

Intolerance predicts climate skepticism

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ABSTRACT

While there is almost unanimous consent among scientists that climate change is real and has detrimental consequences, there is a sizable number of people who are skeptical towards these propositions and who are not worried by climate change. In an attempt to understand the basis of climate skepticism, we look at the role of intolerance, a culturally transmitted attitude to the effect that people with certain characteristics are not to be respected. The theoretical link from intolerance to climate skepticism is driven by two elements: insufficient or biased knowledge formation and a value of not caring very much about the welfare of others. Our empirical analysis confirms that intolerance on the basis of race, ethnicity, immigration status, religion or sexual orientation predicts climate skepticism. By using the epidemiological method, relating the views on climate change of second-generation immigrants in Europe to cultural values in their countries of origin, we are able to rule out reverse causality – a novelty in the literature trying to explain climate skepticism. To get a feeling for the importance of intolerance, an increase in the share who are intolerant towards people of a different race in the individual's country of origin by 10 percentage points implies a reduced probability of the individual considering the consequences of climate change extremely bad of 4.3 percentage points (21.5%). An important implication of our findings is that to influence climate skeptics, it may be necessary to go beyond argumentation about the facts as such and to find ways to affect more basic individual characteristics.

1. Introduction

Climate change and the global warming it entails is one of the most pressing issues of our time. The [World Meteorological Organization \(2020\)](#) reports that the average global temperature has increased by 1.2 °C since pre-industrial times (1850–1900), with 2020 being one of the three hottest years on record. A further rise in temperatures will continue for many years to come, and it is likely that a possibly critical level – an increase of 1.5 °C – is reached already in the middle of the present decade. Rising temperatures are expected to have a severe impact on the world's ecosystems and economies, as well as on human well-being, especially in developing countries.¹

In recent years, there has been coordinated political action aiming to curtail this development, most notably the Paris Agreement, which came into force in late 2016. It is a legally binding treaty adopted by 196 parties, which aims at cutting greenhouse-gas emissions by 2030 such

that the global warming preferably stays at a 1.5 °C increase, but necessarily below a 2 °C increase. However, as reported by [Leahy \(2019\)](#), the Paris Agreement is unlikely to succeed in reaching its goal – almost 75% of the pledges to reduce emissions are considered insufficient. Thus, more political – and individual – action is needed if the goal is to be met.

The awareness of climate change, and of its causes and consequences, stems from an extensive body of scientific analysis. [Cook et al. \(2016, p. 1\)](#) show that “the finding of 97% consensus [that humans are causing recent global warming] in published climate research is robust and consistent with other surveys of climate scientists and peer-reviewed studies.” However, while most people seem to agree that climate change is real and a serious matter, there are quite a few people – also among political decision-makers – who do not see it as a major threat. [Pew Research Center \(2018\)](#) surveyed 26 countries across the world and found a large variation in views; the median shares across the

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¹ For a comprehensive analysis of the likely consequences of global warming at 1.5 °C and 2 °C increases, see [Intergovernmental Panel on Climate Change \(2018\)](#). According to [Xu et al. \(2020\)](#), 1–3 billion people are projected to be left outside favorable climate conditions by 2070 (whilst certain areas of the world, not least high-income countries with mild average climates at present, will have beneficial climate conditions during this period).

countries of those who saw climate change as a major threat, minor threat and no threat were 68%, 20% and 9%, respectively. In the United States, 16% saw climate change as no threat and 23% saw it as a minor threat.² It is reasonable to suppose that people who see climate change as a minor or no threat either oppose or do not support political programs that prioritize countering it; and one can also expect them to not adapt their individual choices in a manner that reduces greenhouse-gas emissions.

This is where our study comes in. To better understand why individuals are “climate skeptics”, which is relevant for anyone interested in trying to influence skeptics towards embracing views more in line with the scientific consensus, we explore the role of a cultural value that has not thus far been investigated: *intolerance*. By intolerance, we mean an absence or negation of “respect for diversity” (Corneo and Jeanne, 2009, p. 691) or an absence or negation of “openness, inclusiveness and diversity to all ethnicities, races and walks of life” (Florida, 2003, p. 10). We hypothesize that people who are intolerant towards minority groups and who oppose diversity will tend to be more inclined to embrace climate skepticism. We propose two reasons for such a link. First, intolerance often follows from *poor or biased knowledge* about other people, not least in the form of stereotypes. People who base assessments about minority groups on the basis of poor or biased knowledge are likely to base assessments of other important issues, such as climate change, on poor or biased knowledge as well, one part of which is a reliance on “fake news”, i.e., distorted reporting about facts. Second, intolerance is based on a *value*, arguably based on low empathy, selfishness or fear, *that prioritizes some people before others*. What “we” do and what “we” are is considered fine, but what “they” do and what “they” are is not to be respected. People who hold this kind of value are likely to hold it in other areas as well – e.g., in the context of climate change, where effects on others, either in other (and poorer) countries or future human beings, are not given as large a weight as effects on themselves.

