooperation in social dilemmas (Buchan et al., 2011). Thus, Batalha and Reynolds (2012) even argue that a superordinate global identity in the context of climate negotiations is essential to enable aligned climate action.

The Common Ingroup Identity Model (Gaertner et al., 1993) suggests that through the lens of a global identity, all nations are viewed as part of the superordinate global 'in-group'. Arguably, second-order beliefs about other nations then represent perceived (normative) information about other group members (e.g., Jachimowicz et al., 2018). It has been shown

that the stronger one identifies with a group, the stronger the group norms influence one's own beliefs and behaviour (Fielding et al., 2008; Reed, 2004; Terry & Hogg, 1996). Further, stronger feelings of identification with a group increase one's collective efficacy beliefs of the group (Jung & Sosik, 2002; Murray et al., 2020). Therefore, I argue that the stronger one identifies with 'all humanity', that is, the stronger one's global identity, the stronger the effect of second-order beliefs about other nations on collective efficacy beliefs will be.

Perceived National Responsibility

The recent 'Eurobarometer' regarding the climate crisis indicates that 63% of European citizens believe that national governments are responsible to mitigate the climate crisis (European Commission, 2021). Research shows that perceptions of responsibility to act on the climate crisis influence pro-environmental policy support. If people regard their countries as having a moral obligation to take measures on the climate crisis, policies implementing appropriate measures are more likely to be supported (Nisbet, 2009). A comparison across four European countries showed that for citizens of all countries, environmental action was predicted by the feeling of responsibility (Punzo et al., 2019). In another study, the acceptability of energy policies was predicted by the 'personal responsibility for the problem' as well as the 'moral obligation to act upon it' (de Groot & Steg, 2009). However, most of these studies investigate perceptions of individual, instead of national responsibility, even though far fewer people perceive individuals as the responsible agents to address the climate crisis (European Commission, 2021). Therefore, in this paper, perceptions of *national* responsibility are examined. I argue that perceived national responsibility moderates the relation between participative efficacy beliefs and pro-environmental policy support. Thereby, beliefs about what *can* be done ('I believe that my nation can contribute to limiting global warming to 1.5°C') will have a stronger effect on the corresponding action (e.g., support for a national carbon tax) if people believe that it *ought* to

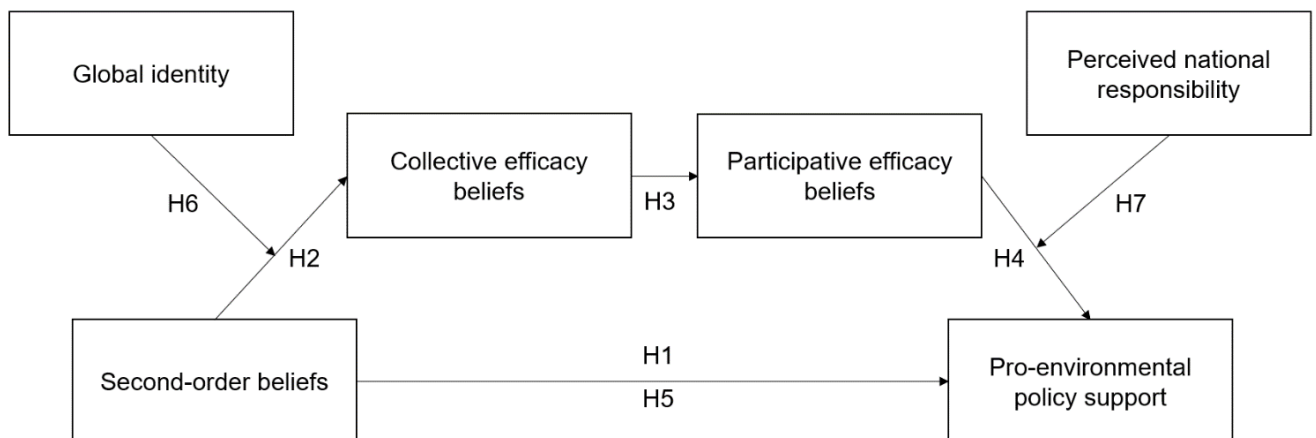
be done by their own nation (‘I believe that my nation is responsible for limiting global warming to 1.5°C’). As feelings of responsibility can be a strong driver of PEB on their own (Ng & Basu, 2019), strong perceptions of responsibility might additionally buffer the negative effects of low participative efficacy beliefs. That is, people might support pro-environmental policies despite the belief that their nation’s contribution does not make a big difference if they think that their nation has a moral obligation to act. However, if the perceived national responsibility is low, people will likely redirect responsibility to act to other nations with higher emissions – a common excuse in the discourse of climate delay called ‘whataboutism’ (Lamb et al., 2020). Consequently, it is proposed that under these circumstances even high participative efficacy beliefs will have a small effect on pro-environmental policy support.

The Present Study

To summarize, it is proposed that second-order beliefs about other nations affect pro-environmental policy support through collective and participative efficacy beliefs. Global identity and perceived national responsibility are proposed as moderators of the mediational relation (see Figure 1).

Figure 1

Moderated Mediation Model of Second-Order Beliefs on Pro-Environmental Policy Support



In line with previous research, the investigated second-order beliefs will concentrate on the US and China as these nations are the two world's largest CO₂ emitters and thus, are key players in international climate politics and progress (Ritchie et al., 2020b). Further, the study will focus on the renewable energy transition as the decarbonization of the energy system is of tremendous importance to drastically reduce greenhouse gas emissions and hence, limit global warming to 1.5°C (Ritchie et al., 2020c). Thus, the specific second-order beliefs are about whether citizens of the US and China support the national and international renewable energy transition.

The study can extend research and theory on second-order beliefs and collective action in three ways: 1) by exploring the underlying mechanisms of second-order beliefs on pro-environmental policy support; 2) by investigating a social identity context without a clear 'in-group' or 'out-group' but rather a common superordinate group; 3) by examining the moderating role of perceived national, rather than individual, responsibility on policy support. To test the hypotheses, a cross-sectional study was conducted with citizens of countries that belong to the European Union (EU). The following hypotheses were investigated:

Primary Hypotheses

H1. Second-order beliefs (i.e., the estimated support of Chinese and American citizens for a renewable energy transition) are positively associated with pro-environmental policy support.

H2. Second-order beliefs are positively associated with collective efficacy beliefs regarding humanity's ability to transform to a fully renewable and carbon-free energy system.

H3. Collective efficacy beliefs regarding humanity's ability to transform to a fully renewable and carbon-free energy system are positively associated with participative efficacy beliefs regarding one's nation's ability to contribute to transforming to a fully renewable and carbon-free energy system.

H4. Participative efficacy beliefs regarding one's nation's ability to contribute to transforming to a fully renewable and carbon-free energy system are positively associated with pro-environmental policy support.

H5. The effect of second-order beliefs on pro-environmental policy support will be serially mediated by collective and participative efficacy beliefs, such that second-order beliefs are positively associated with pro-environmental policy support through higher levels of collective and participative efficacy beliefs.

H6. Global identity moderates the effect of second-order beliefs on collective efficacy beliefs, such that the effect is stronger for participants with a strong global identity, that is, who identify strongly with humanity, than those with a weak global identity.

