



Right-Wing Populism and Climate Change Denial: The Roles of Exclusionary and Anti-Egalitarian Preferences, Conservative Ideology, and Antiestablishment Attitudes

Kirsti M. Jylhä *

Institute for Futures Studies, Stockholm, Sweden and Department of Psychology, Uppsala University, Sweden

Kahl Hellmer

Department of Psychology, Uppsala University, Sweden

Populist right-wing politicians and voters tend to dismiss climate change. To investigate possible reasons for this, we tested correlations between climate change denial and variables linked to right-wing populism (Study 1: $N = 1,587$; Study 2: $N = 909$). The strongest predictor of climate change denial was an index capturing exclusionary and anti-egalitarian preferences (opposition to, e.g., multiculturalism and feminism), followed by traditional values (Study 1) and Social Dominance Orientation (Study 2). Populist antiestablishment attitudes correlated only weakly with climate change denial, and this correlation vanished when exclusionary and anti-egalitarian preferences were controlled for. Also, the effects of authoritarianism (Study 2) and (low) openness vanished in the full models. Climate change denial did not correlate with (low) agreeableness, which is a personality trait linked to populism. However, both antiestablishment attitudes and climate change denial correlated with pseudoscientific beliefs (e.g., anti-vaccination attitudes) (Study 1). To conclude, we did not find support for a notable linkage between climate change

*Correspondence concerning this article should be addressed to Kirsti M. Jylhä, Institute for Futures Studies, SE-101 31, Stockholm, Sweden [e-mail: kirsti.jylha@iffs.se].

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denial and populist antiestablishment attitudes. Thus, when addressing climate change denial, it could be more beneficial to focus on the ideological worldviews that are being protected by denial, such as endorsement of the existing societal power relations, than on the antiestablishment arguments used by some who deny.

According to extensive scientific evidence, human actions are causing changes to the climate system (Cook et al., 2016). Urgent reductions of global greenhouse gas emissions are needed to mitigate the rate and impacts of climate change, but the efforts to succeed in this have been insufficient (Anderson & Peters 2016; Burck et al., 2017). One reason for this is that uncertainty and denial regarding different aspects of climate change still exist in society (Sibley & Kurz, 2013; Vainio & Paloniemi, 2011). Even if individuals accept that climate is changing, they may doubt the extent of human contributions to it—or the magnitude of its effects—which could lead them to question the meaningfulness of the proposed behavioral and systemic changes to meet the climate targets (Leviston & Walker, 2012).

Climate change denial correlates with political right-wing orientation (Hornsey, Harris, Bain & Fielding, 2016; McCright & Dunlap, 2003; Poortinga, Spence, Whitmarsh, Capstick & Pidgeon, 2011) and conservative sociopolitical ideologies (Jylhä, Cantal, Akrami & Mifont, 2016; Stanley & Wilson, 2019) in several Western countries. Moreover, recent analyses suggest that politicians and voters of populist right-wing parties are particularly inclined to dismiss climate change (Forchtner, Kroneder & Wetzels, 2018; Lockwood, 2018). The reason for this is unclear from previous research that has focused mainly on analyzing environmentalism in relation to mainstream political views. Thus, the current article aims to investigate the correlations of climate change denial with attitudes and personality traits that are commonly observed among right-wing populists.

Climate Change Denial and Sociopolitical Ideology

Climate change denial correlates with political right-wing orientation (e.g., Hornsey, Harris, Bain & Fielding, 2016) and research has aimed to investigate what part of ideology could explain this (e.g., Jylhä, 2016; Stanley & Wilson, 2019). Political orientation is related to two conservative ideologies: right-leaning individuals tend to be more accepting of (1) traditional values and societal structures, and (2) hierarchical relationships between societal groups (Duckitt, 2001; Jost, Glaser, Kruglanski & Sulloway, 2003).

Inclination to protect traditional values and lifestyles has been linked to climate change denial (Clarke, Ling, Kothe, Klas & Richardson, 2019; Hoffarth & Hodson, 2016; Stanley, Wilson & Milfont, 2017). This could indicate a motivation to see the current system as fair, and a resistance to admitting that the status quo should be changed to mitigate climate change (Feygina, Jost & Goldsmith, 2010).

In other studies, the focal point has been acceptance of hierarchical relationships between social groups (Milfont, Richter, Sibley, Wilson & Fischer, 2013) and between humans and nature (Jylhä & Akrami, 2015). In line with this, narrative that focuses on climate justice has been found to increase political polarization on climate change (Whitmarsh & Cornel, 2017). Climate change denial could thus reflect an effort to protect the existing societal practices that serve wealthy and powerful nations and individuals, regardless of the negative effects that disadvantaged people, nonhuman animals, and future generations may be facing (Jylhä, Cantal, Akrami & Milfont, 2016; McCright & Dunlap, 2011, see also Kahan et al., 2012).

Climate Change Denial and Right-Wing Populism

Despite the extensive research into the relationships between climate change denial and traditional mainstream political views, less is known about the correlation between denial and populist attitudes. Populist right-wing parties have been growing in several Western countries over the past decades, and politicians and supporters of these parties are particularly inclined to dismiss climate change (Forchtner & Kølvråa, 2015; Forchtner, Kroneder & Wetzel, 2018; Jylhä, Rydgren & Strimling, 2019a, Lockwood, 2018). Thus, lack of research in this area is surprising.