Some readers might expect us to relate the intolerance of European natives to their climate views. However, doing so entails a risk of reverse causality. Our empirical strategy is therefore based on the epidemiological method (Fernández, 2011), which relates individual outcome variables (in our case two types of views on climate change) for second-generation immigrants to average characteristics (in our case primarily intolerance) of the countries from which their parents migrated. The assumption is that cultural features of the country of origin are transmitted through the family (Bisin and Verdier, 2011) or, possibly, through continual contact with the country of origin. The main advantage of this method is that reverse causality can be ruled out, since the climate-change views of an individual cannot affect the intolerance of the residents in the parents’ country of origin several decades ago. With the approaches traditionally used in the literature on the determinants of climate skepticism, it is unclear whether a certain factor causes climate skepticism or if climate skepticism causes a certain factor.³ Thus, we have not chosen our sample because we are primarily interested in second-generation immigrants as such, but because the sample enables us to undertake a methodological improvement, for better causal inference.⁴

Our indicators of intolerance are from the World Values Survey (WVS) and are the average replies, in the countries from which the parents of our individuals migrated, to questions about what categories of neighbors people do not want. We use the earliest data available for each country so as to capture the average intolerance in the country relatively close to the

time when the parents migrated. Our two outcome variables are from the European Social Survey (ESS) and are replies to questions about whether the respondent believes that the climate is changing and how good or bad the impact of climate change will be. As such, the first question is more of a factual kind, whereas the second is more of a normative, or evaluative, kind. Our initial sample consists of close to 4000 second-generation immigrants in 22 European countries and Israel, whose parents come from 78 different countries across the world.

The results show that intolerance is a robust predictor of both types of climate skepticism. More specifically, intolerance towards gay people is related to a weaker belief in climate change, and intolerance towards people of a different race, immigrants/foreign workers and Muslims indicate a reduced probability of considering climate change very bad.

Previous studies have not considered intolerance as a possible determinant of climate skepticism – see the meta-analysis in Hornsey et al. (2016) and the literature review in Section 3 below – and so we offer a contribution by highlighting this overlooked factor. We also contribute by providing suggestive evidence of causal determinants of climate skepticism, as most studies in the literature suffer from a possible problem with possible reverse causality.

2. Theoretical framework

Our theoretical framework is illustrated in Fig. 1, which is an adaptation of the model of Stern (2000). We start with two types of basic determinants of intolerant attitudes: knowledge and values.⁵

First, people whose knowledge is poor or biased are more likely to be intolerant towards minority groups. Poor or biased knowledge can be the result of different factors, such as low education, few personal contacts with people who are different or low cognitive ability. Instead of basing attitudes on correct knowledge, people with poor or biased knowledge tend to use stereotypes, by which is meant over-generalized beliefs about a particular group of people, thus amplifying systematic differences between groups (Bordalo et al., 2016). Second, if one pairs poor or biased knowledge, and the accompanying usage of stereotypes, with a value that prioritizes some people over others (typically an “ingroup” seen as worthy of favorable treatment compared to “outgroups”), one gets intolerance. Such a value can be based on low empathy (the psychological identification with or vicarious experiencing of the feelings, thoughts or attitudes of another), selfishness (strongly prioritizing one’s own well-being over that of another) or fear (believing another to be potentially harmful), or a combination of these three. The resulting intolerance can take different forms, e.g., racism, xenophobia, homophobia, islamophobia, misogyny, transphobia and antisemitism.⁶

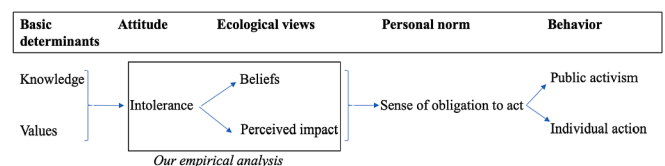


Fig. 1. The theoretical framework. Note: An arrow should be interpreted as a causal channel of influence.