H7. Perceived national responsibility regarding the transformation to a fully renewable and carbon-free energy system moderates the effect of participative efficacy beliefs on pro-environmental policy support, such that the effect is stronger for participants who feel that their nation is more responsible than those who feel that it is less responsible.

Secondary Hypotheses

The following hypotheses were included to test whether the findings of previous studies (Mildenberger & Tingley, 2019; Taddicken et al., 2019) could be replicated in this study's sample.

H8. Second-order beliefs about one's own nation (i.e., the estimated support of citizens of one's home country for a renewable energy transition) will be higher than the second-order beliefs about other nations (i.e., Chinese and American citizens).

H9. Second-order beliefs regarding the support of Chinese and American citizens for a renewable energy transition will be inaccurate, that is, estimates will be lower than the actual support as identified in the nationally representative surveys of the Green Energy Barometer (Ørsted, 2017).

Method

Participants and Procedure

An a-priori power analysis, conducted by using the software tool G*Power (version 3.1.9.7; Faul et al., 2009), with a prospective power of 80% and an expected small effect size ($f^2 = .02$) yielded a required sample size of 647 participants (linear multiple regression: fixed model, R^2 increase; five tested predictors).³ Taylor et al. (2008) also recommend a sample size of at least 500 participants for three-path mediations to reach power above 80% for small effect sizes. The collected sample consisted of 775 participants, out of which 451 were recruited through personal networks and 324 through SONA (i.e., a university-internal system of the University of Groningen in which first-year psychology students can participate in research to earn credit points for their study program). Thirty participants did not complete the survey and were removed from the dataset. To ensure a certain degree of homogeneity in participants' second-order beliefs about the US and China, 60 participants from countries that do not belong to the EU were removed. Finally, 16 participants were excluded during data-cleaning procedures to ensure high data quality. During data-cleaning, all responses were removed that a) had failed the honesty check ('Did you answer the questions in this questionnaire honestly?'), b) were faster than a third of the median response time (3.35 min), or c) showed response patterns (i.e., straight-lining) on at least two separate sets of preidentified items. Outliers were not excluded. The final sample consisted of 669 participants (29% male, 70% female, 0.2% prefer not to say) who ranged in age from 18 to 74 years ($M = 28.60$, $SD = 13.33$), with 420 participants from Germany, 181 from the Netherlands, and the remaining 68 participants from 18 other EU Member States.

The survey was conducted online between January and April 2022. Survey data was collected using the online survey tool 'Qualtrics' (version 01/2022;

³ Since the study's model is quite complex, a power calculation was run for that part of the model which was most likely to require the most power (i.e., the moderation).

<https://www.qualtrics.com>). After informed consent (see Appendix A) had been given, participants proceeded to the survey which had a median response time of 10 minutes. Participants needed to be at least 18 years old to take part in the study and were recruited as a convenience sample through the aforementioned channels. Participants from SONA received 0.3 SONA credits upon survey completion. All other participants who completed the survey were offered a chance to participate in a draw to win one of five 30€ gift cards for an ecological online bookstore.

Ethics approval for the study was granted by the Human Ethics Committee at the University of Groningen (Ethics #: PSY-2122-S-0130). All hypotheses as well as the analysis plan were pre-registered on the Open Science Framework prior to accessing the data (<https://osf.io/ysjvc>). Exploratory analyses are clearly distinguished from confirmatory analyses in the Results section and Appendices. Any deviations from the pre-registered hypotheses and analysis plan are indicated.

Measures

The measures described below were presented in the following order in the survey. The presentation of the items of each scale was randomized and all items were implemented as forced-choice questions. A complete list of all items can be found in Appendix B.⁴ All items of one scale were averaged to form the composite variable, with reverse-coded items being recoded prior to that.

Second-Order Beliefs

Second-order beliefs about citizens of the US and China were measured with the same three items per country. The items were adapted from Judge and Steg (2022) and the content focused on specific beliefs regarding the renewable energy transition that have been assessed

⁴ The scales were presented alongside additional scales that are not part of the theoretical model and thus, not included in the confirmatory analyses. Those measures include personal beliefs about the renewable energy transition, second-order beliefs about one's own nation, public-sphere PEB, identification as an environmental activist and climate change beliefs, and are also listed in Appendix B.

in representative surveys by Ørsted (2017) across 13 countries. An example item is ‘What percentage of [US/Chinese] citizens do you think want their country to be ambitious in its approach to build and produce green energy?’. Using a slider, participants could indicate a value between 0% to 100%. A principal axis factoring analysis supported a unidimensional model with second-order beliefs about American and Chinese citizens explaining 48% of the variance. Thus, all six items were combined into one scale. The reliability of the scale was $\alpha = 0.85$.

Collective Efficacy Beliefs

Collective efficacy beliefs were measured with four items adapted from van Zomeren et al. (2012). The existing items were adjusted to focus on the decarbonization of the energy system, e.g.: ‘I believe that humanity, as a group, can successfully transform to a fully renewable and carbon-free energy system’ ($\alpha = 0.93$). The scale ranged from 1 (*not at all*) to 7 (*very much*).

Participative Efficacy Beliefs

Participative efficacy beliefs were also measured with four items adapted from van Zomeren et al. (2012). The existing items were again adjusted to focus on the decarbonization of the energy system and on nations, instead of individuals, contributing to that collective goal. An example item is: ‘I believe that [participant’s country], as a nation, can contribute greatly so that humanity, as a group, can successfully transform to a fully renewable and carbon-free energy system’ ($\alpha = 0.94$). The scale ranged from 1 (*not at all*) to 7 (*very much*).

Perceived National Responsibility

Perceived national responsibility was measured with three items adapted and extended from the one-item measure by Bouman et al. (2020): ‘To what extent do you feel [participant’s country] is responsible to transform the energy system to fully renewable and carbon-free?’ ($\alpha = 0.89$). The scale ranged from 1 (*not at all*) to 7 (*very much*).

Pro-Environmental Policy Support

Pro-environmental policy support was measured with four items adapted and extended from Bouman et al. (2020): ‘Say [participant’s country] was to pass certain policies mentioned below. On a scale from 1 (strongly against) to 7 (strongly in favour), how much would you support or oppose each of these policies? Increasing taxes on fossil fuels, such as oil, gas, and coal / Using public money to subsidise renewable energy such as wind and solar power / A law banning the sale of the least energy efficient household appliances / Giving tradeable emission permits to companies **without** charging them (*reversed*)’. An explanation of emission permits was provided for the last item (see Appendix A). The reliability of the scale was insufficient ($\alpha = 0.53$). The first three items correlated moderately, with correlations ranging from $r = 0.32$ to $r = 0.44$. However, the last item barely or only weakly correlated with the other items ($r = 0.05$ to 0.12). A principal factor analysis showed that the item loaded only weakly on the common factor. Its commonality of just 0.02 further underlined its misfit with the factor. Thus, the item was removed from the scale. The refined scale had an improved reliability of $\alpha = 0.66$, thus still not quite reaching the satisfactory level of $\alpha = 0.7$. The scale ranged from 1 (*strongly against*) to 7 (*strongly in favour*).