Exclusionary and Anti-Egalitarian Preferences and Conservative Ideology

Right-wing populists tend to endorse socially conservative ideologies (Mudde 2007; Rydgren 2007; van Assche, van Hiel, Dhont, & Roets, 2018). These ideologies predict generalized prejudice toward multiple disadvantaged groups (e.g., immigrants and women; Bergh, Akrami, Sidanius & Sibley, 2016; Ekehammar, Akrami, Gylje & Zakrisson, 2004) and, in line with this, right-wing populists express generally exclusionary and anti-egalitarian preferences. That is, they strive to protect or restore the relative higher status of the native majority groups while opposing multiculturalism, immigration, and societal focus on minority rights and feminism (Jungar & Jupskås, 2014; Jylhä, Rydgren & Strimling, 2019b; Mols & Jetten, 2016; Mudde & Rovira Kaltwasser, 2013; Rooduijn, Burgoon, van Elsas & van de Werfhorst, 2017). Thus, their tendency to deny climate change could reflect the previously discussed findings regarding acceptance of the prevailing social power structures.

Supporting this, aversion to wealth redistribution partly mediates the correlation between Trump support and climate change denial (Panno, Carrus & Leone, 2019). Also, climate change denial correlates with racial resentment and negative views on immigration (Benegal, 2018; Krange, Kaltenborn & Hultman, 2018; Ojala, 2015). Building on these results and the previously described patterns of generalized prejudice (e.g., Ekehammar, krami, Gylje & Zakrisson, 2004), it

seems possible that climate change denial correlates with a broader set of attitudes including, for example, conservatism, exclusionism, and anti-egalitarianism.

Populist Antiestablishment Attitudes

Populism is commonly defined as a thin-centered ideology including a view of society being divided into two homogeneous and antagonistic groups: the pure and virtuous people and the corrupt and self-absorbed elite (e.g., politicians and researchers; Mudde, 2004). Being a thin-centered ideology, populism alone cannot form a political agenda, but is mixed with a “host” ideology that can either be on the left or right.

Populist antiestablishment views could help explain climate change denial (Forchtner, Kroneder & Wetzel, 2018). Indeed, dismissive discourses regarding climate change often portray the mainstream researchers as untrustworthy and corrupt (Cann & Raymond, 2018). Moreover, both climate change deniers and right-wing populists commonly claim to be in an underdog position or to be political victims whose voices are silenced in society (Anshelm & Hultman, 2014; Hellström & Nilsson, 2010). These views also seem compatible with a generally conspiratorial mindset that has been linked with both climate change denial (Lewandowsky, Oberauer & Gignac, 2013) and populist worldviews (Castanho Silva, Vegetti & Littvay, 2017).

Importantly, there is a need to empirically test whether antiestablishment attitudes indeed correlate positively with climate change denial. Such a correlation could be expected based on some research that has focused on the effects of political or institutional distrust (Harring & Jagers, 2013; Ojala, 2015; Vainio & Paloniemi, 2011), which are related to, but distinct from, populist antiestablishment attitudes. However, one recent study found a negative correlation between political distrust and climate change denial across several European countries (Fairbrother, Johansson Sevä & Kulin, 2019)

It is also unclear whether populist attitudes in and of themselves predict climate change denial, particularly because many parties considered right-wing populist could more correctly be classified as “far-right” (i.e., radical or extreme right-wing) parties. More specifically, populism is not the most relevant aspect of their ideology (Rydgren, 2017; Stavrakakis, Katsambekis, Nikisianis, Kioupkiolis & Siomos, 2017), and political distrust is not a consistent predictor of supporting them (Rooduijn, 2018). Rather, these parties selectively employ populist rhetoric, particularly when aiming to gain support for their anti-immigration and anti-Muslim agendas (Rydgren, 2017; Stavrakakis et al., 2017, see also Mols & Jetten, 2016; Müller, Hedström, Valdez & Wennberg, 2014). Moreover, antiestablishment views are not only expressed by right-wing populists (Rydgren, 2017). Consequently, it is possible that the effect of antiestablishment attitudes

on anti-environmentalism is outperformed by attitudes that are compatible with the “host ideology” of populist right-wing parties.

Personality Underpinnings

Research on personality effects could provide further understanding about the public perceptions of climate change in the current political landscape. Both climate change denial (Milfont, Milojev, Greaves & Sibley, 2015) and populism (right and left; Bakker, Rooduijn & Schumacher, 2016; Nai & Martinez i Coma, 2019) correlate negatively with Big-Five “agreeableness.” This personality trait is characterized by traits of altruism, trust, and soft-heartedness (McCrae & Costa, 2008), and it has been suggested that individuals low in it are attracted to populist anti-establishment arguments (Bakker, Rooduijn & Schumacher, 2016). Also, agreeableness overlaps with empathy, which too has been connected to environmentalism, perhaps reflecting concern for those facing the most serious consequences of environmental depletion (Jylhä & Akrami, 2015; Milfont & Sibley, 2016).