² Another survey by Eurostat (2019) found that among EU citizens, 93% see climate change as a serious problem and 79% see it as a very serious problem.

³ This method of regressing individual outcomes on country-of-origin factors has become established in social-science research; see, e.g., Algan and Cahuc (2010), Luttmer and Singhal (2011) and Berggren et al. (2019).

⁴ We actually conduct an analysis with a native sample in Section 5.3, keeping in mind the methodological limitations, and the results seem to generalize to natives as well.

⁵ Regarding the relationship between knowledge and intolerance, see, e.g., Hello et al. (2002), Hainmueller and Hiscox (2007), Strabac and Listhaug (2008), Hodson and Busseri (2012), Berggren et al. (2019), Rao (2019), Vural-Batik (2020) and Andersson and Dehdari (2021). Regarding the relationship between values and intolerance, see, e.g., Leong and Ward (2006), Schiefer et al. (2010) and Van Assche et al. (2021).

⁶ By using terms that include “phobia” we yield to established practice but do not mean that a negative attitude towards the group in question needs to stem from fear, although it could.

The next step in Fig. 1 goes from intolerance to two ecological views: (i) the degree to which one believes that climate change is occurring and (ii) the perceived impact of climate change (the degree to which it will be good or bad for people in the world). The reason to expect intolerance to predict skeptical attitudes in the ecological realm is that the characteristics and mindset of an intolerant person are likely to influence his or her ecological views as well. First, poor or biased knowledge implies reliance on stereotypes when it comes to characterizing other people – and in the ecological realm, it implies beliefs about the ecological state of the world that are not formed by consideration of the best available scientific evidence but on low-quality sources of information. Sometimes beliefs are even formed by “fake news” (i.e., false information that does not occur through the same journalistic processes as regular news but mimics regular news), through which misinformation and disinformation is spread (Treen et al., 2020).⁷ Second, values that entail prioritizing some people, in particular one’s own group, over others, applies not only to attitudes towards minority groups in one’s own country at present, but also to people in other parts of the world living under different conditions and to future generations. In this way, there is an *epistemic* reason and a *normative* reason (based on the individual’s psychological characteristics producing his or her values) for expecting intolerant people to be more skeptical on climate issues. In intolerance, there is, we theorize, a *particular combination* of these two features that predict climate skepticism.

The third part of Fig. 1, which we do not study empirically, is the generation of a personal norm in the form of an obligation to act. If one is skeptical that there is global warming or that the effects thereof are bad, one is unlikely to experience such a norm. Lastly, and as illustrated in the rightmost part of the figure, if one does not develop such a norm, one is unlikely to engage in either political or individual action to counter the warming of the planet. These last two steps illustrate the importance of better understanding the determinants of climate skepticism, as it arguably may have dire consequences.

3. Literature review

Important previous studies on the determinants of climate skepticism include Baiardi and Morana (2021), who analyze the evolution of public attitudes on climate change across European countries 2009–2019. Using aggregate panel data, they conclude that environmental concerns are associated with per capita incomes, but also with social trust and the political position of the government. Using individual-level data, Neumayer (2004) examines the correlation between political orientation and how pro-environmentalist one is and finds that left-wing individuals are more pro-environmental than individuals to the right. Tjernström and Tietenberg (2008) likewise find that individuals with liberal or left-wing political values are more concerned about climate change than people on the (conservative) right. Using survey data from New Hampshire and Michigan, Hamilton (2011) shows that there is a significant interaction effect between education and climate concern, confirming that such concern was increasing with education for Democrats and decreasing with education for Republicans.

Using qualitative methods, Norgaard (2011) identifies psychological and sociological factors (emotions, culture and social structure) that explain a propensity among people to manage to ignore information about climate change, without explicitly rejecting it. McCright et al. (2016) investigate the role of political beliefs among Europeans for climate skepticism and find a divide: While citizens on the left consistently reported stronger belief in climate change and support for action to

⁷ Interestingly, Lutzke et al. (2019) find, in an online experiment, that participants exposed to guidelines that encouraged critical thinking reported a reduced likelihood to trust, like and share fake news about climate change on Facebook. This occurred without diminishing individuals’ likelihood to trust, like or share scientifically informed climate news.

mitigate it in 14 Western European countries, no such difference could be identified for the 11 post-Communist countries. Kauder et al. (2018) also do not find a difference, among German students, between Social Democrats and Christian Democrats (but sympathizers of the Green Party are more pro-environment). Ecklund et al. (2017) show a modest association between climate skepticism and evolution skepticism and that, overall, religion has a much stronger and clearer association with the latter than the former. Ziegler (2017) looks at China, the United States and Germany and shows that six environmental values⁸ are predictors of views about climate change; in the United States, political orientation also plays an important role (and yields interaction effects).