Global Identity

Global identity was measured with an adapted version of the ‘Identification With All Humanity Scale’ by McFarland et al. (2012), deviating from the validated scale in assessing solely participants’ identification with humanity but not with their community and country. The scale consisted of a total of nine items, such as: ‘How close do you feel to people all over the world?’ ($\alpha = 0.84$) and ranged from 1 to 5 with different labels for the answer options (e.g., ‘not at all close’ to ‘very close’), depending on the exact wording of the item.

Results

All data analyses were performed using R Studio (version 2021.9.0.351; RStudio Team, 2021). An alpha level of .05 was used for all statistical tests unless otherwise indicated.

Descriptive Analysis and Statistical Test Assumptions

Means, standard deviations, and bivariate correlations between all variables can be found in Table 1. All variables were negatively skewed, though second-order beliefs, participative efficacy beliefs, and global identity could still be considered fairly symmetrical. However, Shapiro-Wilk tests revealed that all variables except for second-order beliefs ($p = .056$) deviated significantly from the normal distribution. The distribution of residuals also deviated significantly from a normal distribution ($p < .001$) and the assumption of homoscedasticity was not met either ($p < .01$). However, as the implemented bootstrapping approach does not make any assumptions about the data distribution and robust standard errors were calculated, these violations should not affect the accuracy of the analysis. The linearity of the multiple correlation between X and Y was assessed by plotting the residuals vs. fitted values. Based on the plot, the assumption of linearity was estimated to be met. Though the dataset contained a small number of outliers, their overall influence on the regression model was judged as low, based on a visualization of Cook's distances, and outliers were not removed.⁵ The Durbin Watson test revealed no violation of the independence of residuals with an autocorrelation of .04 ($p = .296$). Further, multicollinearity was not an issue as all variance inflation factors ranged around 1.

⁵ An additional analysis in which all outliers on pro-environmental policy support ($n = 18$) were removed, did not differ meaningfully in its results.

Table 1*Means, Standard Deviations, and Bivariate Correlations between Variables*

	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Second-order beliefs	50.94	14.70					
2. Collective efficacy beliefs	4.97	1.28	.18***				
3. Participative efficacy beliefs	4.86	1.29	.13**	.51***			
4. Perceived national responsibility	5.66	1.30	.11**	.26***	.37***		
5. Global identity	3.28	0.64	.06	.19***	.26***	.37***	
6. Pro-environmental policy support	5.31	1.13	.05	.17***	.28***	.50***	.37***

Notes. Spearman correlation coefficients are reported as no variable except for second-order beliefs was normally distributed. *M* = mean, *SD* = standard deviation

** $p \leq .01$ *** $p \leq .001$

Primary Analyses

Mediation Analysis

A serial mediation analysis (H1- H5) was conducted using model 6 of the Process function for R by Hayes (2022). Statistical significance was assessed by applying bootstrapping with 5,000 resamples to obtain robust 95% confidence intervals (CI) of the indirect effects. If the CI did not include zero, the effect was considered significant (Hayes, 2022).

Figure 2 shows the results of the serial mediation analyses. Although higher second-order beliefs were associated with higher pro-environmental policy support, the effect did not reach significance, thereby rejecting hypothesis 1 (direct effect, $b = .002$, $se = .003$, $p = .507$, 95% CI = [-.004, .01]).⁶ The total effect was just marginally significant (total effect, $b = .005$, $se = .003$, $p = .0895$, 95% CI = [-.001, .01]).

Supporting hypothesis 2, second-order beliefs were found to be a positive predictor of collective efficacy beliefs ($b = .01$, $se = .003$, $p < .001$, 95% CI = [.008, .02]). Higher collective efficacy beliefs, in turn, predicted higher participative efficacy beliefs ($b = .51$, $se =$

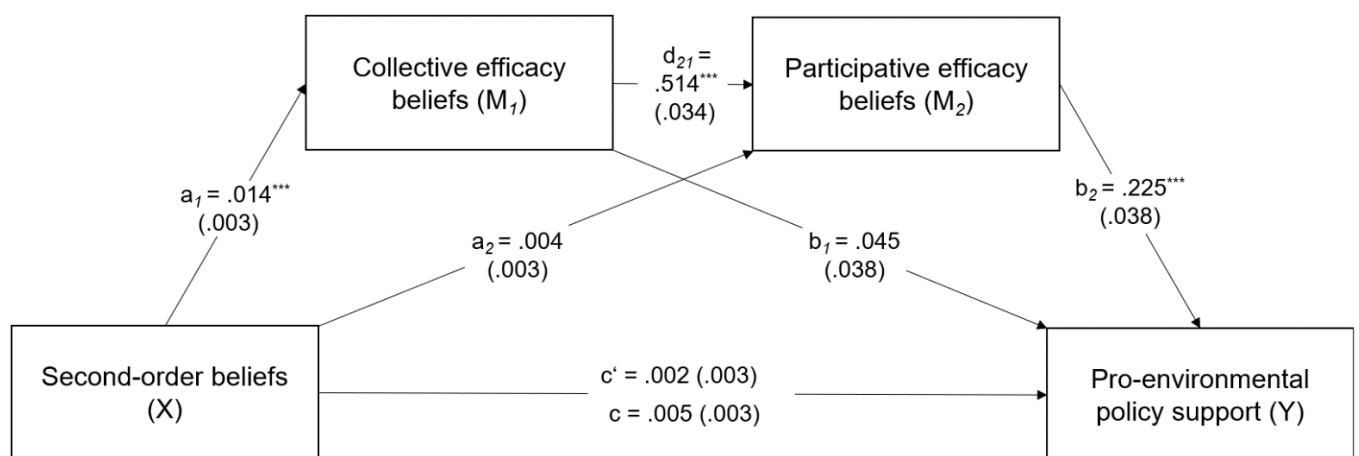
⁶ In this paper, all reported regression coefficients are unstandardized.

.03, $p < .001$, 95% CI = [.45, .58]), thus supporting hypothesis 3. Lastly, hypothesis 4 was supported as participative efficacy beliefs were a significant predictor of pro-environmental policy support ($b = .23$, $se = .04$, $p < .001$, 95% CI = [.15, .30]).

While the indirect effects of second-order beliefs on pro-environmental policy support via either collective or participative efficacy beliefs (simple mediation) were not significant, the hypothesized *serial* mediation was significant (see Table 2). Albeit small, the positive indirect effect of second-order beliefs on pro-environmental policy support via both collective and participative efficacy beliefs was significant ($b = .002$, $se = .001$, 95% CI = [.001, .003]). Though the historically popular approach to test mediations by Baron and Kenny (1986) requires a significant total effect to establish any mediational relationship between X and Y, recent approaches argue that neither a significant total nor direct effect is mandatory and that the focus should instead be on the significance and magnitude of the indirect effect (Hayes, 2009; Rucker et al., 2011). According to this approach, hypothesis 5 was supported.

Figure 2

A Serial Mediation Model of Second-Order Beliefs on Policy Support via Efficacy Beliefs



Notes. The values shown are unstandardized regression coefficients. Standard errors are shown in brackets.