Further, the Big-Five personality trait “openness” correlates negatively with climate change denial (Jylhä, 2016; Milfont, Milojev, Greaves & Sibley, 2015; Sibley et al., 2011). Openness refers to the degree to which individuals prefer new experiences and ideas as well as enjoy intellectual and imaginary endeavors (McCrae & Costa, 2008). It has been suggested that openness is linked to a tendency to consider and accept relatively novel and complex concepts, such as climate change (Sibley et al., 2011; Jylhä, 2016). In addition, low openness predicts acceptance of group-based hierarchies, which could help explain why it correlates with climate change denial (Jylhä, 2016). Correlation between openness and antiestablishment attitudes could, however, be more complicated and depend on the cultural context and whether the party in question is left- or right-wing (Bakker, Rooduijn & Schumacher, 2016).

Aims and Hypotheses

Right-wing populists tend to dismiss climate change (e.g., Lockwood, 2018), but research investigating explanations for this is still scarce. Thus, the present article explores, in two studies, the correlations between climate change denial and psychological variables that are linked to right-wing populism.

Antiestablishment Attitudes and Host Ideology of Right-Wing Populist

Our first aim was to investigate if populist attitudes and the host ideology of contemporary radical right-wing parties (exclusionary and anti-egalitarian preferences: e.g., negative attitudes toward multiculturalism) (see, e.g., Mudde & Rovira Kaltwasser, 2013; Rooduijn, Burgoon, van Elsas & van de Werfhorst,

2017) uniquely predict climate change denial. Based on the anti-elite discourses observed among climate change deniers (Cann & Raymond, 2018), and in line with previous research results using related concepts (political or institutional distrust: e.g., Ojala, 2015, but see Fairbrother, Johansson Sevä & Kulin., 2019), we expected that populist antiestablishment attitudes correlate positively with climate change denial (H1a).

Importantly, however, people with various political attitudes may express antiestablishment views (Rydgren, 2017) while climate change denial is common specifically among populists from the right-wing side of the political spectrum (Lockwood, 2018). Thus, we hypothesized that exclusionary and anti-egalitarian preferences would outperform antiestablishment attitudes in predicting denial (H1b). We also exploratorily tested if these variables interact in predicting climate change denial.

Furthermore, we examined one additional explanation for why antiestablishment attitudes may correlate with climate change denial: Both sets of attitudes are compatible with a conspirational and pseudoscientific worldview where some powerful groups (e.g., scientists) are suspected of misleading the public (see also Castanho Silva, Vegetti & Littvay, 2017). Thus, we exploratorily tested models where belief in pseudoscience was included in addition to climate change denial (Study 1).

Full Model Including Personality and Ideological Variables

Our second aim was to test models that simultaneously include several psychological variables as predictors of climate change denial. These models included the previously described variables as well as traditional values (Study 1), conservative ideologies (Social Dominance Orientation [acceptance of group-based hierarchies: Pratto, Sidanius, Stallworth & Malle, 1994] and Right-Wing Authoritarianism [authoritarian submission, authoritarian aggression, and conventionalism: Altemeyer 1998] Study 2), and the personality traits openness and agreeableness (Study 1 & 2).

Previous research has shown that variables that capture more proximal attitudes tend to outperform the effects of more distal and general psychological variables. For example, the effect of personality on intergroup attitudes and climate change denial is mediated by conservative ideologies (e.g., Akrami, Ekehammar & Bergh, 2011; Ekehammar, Akrami, Gylje & Zakrisson, 2004; Jylhä, 2016). Thus, we expected to find support for path models where personality traits (most distal and general) form paths to conservative ideologies (intermediate distal and general), which in turn form paths to exclusionary and anti-egalitarian preferences (most proximal and specific), and that exclusionary and anti-egalitarian preferences mediate—at least partly—the correlations between climate change denial and the other included independent variables (H2).

Table 1. Basic Statistics and Bivariate Correlations (Spearman's Rho) between the Variables in Study 1

	1	2	3	4	5	6	<i>M</i>	<i>SD</i>	Skewness
1. Climate change denial							1.42	0.63	2.16
2. Antiestablishment attitudes	.10*						3.05	0.90	0.10
3. Exclusionism/anti-egalitarianism	.42*	.20*					1.65	0.71	1.40
4. Traditional values	.35*	.13*	.53*				1.65	0.91	1.41
5. Openness	-.17*	-.01	-.25*	-.15*			3.67	0.65	-0.31
6. Agreeableness	-.04	-.16*	-.11*	-.02	.15*		3.78	0.56	-0.53
7. Pseudoscientific beliefs	.13*	.18*	.14*	.22*	-.02	.11*	2.14	0.88	0.61

* $p < .001$

As for antiestablishment attitudes, we did not form hypotheses regarding correlations with variables other than climate change denial as this would be out of scope of the present article. However, some plausible direction could be mentioned. Given the current liberal and cosmopolitan status quo of Sweden (see, e.g., Jylhä, Rydgren & Strimling, 2019b; Moffit, 2017), antiestablishment attitudes could correlate negatively rather than positively with conservative ideologies and exclusionism/anti-egalitarianism.