Poortinga et al. (2019) demonstrate that prioritizing self-enhancement over self-transcendence, as well as standing to the right politically, are associated with more climate skepticism. Boto-García and Bucciol (2020) look at the relation between actions to reduce energy consumption and beliefs in personal responsibility for climate change mitigation. Their findings imply that self-transcendence and openness are positively related to responsibility, while self-enhancement and conservation are negatively related to it.⁹ Lastly, Kahan et al. (2012) test, in an American setting, whether science comprehension affects beliefs about climate risk, and find that it does not. Rather, people express beliefs in line with the cultural groups to which they belong (either individualist-hierarchical or egalitarian-communitarian), pointing at the importance of taking cultural characteristics into account. The central role of values and culture is also underlined by Hornsey et al. (2016).

None of these previous studies apply the epidemiological method to rule out reverse causality. While acknowledging these valuable contributions to the literature, we believe we present novel results that complement them and, thereby, provide an enhanced understanding of the drivers of climate skepticism.

4. Data and empirical strategy

4.1. Data

4.1.1. The dependent variables

Our dependent variables are constructed on the basis of questions and replies from individuals surveyed in the 8th round of the ESS, which contains a special questionnaire on environmental attitudes across Europe. The survey was administered in 2016 in 22 European countries plus Israel. There was a total of 44,387 nationally representative respondents, but in order to use our empirical method (see Section 4.2.1), we only include second-generation immigrants, totaling 3875. By second-generation immigrants, we mean people who were born in their country of residence (out of the 23 that are included) and who have at least one parent born in another country (anywhere in the world).

We use the following two dependent variables, both of which are dummy variables:

- Belief in climate change (*Belief*): 1 = reply 4, “Definitely changing”, to the question “You may have heard the idea that the world’s climate is changing due to increases in temperature over the past 100 years.

⁸ The six environmental values are: “humans have the right to modify the natural environment to suit their needs”, “humans are severely abusing the planet”, “plants and animals have the same right to exist as humans”, “nature is strong enough to cope with the impacts of modern industrial nations”, “humans were meant to rule over the rest of nature” and “the balance of nature is very delicate and easily upset”.

⁹ When relating self-enhancement/self-transcendence to our outcome variables using the epidemiological method, we found that the association is not robust to the model specification (see Section 5.3 for further testing using this value). The same goes for political orientation. Results are available on request.

What is your personal opinion about this? Do you think the world's climate is changing?"; 0 = replies 1–3. (Question 37 in the ESS.)

- Perceived impact of climate change (*Impact*): 1 = replies 9 or 10, where 10 is "Extremely bad", to the question "How good or bad do you think the impact of climate change will be on people across the world?"; 0 = replies 0–8. (Question 42 in the ESS.)

This way of coding the variables means that the dependent variables capture pro-environmentalist attitudes and that positive (negative) point estimates indicate a lower (higher) probability of climate skepticism. The correlation between these two variables is 0.24. Descriptive statistics for the dependent variables are presented in [Table A1](#) in the Appendix.

4.1.2. The main explanatory variables: indicators of intolerance

The main explanatory variables, based on our theorizing, are a number of indicators of intolerance, taken from the WVS. Since they are conceptually similar, they are included one at a time in our specifications. They are based on replies to the survey question "On this list are various groups of people. Could you please mention any that you would not like to have as neighbors?"¹⁰ We make use of the following categories: "Muslims", "Jews", "people of a different race", "homosexuals" and "immigrants/foreign workers". The variables are defined as the share of the population in the countries of origin of the parents of the second-generation immigrants that pick each category, according to the earliest available WVS record for each country.¹¹ The reason for picking the earliest available data is that our empirical method assumes an influence from the culture of the countries of origin on the parents, and since they migrated some decades ago – early enough to have reasonably adult children participating in the ESS survey that we make use of for our dependent variables – we want to pick a value as close as possible to the assumed average year of migration of the parents.¹² In addition to these five indicators of intolerance, we include another question from the WVS concerning attitudes towards homosexuality, which serves to check whether the neighbor questions do capture attitudes towards minority groups: "Please tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between, using this card. Statement: homosexuality." This variable is coded as the share of the population in the countries of origin of the parents of the second-generation immigrants that pick categories 1 and 2 (on a scale from 1 to 10, where 1 is "Never justifiable" and 10 is "Always justifiable").¹³ Descriptive statistics for the explanatory variables are presented in [Table A2](#) in the Appendix.