*** $p < .001$

Table 2*Indirect, Direct, and Total Effect of Second-Order Beliefs on Policy Support*

Path	Coefficient	Standard error	95% CI	
			LL	UL
Second-order beliefs → Collective efficacy beliefs → Policy support	.001	.001	-.001	.002
Second-order beliefs → Participative efficacy beliefs → Policy support	.001	.001	-.0004	.002
Second-order beliefs → Collective efficacy beliefs → Participative efficacy beliefs → Policy support	.002	.001	.001	.003
Total effect	.005	.003	-.001	.011
Direct effect	.002	.003	-.004	.008
Total indirect effect	.003	.001	.001	.006

Notes. The values shown are unstandardized regression coefficients. CI = confidence interval, LL = lower limit, UL = upper limit

To summarize, although there was no direct effect between second-order beliefs and pro-environmental policy support, the results indicated a small positive indirect effect between second-order beliefs and pro-environmental policy support via higher levels of collective efficacy beliefs and higher levels of participative efficacy beliefs. Overall, the three variables explained 8.48% of the variance of pro-environmental policy support ($F(3,665) = 20.55, p < .001$).

Moderation Analysis

For the moderation analysis, the interacting variables were mean-centred, and analyses were run with robust standard errors. The moderators were tested in two separate models as Process does not offer a model for a moderated serial mediation with two moderators at once. Model 83 of the Process function for R was used to test H6 and model 87 to test H7 (Hayes, 2022).

The index of moderated mediation with global identity as a moderator of the a_1 -path was not significant ($b = .0002, se = .001, 95\% CI = [-.001, .002]$), suggesting that there were no differences in the indirect effect between different levels of global identity, thus rejecting hypothesis 6. Global identity was a significant predictor of collective efficacy beliefs ($b = .37,$

$se = .08, p < .001, 95\% \text{ CI} = [.21, .53]$). However, the interaction between global identity and second-order beliefs was not significant ($b = .002, se = .006, p = .79, 95\% \text{ CI} = [-.01, .01], \Delta R^2 = .0001$). An exploratory post-hoc analysis revealed that global identity was another significant predictor of pro-environmental policy support, explaining additional variance over and above the other three variables ($b = .35, se = .03, p < .001$).

The index of moderated mediation with perceived national responsibility as a moderator of the b_2 -path did also not reach significance ($b = -.0000, se = .0002, 95\% \text{ CI} = [-.0004, .0004]$). Consequently, there were no differences in the indirect effects between different levels of perceived responsibility. Hence, hypothesis 7 was rejected. Perceived national responsibility was a significant predictor of pro-environmental policy support ($b = .39, se = .04, p < .001, 95\% \text{ CI} = [.31, .48]$) but the interaction between perceived national responsibility and participative efficacy beliefs was not significant ($b = -.0003, se = .03, p = .99, 95\% \text{ CI} = [-.05, .05], \Delta R^2 = .0000$).

Secondary Analyses

Wilcoxon signed-rank tests revealed that the perceived support for a renewable energy transition of one's own nation ($M = 64.65, SD = 13.32$) was significantly higher than the perceived support of Chinese ($M = 52.28, SD = 18.50, p < .001$) and American citizens ($M = 49.60, SD = 15.06, p < .001$) as well as the combined estimate for both countries ($M = 50.94, SD = 14.70, p < .001$), thereby supporting hypothesis 8.⁷ As Table 3 demonstrates, the perceived support for a renewable energy transition of Chinese and American citizens was further significantly lower than their *actual* support (as identified in representative surveys by Ørsted (2017)), both when looking at the combined as well as country-specific estimates (for all three tests $p < .001$), thereby supporting hypothesis 9.

⁷ As the difference score of the dependent variable was not normally distributed, a non-parametric test was conducted. However, paired samples t-tests came to the same conclusion.

Table 3*Comparison between the Actual and Estimated Support for the Renewable Energy Transition*

	Actual support ^a	Estimated support	Difference
China and US combined	86.5	50.94	35.56 ^{***}
China	91.3	52.28	39.02 ^{***}
US	81.3	49.60	31.07 ^{***}
Germany	81.0	63.88 ^b	17.12 ^{***}
Netherlands	73.0	68.91 ^b	4.09 ^{***}

Notes. The values shown are percentages (as shares of the total population), averaged across three items which assessed people's support for the renewable energy transition.

^aBased on representative national surveys by Ørsted (2017). ^bParticipants were asked to estimate the support for a renewable energy transition within their own country. Therefore, these estimates are exclusively based on the responses of citizens of those countries (i.e., Germans or Dutch).

*** $p < .001$

Although the estimated support was also significantly lower than the actual support when participants were judging their own country, this discrepancy was much smaller.⁸ Alpha was Bonferroni-adjusted prior to running the analyses.

Discussion

The goal of this study was to investigate the underlying mechanisms and boundary conditions of the effect of second-order beliefs about other nations on pro-environmental policy support. The results indicate that there exists an indirect effect of second-order beliefs about other nations on pro-environmental policy support via collective and participative efficacy beliefs. Overall, the hypotheses were partially supported. While second-order beliefs had the expected, although small, positive indirect effect on pro-environmental policy support via collective and participative efficacy beliefs, no significant direct effect of second-order beliefs on pro-environmental policy support was found. The absence of a direct effect contradicts previous studies that have repeatedly demonstrated such effects (Beiser-McGrath & Bernauer, 2019; Mildemberger & Tingley, 2019; Schuldt et al., 2019) which could have

⁸ Only responses from participants of the Netherlands and Germany were investigated in detail for the 'own country'-analysis since the samples of all other countries were too small ($n < 10$) to provide reliable results.

been due to some methodological limitations of the current study (see the Limitations section for more details). Nonetheless, the indirect effect helps to understand why second-order beliefs about other nations can potentially influence pro-environmental policy support (as demonstrated in other studies). If people (incorrectly) believe that other countries do not work towards the collective goal, this lowers expectations of achieving the common goal as a group. This lowered expectation negatively affects the perceived effectiveness of one's own national contribution, ultimately resulting in decreased policy support. Altogether, this demonstrates a typical collective action problem in which even though someone must take the first step, no one wants to be the first out of fear that others will free ride (Lamb et al., 2020).

Additionally, the results emphasize that collective efficacy beliefs about superordinate, shared collectives like 'all humanity' clearly matter in the context of global crises like the climate crisis, even for behaviours commonly conceptualized as individual action such as supporting policies. However, the findings also imply that collective efficacy beliefs on their own do not suffice. In addition, participative efficacy beliefs need to be considered when aiming to explain pro-environmental policy support which corroborates previous findings on the influence of collective and participative efficacy beliefs (Hamann & Reese, 2020; van Zomeren et al., 2012). The analysis further revealed that participative efficacy beliefs do not only apply to individuals but also to (subordinate) collectives (i.e., countries), a finding which might have important implications for other small- and large-scale contexts in which group collaboration is required.