Study 1

Method

Participants and data. Data were part of a larger online questionnaire designed for an undergraduate course in personality psychology at Uppsala university, Sweden, during May 2016. Respondents were recruited by course supervisors and students via online social networks and face-to-face requests. The students of the course did not participate and were blind to the specific hypotheses and details of the study. The final sample included 1,587 participants ($M_{\text{age}} = 29.3$ years, $SD_{\text{age}} = 12.2$, $\text{range}_{\text{age}} [18-88]$; 70.4% women). An additional 27 respondents participated but were excluded due to either reporting a level of education not plausible considering their reported age ($n = 2$), not rating 10 or more items ($n = 24$), or reporting an age well over 100 years ($n = 1$). The amount of missing values was low across the data (33 for gender, 0–11 for the other items). Missing values were not replaced. This was a convenience sample and the sample size was thus not based on power calculations. However, this study is well-powered and exceeds the common sample-size recommendations (Wolf, Harrington, Clark & Miller, 2013).

Measures. Appendix A presents the items developed for this study, and Table 1 the scale properties. We included measures for climate change denial (five items, $\alpha = .84$, adapted from Häkkinen & Akrami, 2014), pseudoscientific

beliefs (three items, $\alpha = .67$), antiestablishment attitudes (three items, $\alpha = .72$; one of the items from Müller, Hedström, Valdez & Wennberg, 2014: “The political parties mostly represent lobby groups and elite interests, not the people as a whole”), exclusionary and anti-egalitarian preferences (eight items, $\alpha = .86$; one of the items from Müller, Hedström, Valdez & Wennberg, 2014: “In society, too much consideration is given to different minorities than to the people as a whole”), endorsement of traditionalist values (“The old-fashioned values still show the best way to live”), and personality variables openness (10 items, $\alpha = .79$, example: “Is curious about many different things”) and Agreeableness (nine items, $\alpha = .73$, example: “Has a forgiving nature”) from a Big-Five scale (John & Srivastava, 1999). The items were rated on a 5-point Likert-type scale ranging from 1 (*do not agree at all*) to 5 (*agree fully*). We also measured gender, age, education level, and variables that are not relevant in the present article.

Results

Initially, we tested zero-order correlations between the variables using Spearman’s rho due to high skewedness of the data (regarding variables climate change denial, exclusionism/anti-egalitarianism, and traditional values, see Table 1). Climate change denial correlated positively with antiestablishment attitudes—which supports H1a—as well as with pseudoscientific beliefs, exclusionary and anti-egalitarian preferences, and traditional values (see Table 1). Openness correlated negatively with exclusionary and anti-egalitarian preferences and traditional values, but not with antiestablishment attitudes or pseudoscientific beliefs. Age correlated positively with climate change denial ($r = .11, p < .001$), exclusionism and anti-egalitarianism ($r = .06, p < .05$), traditional values ($r = .11, p < .001$), and openness ($r = .14, p < .001$) and was therefore included as a control variable. Agreeableness, gender ($r = .02, p = .39$), and education level ($r = -.01, p = .67$) did not correlate with climate change denial and were thus excluded from further analyses.

To investigate the unique contributions of the independent variables in explaining climate change denial, we tested path models in R package lavaan (Rosseel, 2012). Robust maximum likelihood (MLR) estimator was used because it calculates estimates that are robust to nonnormality of the data. As the first step, paths were formed from all independent variables to climate change denial. The effects of antiestablishment attitudes and openness became nonsignificant, which provides initial support for the proposed mediation effects (H2). Supporting H1b, closer analyses revealed that the effect of antiestablishment attitudes vanished when exclusionism/anti-egalitarianism was controlled for.

Next, we tested our main model, in which paths and correlations were included based on our theoretical expectations and the observed zero-order correlations (see Table 1). Pseudoscientific beliefs and climate change denial

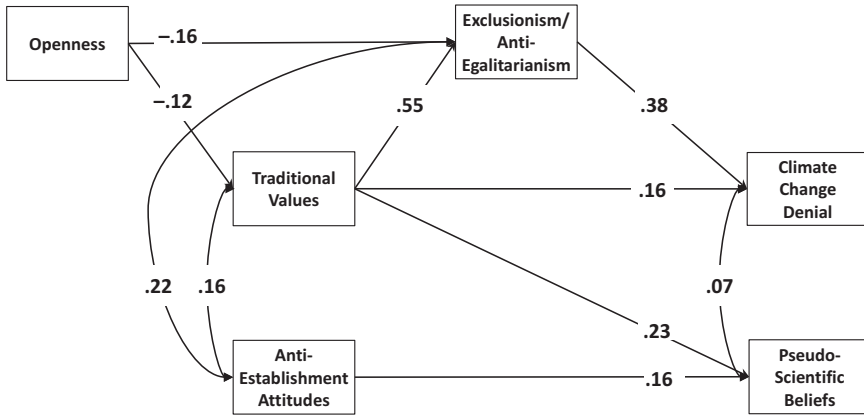


Fig 1. Standardized structural relations explaining climate change denial in Study 1 (only significant [$p < .05$] paths are depicted). Note: Both direct and indirect effects of openness on pseudoscientific beliefs are nonsignificant.