4.1.3. Control variables

The control variables are of two kinds: country-level controls that apply to the countries of origin of the parents of the respondents (from the [World Bank, 2015](#)), and individual-level controls that apply to the second-generation immigrant respondents (from the ESS). These are added in different combinations.

The country-level variables are *Polity2* and log *GDP* per capita. The first is a measure of the political system in the countries of origin. It

¹⁰ Interpreting this WVS indicator as a measure of intolerance is not new: see, e.g., [Strabac and Listhaug \(2008\)](#), [Berggren and Elinder \(2012\)](#), [Hadler \(2012\)](#) and [Berggren and Nilsson \(2013\)](#).

¹¹ Most parents migrated from the same country. If the parents come from different countries, we use the average of the two country values. If we do not have data on one parent's country of origin, we only use the value from the other parent's country of origin.

¹² For most countries, the earliest available WVS record is from the early 1990s, but several countries also have information as far back as the early 1980s.

¹³ [Bobo and Zubrinsky \(1996\)](#) validate that the neighbor measure concerning race is a measure of racial prejudice rather than attitudes towards social class or the like.

ranges from autocracy, taking the value –10, to democracy, taking the value +10. The second is the logarithm of real GDP per capita in USD. In both cases, we use the average value for the country of origin during the period 1960–1990. The idea is to control for basic political and economic influences of ecological views, to make sure the intolerance measures do not capture those potential channels.

The individual-level variables are chosen to control for individual characteristics that can affect environmental positions. They are: *Age* and *Age squared*; *Male* (taking the value 1 if the respondent is a male and 0 if she is a female); *Married* (taking the value 1 if the respondent is 1 and 0 otherwise); *Children* (with 1 denoting if the respondent has ever had children – own children, partner's children, foster children or stepchildren – living in the household and with 0 if this has never been the case); *Good health* (the respondent's subjective health, with 1 being either of the two categories "very good" and "good" health and with 0 being any of the three alternative categories "fair", "bad" and "very bad" health); *News* (with 1 indicating that the respondent listens to news about politics and current affairs for more than 30 min per day and with 0 denoting listening less than that); *Religious* (taking a value between 0 and 10, in answer to the question "How religious are you?"); education is measured by two variables (with lower education being the excluded category): *Upper secondary degree* (taking the value 1 if the respondent has graduated from upper secondary school and 0 otherwise) and *Tertiary degree* (taking the value 1 if the respondent has a degree at the university level and 0 otherwise); employment status is measured by two variables (being employed is the excluded category): *Unemployed* (taking the value 1 if the respondent is unemployed and 0 otherwise) and *Out of labor force* (taking the value 1 if the respondent is neither employed or unemployed and 0 otherwise); the income level is measured by two variables (with high income as the excluded category): *Low income* (taking the value 1 if the respondent is in one of the three lowest income deciles and 0 otherwise) and *Middle income* (taking the value 1 if the respondent is in one of the four middle income deciles and 0 otherwise); and lastly *Working fathers/Working mothers* (taking the value 1 if the parent was employed or self-employed, and 0 if the parent was not working, dead or absent, when the respondent was 14 years old).

There is a risk of endogeneity for all the individual-level variables except for age and gender, which speaks in favor of a cautious interpretation of causal effects. Descriptive statistics for control variables are presented in [Table A3](#) in the Appendix. It bears noting how similar on observables our sample is to the full sample.

4.2. Empirical strategy

We employ the so-called epidemiological method ([Fernández, 2011](#)) to investigate how intolerance affects ecological views/opinions. The approach is illustrated in [Fig. 2](#).