Given that many pro-environmental policies, such as the policies included in this study, do not result in any direct, tangible personal benefits, it is noteworthy that support tends to increase merely with stronger beliefs that the actions of one's own country will make a difference in the global context (i.e., participative efficacy beliefs are high). This finding underpins that, if group agency is established (i.e., assumed to be high), behaviour in social

dilemmas such as the climate crisis might be guided (more) by other considerations (e.g., moral obligations) than personal cost-benefit-analyses, as also indicated by a growing number of recent studies (Agostini & van Zomeren, 2021; Sabucedo et al., 2018). Future research could examine whether efficacy beliefs indeed influence which factors are considered and elaborated upon in the decision-making in such situations.

Furthermore, the hypothesized moderation of the mediation, with global identity and perceived national responsibility as moderators, was not supported. Firstly, this might be due to the high salience of national identities resulting from the survey's focus on different countries. Stone and Crisp (2007) have shown that, even if a common ingroup identity can theoretically emerge in a certain context, the superordinate identity (e.g., global identity) explicitly needs to be made salient to prevent intergroup biases between the subordinate groups, while subgroup identities affect intergroup cooperation without explicitly being made salient. Consequently, while participants' national identities might have been automatically activated, thereby presumably affecting efficacy beliefs, their global identity was likely *not* salient, which could explain why the strength of one's global identity did not moderate the effect of second-order beliefs on collective efficacy beliefs. Secondly, a study by Vilas and Sabucedo (2012) indicates that feelings of moral obligation might mediate the relation between efficacy beliefs and collective action. Therefore, perceived national responsibility might not function as a moderator, as assumed in this paper, but rather another mediator of the model. Future research could investigate if this is the case.

Nonetheless, both variables (i.e., global identity and perceived national responsibility) directly predicted pro-environmental policy support. Thereby, the data suggests that pro-environmental policy support is predicted by the very same variables that previous research has identified as relevant predictors of collective action (Agostini & van Zomeren, 2021; Bamberg et al., 2015; Barth et al., 2015; Brunsting & Postmes, 2002; Rosenmann et al., 2016;

Sabucedo et al., 2018). Hence, the findings imply that pro-environmental policy support is not merely an individual behaviour like many previous studies have presumed (Harring et al., 2017; Rauwald & Moore, 2002; Sharpe et al., 2021) but can indeed be understood as a form of collective action (i.e., as acting as part of a bigger collective to achieve the common goal of mitigating the climate crisis). This corroborates the notion of the SIMPEA (Fritsche et al., 2018) that pro-environmental action results from “think[ing] and act[ing] in line with collectives” (Fritsche et al., 2018, p. 246) such as humankind or future generations, and further illustrates the applicability of models like the SIMCA (van Zomeren et al., 2008) to contexts that are not usually conceptualized as collective action.

The secondary analyses revealed that the support for pro-environmental policies was generally underestimated, even though the discrepancy was more pronounced when judging the support of citizens of the US and China than of one’s home country. Additionally, support for pro-environmental policies within one’s home country was generally estimated to be higher than that of Chinese and American citizens, even though the opposite has been found in representative surveys (Ørsted, 2017).⁹ These findings are in line with previous research highlighting such misperceptions and evaluative national ingroup biases of second-order beliefs (Mildenberger & Tingley, 2019; Taddicken et al., 2019). Interestingly, the correlation between one’s global identity and second-order beliefs was not significant, suggesting that a stronger global identity is *not* associated with higher second-order beliefs about other nations (i.e., a decreased national ingroup bias). Again, it is likely that this can be explained by national identities being more salient than one’s common ingroup (i.e., one’s global identity) due to the study design, thereby influencing evaluations more (see Stone & Crisp, 2007). Since (strong) national identities likely impede negotiations and cooperation among UN members as each country merely focuses on its own interests (Batalha & Reynolds, 2012),

⁹ The latter part has only been verified for the two countries investigated in the secondary analysis (i.e., Germany and the Netherlands).

fostering and increasing the salience of a superordinate, global identity might be key to enabling coordinated climate action. After all, there is no out-group in global crises like the climate crisis.

Although people usually tend to perceive themselves as better than the average (e.g., more pro-environmental) and hold inflated self-assessments (see Bergquist, 2020 and Kruger & Dunning, 1999), participants did *not* overestimate the pro-environmental policy support of their home country. Moreso, policy support was significantly underestimated even in one's home country. As previous work demonstrates, these misperceptions might be due to two cognitive biases, namely pluralistic ignorance and false consensus (Geiger & Swim, 2016; Sokoloski et al., 2018). Pluralistic ignorance bias refers to the tendency to falsely assume that most other people do not share one's own opinion, false consensus bias, by contrast, refers to overestimating how many others share one's own opinion. Interestingly, a study by Sokoloski et al. (2018) indicates that *supporters* of an offshore wind project showed pluralistic ignorance while *opponents* had a false consensus bias, resulting in both groups underestimating the support of others for the project. Other studies came to a similar conclusion and showed that these biases further affect societal discussions as environmentally concerned individuals, believing they hold a minority opinion, tend to self-silence themselves out of fear of being perceived as less competent (Geiger & Swim, 2016). These findings highlight that people generally seem to underestimate how many others support climate action. Considering the strong impact of such (flawed) normative information on individual behaviour, it is likely that those misperceptions lower one's own willingness to contribute to the collective goal as well as efficacy beliefs, thereby ultimately impeding ambitious and globally coordinated climate action.

Furthermore, the political inaction by most countries and the (still) lacking media coverage on the climate crisis might add to the general perception that most people do not

care about or support the renewable energy transition (KLIMA° vor acht e.V., 2022; McDonald, 2009; Miller & Krosnick, 2000). Particularly concerning foreign nations, people do not always distinguish between political actors and the general public¹⁰ so the current climate (in)action of governments might function as a (flawed) proxy for perceptions about the public's beliefs and attitudes, explaining the pattern found in this study (see work on 'government-citizens (in)congruence', e.g., Rosset & Stecker, 2019). Hence, increasing and diversifying media coverage on all relevant aspects of the climate crisis might just play an essential role to advance climate action.

Applications

The current research helps to explain why second-order beliefs influence pro-environmental policy support. Thereby, the findings have important practical implications for the general climate crisis communication as well as the development of (governmental) campaigns aiming to boost public support for pro-environmental policies. In line with current risk communication theories, the results suggest that campaigns and interventions should focus on fostering efficacy beliefs in the population as these might play a key role in promoting climate action by ensuring public support for measures taken. Previous field studies demonstrate promising effects of interventions strengthening efficacy beliefs on increasing public engagement with the issue (Geiger et al., 2017). Thereby, campaigns should convey both a sense of collective agency as *one* global community as well as participative agency of one's home country, emphasizing the impact of each member's contributions. Furthermore, information campaigns could be implemented to correct misconceptions about other countries, thereby increasing pro-environmental policy support and simultaneously reinforcing collective efficacy beliefs, which will subsequently positively affect participative

¹⁰ Historical examples demonstrate such equating of governmental actions with citizens of the respective countries. The tendency can also currently be observed in the case of the Russian government and Russian citizens (Ye, 2022).

efficacy beliefs. Mildenerger and Tingley (2019) highlight the likely success of such awareness campaigns.