Table 2. Standardized Effects of the Independent Variables on Climate Change Denial in Study 1

Predictors	Mediator	Total effect	Direct effect	Indirect effect
Exclusionism/Anti-egalitarianism (E/A)	—	—	.38*	—
Antiestablishment attitudes	—	—	.03	—
Traditional values (Trad)	E/A	.37*	.16*	.21*
Openness	E/A	-.08*	-.02	-.06*
Openness	Trad	-.04	-.02	-.02*

* $p < .05$

were dependent variables and were intercorrelated (see Figure 1). Paths were formed from openness to exclusionism/anti-egalitarianism and traditional values, from antiestablishment attitudes and traditional values both to exclusionism/anti-egalitarianism and pseudoscientific beliefs, and from all independent variables to climate change denial. Correlation was formed between the residuals of antiestablishment attitudes and traditional values.

Figure 1 illustrates the significant paths and correlations, and Table 2 shows all direct and indirect paths. Climate change denial was predicted by exclusionism/anti-egalitarianism and traditional values, whereas pseudoscientific beliefs were predicted by antiestablishment attitudes and traditional values. Climate change denial and pseudoscientific beliefs correlated weakly after the correlations with other relevant correlations were controlled for. Also, the residuals of exclusionism/anti-egalitarianism, traditional values, and antiestablishment attitudes were intercorrelated. The paths from openness to exclusionism/anti-egalitarianism and traditional values were statistically significant. However, the paths from antiestablishment attitudes ($p = .26$) and openness ($p = .39$) to climate

change denial, and from exclusionism/anti-egalitarianism to pseudoscientific beliefs ($p = .44$), were nonsignificant. The model showed excellent fit to the data ($\chi^2(2) = 2.72$, $p = .26$, Comparative Fit Index (CFI) = 1.00, Root Mean Square Error of Approximation (RMSEA) = .02, 90% CI [.00, .05], Standardized Root Mean Square Residual (SRMR) = .01) and explained 25% of variance in climate change denial and 8% of variance in pseudoscientific beliefs. We also tested a model where age was controlled for, and this did not change the results shown in Figure 1. However, age had a positive effect ($b^* = .08$, $p < .01$) and explained some unique variance in denial (0.7%).

We also tested models with alternative path structures. Two models showed equally good fit to the data as the proposed model ($\chi^2/df = 1.4$). In the first model, antiestablishment attitudes formed a path to anti-egalitarian attitudes instead of being correlated (total effect [on denial]: $b^* = .10$, $p > .001$; indirect effect: $b^* = .07$, $p < .001$). In the second model, pseudoscientific beliefs were not placed as a dependent variable, but formed a path to, and mediated the effect of antiestablishment attitudes on, climate change denial (total effect: $b^* = .03$, $p = .26$; indirect effect: $b^* = .01$, $p < .05$). These models were not chosen as the final model because these causal mediation effects have not been evaluated in previous research, and the effects were weak.

No other models were found to fit the data as well as these models. For example, in one model exclusionism/anti-egalitarianism formed a path to traditional values ($\chi^2/df = 43.9$). We also tested models where antiestablishment attitudes were a dependent variable and paths were formed from climate change denial and pseudoscientific beliefs ($\chi^2/df = 8.7$), from exclusionary and anti-egalitarian attitudes ($\chi^2/df = 3.3$), or from all these variables ($\chi^2/df = 4.7$).

Finally, we tested the possibility that antiestablishment attitudes and exclusionism/anti-egalitarianism interact in explaining climate change denial. In a hierarchical regression model, climate change denial was the dependent variable and the independent variables were antiestablishment attitudes and exclusionism/anti-egalitarianism (step 1) and the interaction term of these two variables (step 2). The interaction term did not explain any unique variance in denial ($b^* = .16$, $p = .13$).

In summary, the results support our hypotheses: Antiestablishment attitudes correlate positively with climate change denial (H1a). Exclusionism/anti-egalitarianism outperforms antiestablishment attitudes in explaining denial (H1b), and mediates at least partly the effects of traditional values and openness on denial (H2).

Study 2

Study 2 aimed to replicate and extend the findings of Study 1. First, to further investigate the effect of antiestablishment attitudes, we replaced our measure with

Table 3. Bivariate Correlations (Spearman's Rho) between the Variables in Study 2

	1	2	3	4	5	6	<i>M</i>	<i>SD</i>	Skewness
1. Climate change denial							1.32	0.58	2.79
2. Antiestablishment attitudes	.08*						3.09	0.79	0.19
3. Exclusionism/Anti-egalitarianism	.43*	.25*					1.62	0.67	1.51
4. Social Dominance Orientation	.44*	.08*	.66*				1.67	0.63	1.27
5. Right-Wing Authoritarianism	.31*	.16*	.54*	.43*			2.26	0.46	0.25
6. Openness	-.13*	.01	-.21*	-.16*	-.23*		3.62	0.67	-0.28
7. Agreeableness	-.02	-.06†	-.05	-.10*	.05	.13*	3.85	0.55	-0.49

* $p < .05$, † $p < .10$

a more robust scale that was recently validated by Schulz et al. (2017). Second, we added a measure for endorsement of group-based hierarchies and dominance (Social Dominance Orientation: Pratto, Sidanius, Stallworth & Malle, 1994) to investigate if the correlation between exclusionism/anti-egalitarianism and climate change denial is based on a generally accepting view of existing group-based hierarchies. Third, to further study the role of traditionalism in explaining climate change denial, we included a measure for Right-Wing Authoritarianism that captures traditionalism/conventionalism and readiness to support strong authorities and punish deviant groups who threaten the social order (Altemeyer, 1998).