Notably, this empirical approach does not entail regressing the ecological views of our ESS respondents on their individual intolerance levels, as such estimates could reflect reverse causality. Instead, the ecological views are regressed on intolerance in the country of origin of the ESS respondents' parents, as defined in [Section 4.1.2](#) above. This rules out reverse causality and constitutes a methodological improvement compared to other studies on the determinants of climate skepticism. In addition, stable country-of-birth characteristics are accounted for through fixed effects; and individual characteristics are also controlled for.

The assumption underlying the epidemiological approach, following [Bisin and Verdier \(2001, 2011\)](#), is that values and attitudes, as cultural traits, are transmitted to the individual both horizontally (from the culture of the society in which one grows up and, if one stays in touch with the country of origin, directly from that culture) and vertically (from the beliefs and values of parents, which in turn were and are

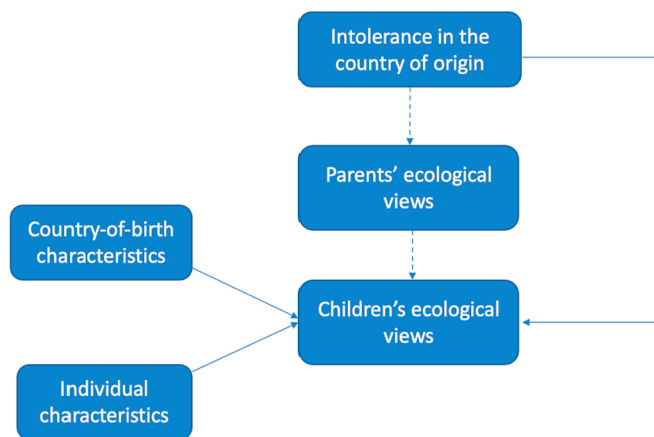


Fig. 2. The empirical method.

influenced by the culture of the society in which they grew up).¹⁴ In our empirical analysis, we cannot analyze vertical transmission, indicated by the hyphenated arrows in Fig. 2, directly due to a lack of data on the views of the parents; but even if we could, performing the analysis that way would entail a risk for reverse causality as well, since it is conceivable that children influence the views of their parents.

We operationalize this approach using Linear Probability Models (LPM) of the following kinds:

$$\text{Belief}_{ica} = \beta_0 + \beta_1 X_a + \beta_2 Q_a + \beta_3 Z_{ica} + \gamma_c + \varepsilon_{ica} \quad (1a)$$

$$\text{Impact}_{ica} = \beta_0 + \beta_1 X_a + \beta_2 Q_a + \beta_3 Z_{ica} + \gamma_c + \varepsilon_{ica} \quad (1b)$$

Belief_{ica} and Impact_{ica} are the ecological views (as defined in Section 4.1.1) of second-generation immigrant i , born and residing in country c with parents born in country a , where $a \neq c$. The variable X_a is a measure of intolerance (as defined in Section 4.1.2) in country a . The vector Q_a is the two control variables, *Polity2* and *log GDP* per capita, for country a (see Section 4.1.3). Z_{ica} is a vector of individual controls (as defined in Section 4.1.4), γ_c is second-generation immigrant i 's country-of-birth fixed effects¹⁵ and ε_{ica} is the error term. Standard errors are clustered by the parents' birth country to allow for arbitrary correlations of the error terms among second-generation immigrants from the same country of origin a .

5. Results

5.1. Illustrations

As a first illustration of the relationship between intolerance in the countries of origin and the two ecological views, we present a selection of four graphs. Fig. 3 (a–b) for the outcome variable *Belief* and Fig. 4 (a–b) for the outcome variable *Impact*. They show, on the x axis, the average degree of intolerance, using four different indicators, in the countries from which the parents migrated and, on the y axis, the difference between our sample of second-generation immigrants and natives when it comes to

¹⁴ That parents transmit values to their children has been shown to hold in many contexts, e.g., when it comes to choice of political party (Settle et al., 2009), conservatism (Vollebergh et al., 1999), trust (Ljunge, 2014), risk attitudes (Dohmen et al., 2012), female labor force participation (Fernández et al., 2004), work ethic (ter Bogt et al., 2005), religion (Bradshaw and Ellison, 2008), attitudes towards euthanasia, homosexuality and ethnic minorities (Jaspers, 2008), generosity (Wilhelm et al., 2008) and cognitive and non-cognitive skills (Coneus et al., 2012).