Lastly, though not central to this study's model, strong direct effects of global identity and perceived national responsibility on pro-environmental policy support were found, with the former finding already being well-established in the literature (e.g., Loy & Reese, 2019). Hence, interventions as well as the climate crisis communication in general could aim to promote the salience and strength of people's global identity and, particularly in developed countries, their sense of moral obligation to act. Global identities might even act as a buffer for the negative effect of biased low second-order beliefs as Buchan et al. (2011) demonstrated that one's global identity predicts 'behavioural contributions to a global public good above and beyond expectations about what other participants are likely to contribute' (p. 821).

Strengths, Limitations, and Future Directions

A major strength of this study is that it is the first study to investigate the mechanisms and boundary conditions of the effect of second-order beliefs about other nations on pro-environmental policy support, thereby extending the small body of literature on the topic. It was shown that second-order beliefs affect efficacy beliefs which, in turn, are related to pro-environmental policy support. Consequently, the findings also contribute to increasing the understanding of which factors enhance pro-environmental policy support which has high practical relevance. Another strength of the present research is that it demonstrates the relevance of examining higher-order efficacy beliefs in the context of the climate crisis. Particularly, it was shown that participative efficacy beliefs do not just apply to individuals but also to collectives that are part of a superordinate group. Thus, the current study can serve as a conceptual starting point for future research and interventions.

One of the main limitations of this study concerns the non-probability sampling method. As the study's sample was not randomly chosen but instead based on convenience sampling, the sample was not representative of the general population regarding key sociodemographic variables such as age or gender. Furthermore, a significant share of the sample consisted of first-year psychology students who, by themselves, made up almost the entire Dutch subsample. These biases likely contributed to the occurrence of a ceiling effect in this study with nearly 40% of the sample indicating that they are 'in favour' or even 'strongly in favour' of the proposed policies, which could also explain why no direct effect of second-order beliefs on pro-environmental policy support was found. Furthermore, due to the non-representativeness, inferences drawn from the study cannot be generalized. However, considering that this was the first study to investigate why and how second-order beliefs influence pro-environmental policy support and aimed at exploring rather than validating possible mediators and moderators, limited generalizability is of less concern at this stage (Mook, 1983). Another important limitation refers to the cross-sectional study design. Using cross-sectional data to test for mediation effects can lead to biased and sometimes misleading estimates of parameters (Maxwell & Cole, 2007). Consequently, it is strongly advised that future studies aim to replicate this study's findings in representative, randomly selected samples, collecting longitudinal data within experimental designs and using structural equation modelling.

Furthermore, amidst data collection, Russia has commenced a war of aggression against Ukraine, leading to a sudden rise and shift in societal discussions about energy production and international dependencies relating to the supply of energy among many European countries (such as Germany). This historic event has most likely altered the attitudes towards fossil fuels and renewable energy sources of many individuals, thereby potentially affecting this study's results and the conclusions drawn.

Another shortcoming concerns the sample's heterogeneity in regard to participants' nationalities.¹¹ A cross-European analysis has shown that there are significant differences between countries in their climate crisis perceptions and their determinants (Poortinga et al., 2019). Exploratory analyses¹² also found differences between Dutch and German participants in their second-order beliefs and pro-environmental policy support, but interestingly not in their efficacy beliefs. Furthermore, even though Dutch participants had higher second-order beliefs, German participants showed higher support for pro-environmental policies. Besides the obvious implication of this finding that there are additional factors that influence pro-environmental policy support, more importantly, it shows that there are either national differences in the effect of second-order beliefs on policy support or in the changeability or general tendency to support pro-environmental policies between countries (e.g., Harring, 2014). Future research could explore these national and cultural differences in more detail.

Similarly, the content and focus of the second-order beliefs themselves matter. Although the two countries were combined for the purposes of my analyses, the Chinese population was estimated to support the renewable energy transition more than the American population (see Appendix C). Though this difference did not seem to alter the general patterns found in this study, it highlighted variations in the perceptions about different countries that could potentially affect the mediators and/or outcome variable differently. Therefore, another area for future research could be to investigate whether second-order beliefs about other countries besides China or the US influence efficacy beliefs and pro-environmental policy support in the same way; particularly keeping in mind a country's amount of GHG emissions (and its global 'rank') as well as the unequal power and influence of different nations in international policymaking. The view could also be extended to second-order beliefs about

¹¹ Although, as outlined earlier, the majority of participants was from Germany or the Netherlands, participants came from a total of 20 different countries of the EU with very small numbers of participants per country apart from Germany and the Netherlands.

¹² Refer to Appendix C for the results of the exploratory analyses.

other relevant non-state actors in the sustainability transformation (i.e., keystone industries) or other impactful outcome behaviours besides pro-environmental policy support.

There are also limitations related to the measures used in this study. The collective efficacy beliefs scale did not distinguish between collective efficacy (i.e., beliefs about the capabilities of a group) and collective *response* efficacy (i.e., beliefs about outcomes of a group's actions), though some studies indicate that those might be two separate constructs (Doherty & Webler, 2016; Riggs & Knight, 1994). On a broader note, there existed no validated scales for many of the constructs measured in this study. While this did not affect reliability scores in most cases, the measure of pro-environmental policy support showed relatively low reliability, potentially explaining the direct null effect of second-order beliefs on pro-environmental policy support. Though all three pro-environmental policies focused exclusively on hard policy measures and were mostly adopted from another study, an exploratory analysis¹² revealed significant differences between the support for each of these policies. In line with previous research, pull measures (i.e., subsidies) were supported more than push measures (i.e., taxes), and bans, often perceived as less fair and an infringement on one's freedom, found the least support (Banister, 2008; Eriksson et al., 2006; Schuitema & Bergstad, 2019). Future resources should be dedicated to constructing a reliable and valid scale of pro-environmental policy support. Alternatively, future studies could concentrate on single policy measures or aim to capture actual behaviour, where possible.

Lastly, future psychological research should consider adopting a higher-order, superordinate perspective. The climate crisis is a global and systemic issue. Hence, instead of regarding pro-environmental action as purely individual, it should be conceptualized as part of a collective process. In this study, first attempts of this approach have been made by investigating higher-order efficacy beliefs. Further, in line with previous work, this study has found a positive effect of adopting a global identity on pro-environmental action such as

supporting policies (Batalha & Reynolds, 2012; Renger & Reese, 2017; Rosenmann et al., 2016). Therefore, future studies could investigate how global identities emerge and how they can be fostered.

Conclusion

In order to successfully mitigate the climate crisis, progressive climate action is urgently needed. However, the implementation depends largely on public support, so it is vital to investigate which factors influence the support for pro-environmental policies. Some scholars have suggested focusing on second-order beliefs as a central factor explaining current climate policy inaction (e.g., Mildenerger & Tingley, 2019). In this paper, I examined how and why second-order beliefs about other nations affect pro-environmental policy support. The findings suggest that there is an indirect effect of second-order beliefs about other nations on pro-environmental policy support via collective and participative efficacy beliefs. Thereby, pro-environmental policy support relies upon the perception of collective and participative agency. Furthermore, global identity and perceived national responsibility also predicted the support for pro-environmental policies. Moreover, it was shown that pro-environmental policy support was generally underestimated within one's home country as well as other countries, with one's home country being evaluated as more supportive than foreign countries (i.e., the US and China). As these misperceptions are associated with weaker efficacy beliefs, thereby decreasing pro-environmental policy support, and further affecting societal discussions about the topic (Geiger & Swim, 2016; Geiger et al., 2017), resolving such misperceptions and fostering efficacy beliefs could potentially have cascading effects on the societal transition towards a climate-neutral world.