Method

Participants and data. Data were part of a larger online questionnaire designed for an undergraduate course in personality psychology at Uppsala University, Sweden, during December 2016. Respondents were recruited by course supervisors and students via online social networks and face-to-face requests. The final sample included 909 participants ($M_{\text{age}} = 27.6$ years, $SD_{\text{age}} = 10.5$, $\text{range}_{\text{age}} [18-80]$; 78% women). An additional 12 respondents were excluded due to not rating 10 or more items ($n = 8$), reporting a level of education not plausible considering their reported age ($n = 1$), or lack of variability in ratings ($n = 1$). The amount of missing values was low across the data (0–11/item). Missing values were not replaced.

Measures. The same measures as in Study 1 were used to measure climate change denial ($\alpha = .84$), exclusionary and anti-egalitarian preferences ($\alpha = .84$), openness ($\alpha = .79$), and agreeableness ($\alpha = .73$) (see Table 3 for scale properties). Antiestablishment attitudes were measured by the anti-elitism subdimension of the populism-scale by Schulz et al. (2017) (five items, $\alpha = .75$, example: “People like me have no influence on what the government does”). We also measured Social Dominance Orientation (short version of the SDO₇-scale: Ho et al., 2015; eight items, $\alpha = .79$, example: “Some groups of people are simply inferior to other groups”) and Right-wing authoritarianism (Zakrisson, 2005; 15 items,

$\alpha = .67$, example: “Our country needs a powerful leader, in order to destroy the radical and immoral currents prevailing in society today”). The items were rated on a 5-point Likert-type scale ranging from 1 (*do not agree at all*) to 5 (*agree fully*). We also measured gender, age, education level, and variables that are not relevant in the present article.

Results

Zero-order correlations using Spearman’s rho showed that climate change denial correlates negatively with openness, and positively with antiestablishment attitudes (supporting H1a), exclusionism/anti-egalitarianism, Social Dominance Orientation, Right-Wing Authoritarianism (see Table 3), and age ($r = .10, p < .01$). However, climate change denial did not correlate with agreeableness or gender ($r = .05, p = .15$) and these variables were therefore excluded from further analyses.

As for the other correlations, positive correlations were found between antiestablishment attitudes, exclusionary and anti-egalitarian preferences, Social Dominance Orientation, and Right-Wing Authoritarianism. Openness correlated with all these ideological variables except for antiestablishment attitudes (see Table 3), and age correlated only with exclusionary and anti-egalitarian preferences ($r = .09, p < .01$).

We then investigated the effects of all independent variables in the same path model by using MLR estimator in R package lavaan (Rosseel, 2012). Supporting hypotheses H1b and H2, the effects of antiestablishment attitudes, Right-Wing Authoritarianism, and openness became nonsignificant.

Next, we built on this model by adding paths and correlations based on zero-order correlations (see Table 3) and our theoretical expectations. Paths were formed from Right-Wing Authoritarianism and Social Dominance Orientation to exclusionism/anti-egalitarianism and antiestablishment attitudes, and from openness to Right-Wing Authoritarianism, Social Dominance Orientation, and exclusionism/anti-egalitarianism. We also let the residuals of Right-Wing Authoritarianism and Social Dominance Orientation, as well as residuals of antiestablishment attitudes and exclusionism/anti-egalitarianism, correlate.

Figure 2 illustrates the significant paths and correlations, and Table 4 shows all direct and indirect paths. Exclusionism/anti-egalitarianism had the strongest effect, and Social Dominance Orientation had a weak direct effect, on climate change denial. Supporting H2, exclusionism/anti-egalitarianism mediated the effects of Right-Wing Authoritarianism and (partially) Social Dominance Orientation on denial, and exclusionism/anti-egalitarianism, Right-Wing Authoritarianism, and Social Dominance Orientation mediated the correlation between openness and exclusionism/anti-egalitarianism. The direct effects of antiestablishment attitudes ($p = .08$), Right-Wing Authoritarianism ($p = .24$), and openness ($p = .57$) on denial were nonsignificant. The model showed good fit

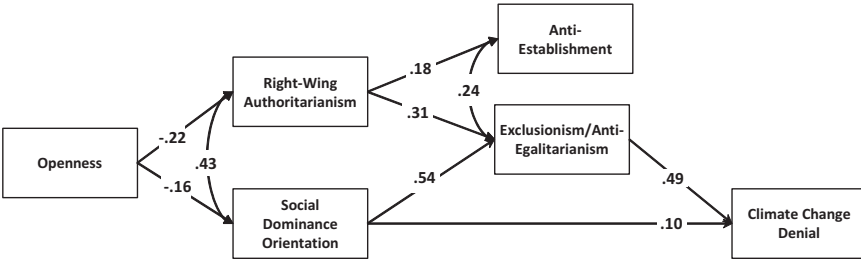


Fig 2. Standardized structural relations explaining climate change denial in Study 2 (only significant [$p < .05$] paths are depicted).