¹⁵ The fixed effects allow us to compare second-generation immigrants born in the same country with different countries of origin, as they control for culture, institutions and other stable, unobserved differences that apply to all residents in country c .

being pro-environmentalist (using averages for the 23 countries).¹⁶ As can be seen, the intolerance measures display a negative slope in all four graphs. This indicates that intolerance in the country of origin is associated with lower levels of *Belief* and *Impact*, i.e., more climate skepticism, in our sample, relative to the native sample. However, as this visual exercise is merely suggestive, we proceed to the regression analysis.

5.2. Main regression results

We present our baseline regression results in Tables 1 and 2, one for each outcome variable.¹⁷

First of all, five of the six intolerance indicators are statistically significant at 10% or lower, and all have the expected negative sign. It thus seems as if a background in an intolerant culture, where people in general do not want Muslims, Jews, people of a different race or homosexuals neighbors and where homosexuality is not considered justifiable, are less likely to believe in global warming, in line with our theoretical reasoning in Section 2. To get a feeling for the size of the effect, if we look at intolerance towards Jews, an increase in the share who are antisemitic in the individual's country of origin by 10 percentage points implies a reduced probability of the individual clearly acknowledging global warming by 4.5 percentage points (7.5%).

When looking at the individual control variables, one should keep in mind that most of these cannot readily be interpreted as causal. Still, it is noticeable that very few of them are statistically significant, and most have small point estimates as well. The ones that stand in a quite robust, statistically significant relationship to *Belief* are *Married*, *Good health*, *Upper secondary degree* and *Out of labor force*, all of them with a negative sign, implying a greater probability of climate skepticism. The two control variables from the country of origin are never statistically significant.

In Table 2, the outcome variable is the individual's perception of the impact climate change has and is an indicator of the view that it is really bad.

In the case of the second outcome variable, which expresses an evaluation of global warming as very bad, four of the six intolerance indicators – intolerance against Muslims, people of a different race, immigrants/foreign workers and homosexuals – are statistically significant at the 10% level or lower. All of the estimates have the same negative sign, implying that intolerance increases the likelihood of climate-skeptical views. To get a feeling for the importance of intolerance for *Impact*, an increase in the share who are intolerant towards people of a different race in the individual's country of origin by 10 percentage points implies a reduced probability of the individual considering the consequences of climate change extremely bad by 4.3 percentage points (21.5%).

In the case of the individual control variables, the same caveat applies here: we cannot, for most of them, rule out reverse causality. As before we have very few instances of statistical significance – it only appears for one variable in particular: having a tertiary degree, which makes the individual more likely to consider climate change very bad. In addition, the two variables stemming from the country of origin, *Polity2* and *log GDP* per capita, are statistically significant for this outcome variable. The sign of the former implies that democracy leads to a reduced probability of strong pro-environmentalism (although the effect size is small), while the richer a country of origin is, the more likely the individual is to take a strong pro-environmentalist view.

At this point, we conclude that intolerance appears to be a predictor

¹⁶ By "natives" we mean people who were born in their country of residence and whose parents were as well. They are compared, in our analysis, with second-generation immigrants, who were born in the same country as the natives but who have at least one parent born in another country.

¹⁷ These regressions contain the full set of control variables, but we have also estimated three other specifications with no control variables at all and a gradual addition of control variables (in two steps). The results are presented and discussed as a robustness check in Section 5.3 below.