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Appendix A

Informed consent form

- I have read the information about the research. I have had enough opportunity to ask questions about it.
- I understand what the research is about, what is being asked of me, which consequences participation can have, how my data will be handled, and what my rights as a participant are.
- I understand that participation in the research is voluntary. I myself choose to participate. I can stop participating at any moment. If I stop, I do not need to explain why. Stopping will have no negative consequences for me.
- Below I indicate what I am consenting to.

Consent to participate in the research:

- Yes, I consent to participate; this consent is valid until 01.07.2022.
- No, I do not consent to participate.¹³

Consent to processing my personal data:¹⁴

- Yes, I consent to the processing of my personal data as mentioned in the research information. I know that until 01-03-2022 I can ask to have my data withdrawn and erased. I can also ask for this if I decide to stop participating in the research.

You have the right to a copy of this consent form. You may take a screenshot of this page if you wish.

¹³ This option was not included in the student sample to prevent an unjust granting of credits. Instead, students were informed about the following: 'If you do not consent or want to withdraw, you can quit the questionnaire now without any consequences'.

¹⁴ This section was only included in the student sample as personal data (i.e., SONA IDs) was only collected there.

Appendix B

Full list of items

A star (*) marks those measures that formed part of the theoretical model and were included in the hypotheses and primary analyses. A double star (**) marks those items that were excluded from the scale before data analysis.

Demographics

1. How old are you?

2. What gender do you identify with?

- Male
- Female
- Non-binary/third gender
- Prefer not to say

3. Where are you from?

▼ Afghanistan (1) ... Zimbabwe (1357)

4. Where do you live?

5. How have you heard about this questionnaire?¹⁵

Second-order beliefs

*US and China**

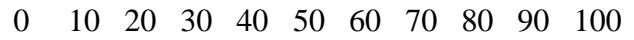
1. What percentage of US citizens do you think AGREES with the statement “A world fully powered by renewable energy is important”? (0,100)

0 10 20 30 40 50 60 70 80 90 100

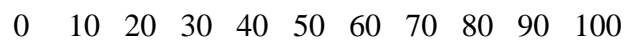
¹⁵ This question was not included in the student sample.



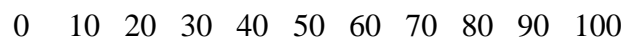
2. What percentage of Chinese citizens do you think AGREES with the statement “A world fully powered by renewable energy is important”?



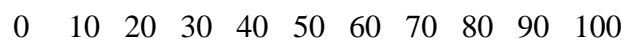
3. What percentage of US citizens do you think WANTS their country to be ambitious in its approach to build and produce green energy?



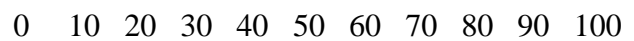
4. What percentage of Chinese citizens do you think WANTS their country to be ambitious in its approach to build and produce green energy?



5. What percentage of US citizens do you think DISAGREES with the statement “A world fully powered by renewable energy is important”? (*reversed*)



6. What percentage of Chinese citizens do you think DISAGREES with the statement “A world fully powered by renewable energy is important”? (*reversed*)



Own nation

1. What percentage of citizens from your own country do you think DISAGREES with the statement “A world fully powered by renewable energy is important”? (*reversed*)

0 10 20 30 40 50 60 70 80 90 100



2. What percentage of citizens from your own country do you think AGREES with the statement “A world fully powered by renewable energy is important”?

0 10 20 30 40 50 60 70 80 90 100



3. What percentage of citizens from your own country do you think WANTS [participant’s country] to be ambitious in its approach to build and produce green energy?

0 10 20 30 40 50 60 70 80 90 100



Personal, first-order beliefs

1. How much do you *personally* WANT [participant’s country] to be ambitious in its approach to build and produce green energy?

1 – not at all 2 3 4 5 6 7 – very much

2. How much do you *personally* AGREE with the statement “A world fully powered by renewable energy is important”?

1 – not at all 2 3 4 5 6 7 – very much

Collective efficacy beliefs*

In the next statements, "humanity" refers to all humans anywhere in the world.

On a scale from 1 to 7, how much do the statements below reflect your beliefs?

1. I believe that humanity, as a group, can successfully transform to a fully renewable and carbon-free energy system.

1 – not at all 2 3 4 5 6 7 – very much

2. I believe that humanity, together, can successfully transform to a fully renewable and carbon-free energy system.

1 – not at all 2 3 4 5 6 7 – *very much*

3. I believe that humanity, through joint actions, can successfully transform to a fully renewable and carbon-free energy system.

1 – not at all 2 3 4 5 6 7 – *very much*

4. I believe that humanity can achieve its common goal of successfully transforming to a fully renewable and carbon-free energy system.

1 – not at all 2 3 4 5 6 7 – *very much*

Participative efficacy beliefs*

In the next statements, "humanity" refers to all humans anywhere in the world.

On a scale from 1 to 7, how much do the statements below reflect your beliefs?

1. I believe that [participant's country], as a nation, can contribute greatly so that humanity, as a group, can successfully transform to a fully renewable and carbon-free energy system.

1 – not at all 2 3 4 5 6 7 – *very much*

2. I believe that [participant's country], as a nation, can provide an important contribution so that humanity, together, can successfully transform to a fully renewable and carbon-free energy system.

1 – not at all 2 3 4 5 6 7 – *very much*

3. I believe that [participant's country], as a nation, can contribute meaningfully so that humanity can successfully transform to a fully renewable and carbon-free energy system.

1 – not at all 2 3 4 5 6 7 – *very much*

4. I believe that [participant's country], as a nation, can provide a significant contribution so that, through joint actions, humanity can successfully transform to a fully renewable and carbon-free energy system.

1 – not at all 2 3 4 5 6 7 – very much

Perceived national responsibility*

1. To what extent do you feel [participant's country] is responsible to contribute to humanity's goal to transform the energy system to fully renewable and carbon-free?

1 – not at all 2 3 4 5 6 7 – very much

2. To what extent do you feel [participant's country] is morally obliged to contribute to humanity's goal to transform the energy system to fully renewable and carbon-free?

1 – not at all 2 3 4 5 6 7 – very much

3. To what extent do you feel [participant's country] has a duty to contribute to humanity's goal to transform the energy system to fully renewable and carbon-free?

1 – not at all 2 3 4 5 6 7 – very much

Pro-environmental policy support*

Say [participant's country] was to pass certain policies mentioned below. On a scale from 1 (strongly against) to 7 (strongly in favour), how much would you support or oppose each of these policies?