Table 4. Standardized Effects of the Independent Variables on Climate Change Denial in Study 2

Predictor	Mediator	Total effect	Direct effect	Indirect effect
Exclusionism/Anti-egalitarianism (E/A)	–	–	.49*	–
Antiestablishment attitudes	E/A	–	-.06	–
Social Dominance Orientation (SDO)	E/A	.36*	.10*	.26*
Right-Wing Authoritarianism (RWA)	E/A	.20*	.05	.15*
Openness	SDO	.00	.02	-.02
Openness	RWA & E/A	-.02	.02	-.03*
Openness	SDO & E/A	-.03	.02	-.04*

* $p < .05$

to the data ($\chi^2(1) = 0.91, p = .34, CFI = 1.00, RMSEA = .00, 90\% CI [0.00, .08], SRMR = .007$) and explained 33% of variance in climate change denial. We also tested a model where age was controlled for, and this did not change the results shown in Figure 2. However, age had a positive effect ($b^* = .14, p < .01$) and explained some unique variance (1%) in denial.

We also tested if the interaction of antiestablishment and exclusionisms/anti-egalitarianism would influence climate change denial over and above the effects of these variables separately. As in Study 1, the results of a hierarchical regression analysis showed that the interaction term ($b^* = .04, p = .78$) does not explain any additional part of variance in climate change denial.

Not many alternative path models could be tested, as most of correlations in the model were found to become nonsignificant, as expected. However, we found some models to show almost as good fit to the data compared to the proposed model ($\chi^2/df = 0.9$). In the best of these models, Right-Wing Authoritarianism and Social Dominance Orientation correlate with antiestablishment attitudes instead of forming causal paths ($\chi^2/df = 1.3$). In this model, the correlation between Social Dominance Orientation and antiestablishment attitudes was statistically significant, yet weak ($b^* = .12, p < .001$). In another model, paths were formed to antiestablishment attitudes from climate change denial, Right-Wing

Authoritarianism, Social Dominance Orientation, and exclusionism/anti-egalitarianism ($\chi^2/df = 1.7$). In this model, the effects of anti-egalitarianism had the strongest effect ($b^* = .39, p < .001$), whereas the effects of climate change denial ($b^* = -.08, p = .08$) and Right-Wing Authoritarianism ($b^* = .07, p = .09$) were nonsignificant. In addition, the effect of Social Dominance Orientation changed direction due to a suppression effect ($b^* = -.14, p < .01$). Although neither of these models was selected as a final model, they support the suggestions that in the current, relatively liberal and cosmopolitan, Swedish society, individuals with more conservative and anti-egalitarian attitudes are more likely to hold cynical and critical attitudes toward politicians (see also Jylhä, Rydgren & Strimling, 2019b)

In summary, the results provide further support for all our hypotheses and for the proposed path model. However, some alternative models gained support as well, which suggests that the causality of the included set of variables is not fixed.

Discussion

Populist right-wing parties have gained increasing support across the Western world over the past decades, and politicians and voters of these parties are more prone to deny climate change than the population in general (e.g., Lockwood, 2018). Thus, we investigated correlations of climate change denial with psychological variables that are linked to right-wing populism.

The results revealed that an index capturing exclusionary and anti-egalitarian preferences (negative views on, e.g., multiculturalism and feminism) was the strongest predictor of climate change denial (Study 1 & 2). This index also helped explain the correlation between Social Dominance Orientation (i.e., acceptance and endorsement of group-based inequalities: Pratto, Sidanius, Stallworth & Malle, 1994) and climate change denial (Study 2). However, Social Dominance Orientation explained some unique variance in climate change denial. This could indicate acceptance of some other forms of power differences that were not covered here, such as ones related to climate-related injustices (see also Jylhä, 2016; for climate injustice, see, e.g., Althor, Watson & Fuller, 2016). Less concern for climate injustice could make it easier to demand more evidence for climate change before admitting it. Climate change denial could also in part reflect opposition to transnational collaborations and international influences that are unavoidable when developing climate policies (Forchtner, Kroneder & Wetzel, 2018).

Antiestablishment attitudes correlated weakly and positively with climate change denial, and this correlation vanished in both studies when exclusionism/anti-egalitarianism was controlled for. This could mean that individuals who have negative views of cosmopolitan and liberal parts of political elite are prone to dismissing the reality and dangers of climate change (see also Lockwood, 2018). Thus, although antiestablishment rhetoric is prevalent among individuals who dismiss climate change (e.g. Cann & Raymond, 2018),

antiestablishment attitudes may not be, in and of themselves, a cause for climate change denial (for related analyses focusing on the rhetoric of right-wing populists, see, e.g., Rydgren, 2017). Accordingly, we suggest that antiestablishment views could be considered when selecting the channels and methods for climate communication, but the content of the communications could focus on the worldviews and lifestyles that are protected by climate change denial. On the other hand, it is possible that some aspects of the antiestablishment rhetoric used in contemporary populist right-wing discourses could increase, and be linked to, anti-environmentalism over and above the effects of conservatism or exclusionary/anti-egalitarianism. Future research could test the effects of more specific forms of populist rhetoric instead of general antiestablishment attitudes.

Nevertheless, a general tendency to believe in pseudoscientific claims correlated with antiestablishment attitudes as well as with climate change denial (Study 1). Thus, climate change denial and populism seem to be compatible with other forms of science denial and conspiratorial thinking (Castanho Silva, Vegetti & Littvay, 2017; Lewandowsky, Oberauer & Gignac, 2013). However, partially different mechanisms seem to explain denial of climate change and other forms of scientific findings (see also Rutjens, Sutton & van der Lee, 2017).