1. Increasing taxes on fossil fuels (such as oil, gas, and coal)

Strongly against

Against

Somewhat against

Neither in favour nor against

Somewhat in favour

In favour

Strongly in favour

2. Using public money to subsidise renewable energy such as wind and solar power

Strongly against

Against

Somewhat against

Neither in favour nor against

Somewhat in favour

In favour

Strongly in favour

3. A law banning the sale of the least energy efficient household appliances

Strongly against

Against

Somewhat against

Neither in favour nor against

Somewhat in favour

In favour

Strongly in favour

4. Giving tradeable emission permits to companies **without** charging them**

(reversed)

Explanation: Emission permits give companies the right to emit a specific amount of greenhouse gases through their operations. These permits can be auctioned

(bought) by the company, so that they have to pay for their emissions, or distributed for free so that they don't have to pay for their emissions.

Strongly against

Against

Somewhat against

Neither in favour nor against

Somewhat in favour

In favour

Strongly in favour

Public sphere pro-environmental behaviour

In the past 12 months, how often have you engaged in the following behaviours?

1. Supporting policy aimed to eliminate fossil fuels and/or support renewable energy

Never

Very rarely

Rarely

Occasionally

Frequently

Very frequently

2. Supporting environmental organizations that campaign to end the production and use of fossil fuels and/or support renewable energy

Never

Very rarely

Rarely

Occasionally

Frequently

Very frequently

3. Participating in marches or protest actions to eliminate the production and usage of fossil fuels and/or support renewable energy

Never

Very rarely

Rarely

Occasionally

Frequently

Very frequently

Global identity*

1. How close do you feel to people all over the world?

Not at all close

Not very close

Just a little or somewhat close

Pretty close

Very close

2. How often do you use the word “we” to refer to people all over the world?

Almost never

Rarely

Occasionally

Often

Very often

3. How much would you say you have in common with people all over the world?

Almost nothing in common

A little in common

Some in common

Quite a bit in common

Very much in common

4. Sometimes people think of those who are not part of their immediate family as “family”. To what degree do you think of all humans everywhere as “family”?

Not at all

Just a little

Somewhat

Quite a bit

Very much

5. How much do you identify with (that is, feel a part of, feel love toward, have concern for) all humans everywhere?

Not at all

Just a little

Somewhat

Quite a bit

Very much

6. How much would you say you care (feel upset, want to help) when bad things happen to people anywhere in the world?

Not at all

Just a little

Somewhat

Quite a bit

Very much

7. How much do you want to be a responsible citizen of the world?

Not at all

Just a little

Somewhat

Quite a bit

Very much

8. How much do you believe in being loyal to all mankind?

Not at all

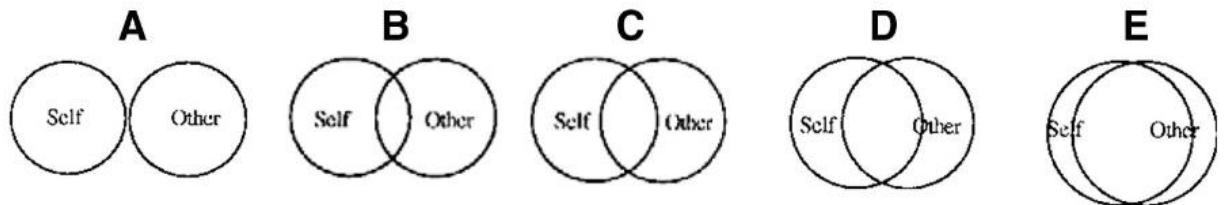
Just a little

Somewhat

Quite a bit

Very much

9. Please mark the letter for the pair of circles that best describes your relationship with people all over the world.



Not at all

Just a little

Somewhat

Quite a bit

Very much

Identification as an environmental activist

1. How much do you identify as an environmental activist?

Not at all

Just a little

Somewhat

Quite a bit

Very much

Climate change beliefs

To what extent do you agree or disagree with the following statements?

1. I believe that climate change is real.

Strongly disagree

Disagree

Somewhat disagree

Neither agree nor disagree

Somewhat agree

Agree

Strongly agree

2. The main causes for climate change are human activities.

Strongly disagree

Disagree

Somewhat disagree

Neither agree nor disagree

Somewhat agree

Agree

Strongly agree

3. Climate change will bring about serious negative consequences.

Strongly disagree

Disagree

Somewhat disagree

Neither agree nor disagree

Somewhat agree

Agree

Strongly agree

4. My local area will be influenced by climate change.

Strongly disagree

Disagree

Somewhat disagree

Neither agree nor disagree

Somewhat agree

Agree

Strongly agree

5. It will be a long time before the consequences of climate change are felt. (*reversed*)

Strongly disagree

Disagree

Somewhat disagree

Neither agree nor disagree

Somewhat agree

Agree

Strongly agree

Honesty check

1. Did you answer the questions in this questionnaire honestly?

Yes

No

Appendix C

Exploratory analyses

As indicated in the pre-registration, some additional tests were run for exploratory purposes. Only those results that were significant and are related to the variables of the main model are subsequently reported. Additional exploratory analyses were run with two variables presented alongside the key variables, namely identification as an environmental activist and PEB, as well as with two sociodemographic variables, namely age and gender. As these analyses go beyond the scope of this paper, the results are not reported here.

Firstly, it was tested whether the average estimated support of Chinese citizens for a renewable energy transition differed from the estimated support of American citizens. Indeed, participants rated the support of Chinese citizens as significantly higher than the support of American citizens ($p < .001$).

It was also assessed whether differences existed between participants of different nationalities.¹⁶ Therefore, a one-way ANOVA and Tukey-Kramer-adjusted post-hoc tests were conducted.¹⁷ Dutch participants had significantly higher second-order beliefs about American and Chinese citizens (US: $M = 52.83$, $SD = 15.34$, China: $M = 56.00$, $SD = 19.19$, combined: $M = 54.41$, $SD = 15.13$) than German participants (US: $M = 47.74$, $SD = 14.79$, China: $M = 49.60$, $SD = 18.15$, combined: $M = 48.67$, $SD = 14.53$), both when looking at the combined ($p < .01$) as well as country-specific beliefs (both $p < .05$). However, there were no significant differences in collective nor participative efficacy beliefs. German participants showed significantly higher pro-environmental policy support ($M_G = 5.56$, $M_D = 4.80$, $p < .001$) and further had a significantly stronger global identity ($M_G = 3.41$, $M_D = 2.92$, $p < .001$)

¹⁶ Only differences between German and Dutch participants were explored due to the aforementioned small sample sizes for all other countries.

¹⁷ The assumption of normally distributed residuals was violated for pro-environmental policy support, collective and participative efficacy beliefs, and perceived national responsibility. Although the ANOVA can be considered robust for violations of this assumption under certain conditions, Kruskal-Wallis tests and pairwise comparisons were additionally run, coming to the same conclusions.

as well as higher perceived national responsibility ($M = 5.90$) than Dutch participants ($M = 5.20$, $p < .001$).

Lastly, support for pro-environmental policies differed significantly between the specific types of policy. Subsidizing renewable energy showed higher support ($M = 5.84$) than taxing fossil fuels ($M = 5.13$, $p < .001$) and banning the least energy-efficient household appliances ($M = 4.95$, $p < .001$). The difference between the latter two policies was also significant ($p < .01$).