Importantly, future studies could aim to replicate our findings in different populations. For example, the effects of antiestablishment attitudes and pseudoscientific views may be more pronounced in samples with a higher proportion of populist voters and/or climate change deniers. Due to low mean values in exclusionism/anti-egalitarianism and denial, at least some of the correlation coefficients may be stronger in the general population. On the other hand, some of the correlations were found to be strong, which could indicate that we have succeeded in capturing variance in these variables. Indeed, our data are comparable with previous research showing that the Swedish population tends to both be relatively liberal and express low levels of climate change denial (see, e.g., Jylhä, Rydgren & Strimling, 2019a; Moffitt, 2017).

As for a generally conservative worldview, endorsement of traditional values explained some unique part of variance in climate change denial (Study 1). In addition, a related—but broader—construct “Right-Wing Authoritarianism” (authoritarian submission, authoritarian aggression, and conventionalism; Altemeyer, 1998) predicted denial indirectly (Study 2). These results are in line with studies showing that general conservatism is a less consistent predictor of environmentalism when compared to acceptance of group-based hierarchies (e.g., Milfont et al. 2013; Häkkinen & Akrami, 2014). However, there is a need for further studies in this area, as one recent longitudinal research suggests that Right-Wing Authoritarianism—but not Social Dominance Orientation—causally predicts climate change denial (Stanley, Wilson & Milfont, 2017; but see Stanley, Milfont, Wilson & Sibley, 2019). Certain psychological mechanisms may remain hidden in cross-sectional correlational studies. Also, cultural context may

influence the results. For example, environmentalism could be more compatible with general conservatism in countries with more pronounced mitigation striving (Jylhä & Akrami, 2015), such as Sweden (Burck et al., 2017).

As for personality variables, openness correlated negatively with climate change denial (Sibley et al., 2011; Milfont et al., 2015) and conservative ideology and exclusionism/anti-egalitarianism helped explain this relation (see also Jylhä, 2016). However, the personality trait agreeableness did not correlate with climate change denial in either of our studies. This provides further support for a rather inconsequential link between antiestablishment views and climate change denial (for the correlation between agreeableness and populism, see Bakker, Rooduijn & Schumacher, 2016; Nai & Martinez i Coma, 2019). It should be noted, however, that agreeableness has correlated with climate change denial in some previous studies, although less strongly than openness (Sibley et al., 2011; Milfont et al., 2015). It is possible that some facets of agreeableness capture the personality underpinnings of environmentalism better.

To conclude, we have shown here that antiestablishment attitudes are not consistently linked or essential to climate change denial, although critical views on liberal and cosmopolitan parts of the elite may play a role in explaining dismissive climate-related attitudes (see also Lockwood, 2018). Given the central role that exclusionism and anti-egalitarianism seems to have in explaining environmentalism, fostering a common higher-order identity (global identity; see, e.g., Reese, 2016) could be one possible solution for the persistent delay in climate action.

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Appendix A

Note: Scales and items developed to the present study are presented here. See the method sections for information of, and references to, other scales.

Climate change denial (Study 1 & 2)

1. I find it hard to believe that the earth's climate is really changing.
2. The temperature on earth varies naturally and human activity has nothing to do with this variation.
3. My opinion is that we will not even notice the effects of climate change.
4. The so-called "climate threat" is exaggerated.
5. I believe that there is enough scientific evidence to confirm the changes in earth's climate. (R)

Exclusionary and anti-egalitarian attitudes (Study 1 & 2)

1. In society, too much consideration is given to different minorities than to the people as a whole.
2. Other cultures are given too much space at the expense of our traditions.
3. Our society is enriched by the different cultures we have. (R)
4. Our country borders should be guarded more strongly.
5. Feminist messages create a worrying development in society.
6. Our society must become considerably more gender equal. (R)
7. The marriage as an institution is diluted when church marries homosexual couples.
8. Love of heterosexuals is equal to love of homosexuals. (R)

Antiestablishment attitudes (Study 1)

1. The political parties mostly represent lobby groups and elite interests, not the people as a whole.
2. Politicians protect more their own interests than societies.
3. I think that majority of politicians have the best interests of society in mind, even though I don't always share their opinions. (R)

Pseudoscientific beliefs (Study 1)

1. Food that is produced by genetic engineering (GMO) is a danger to health.
2. Alternative medicine cures diseases by treating the entire human being, whereas mainstream medicine only treats symptoms.
3. Routine vaccination of all children poses risks, for example, autism.

KIRSTIM. JYLHÄ is a researcher at Institute for Futures Studies, Stockholm. She earned her PhD in psychology at Uppsala University in 2016. Her research aims to explain and find solutions to psychological obstacles to climate action, with particular focus on climate change denial. Another line of her research focuses on investigating radical right-wing support and populism.

KAHL HELLMER is a PhD candidate at the Department of Psychology at Uppsala University. His research focuses on the interplay of psychological and social factors in explaining attitudes and behavior among children (e.g. conformity and help behavior) and adults (e.g. science denial and sexism).