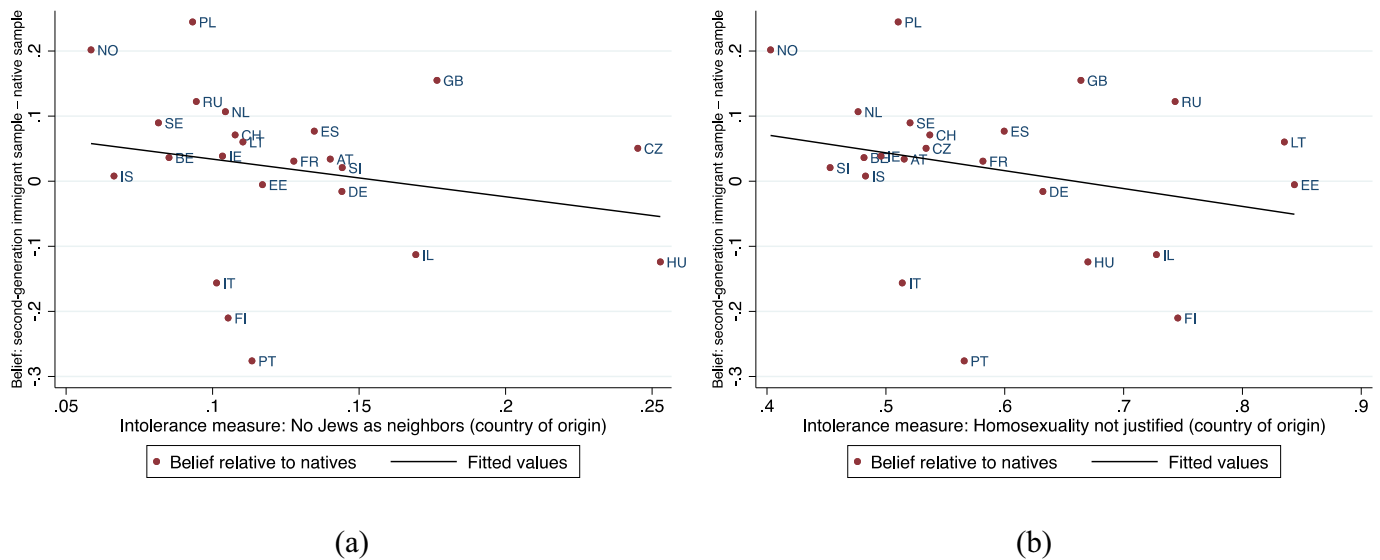


Fig. 3. Associations of *Belief* and *Impact* (second-generation immigrant sample – native sample) with intolerance in the countries of origin.

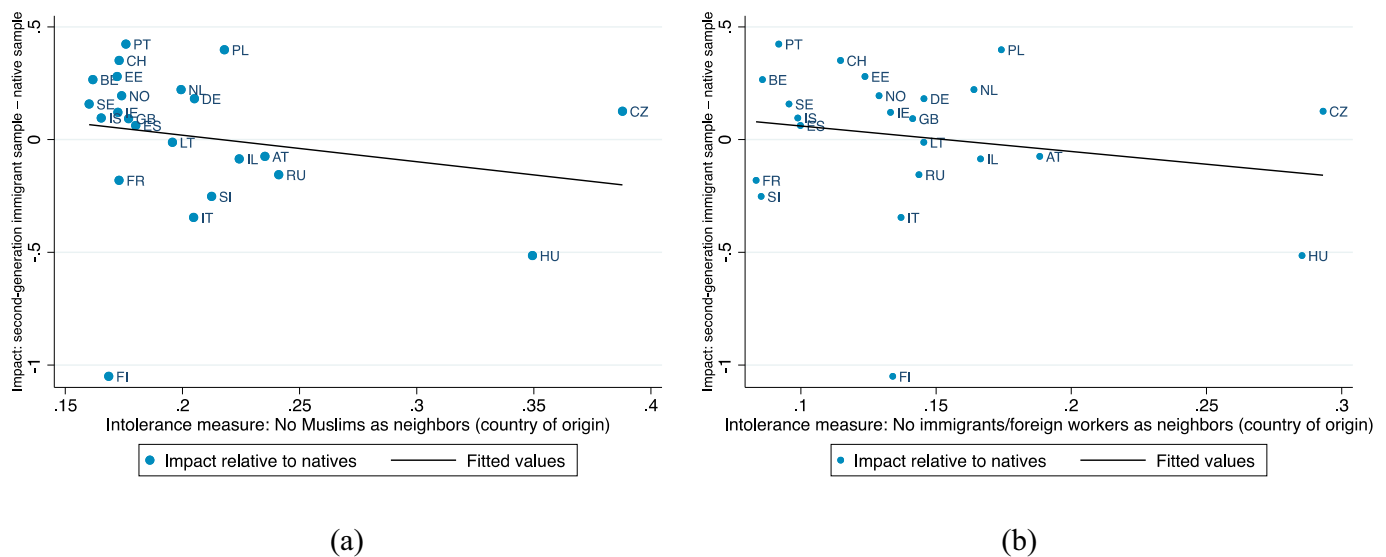


Fig. 4. Associations of *Belief* and *Impact* (second-generation immigrant sample – native sample) with intolerance in the countries of origin.

of climate skepticism. We do not make strong claims regarding which particular type of intolerance that is the most reliable predictor – the types of intolerance are conceptually similar and hard to separate also empirically. The general orientation of having intolerant attitudes is probably what matters.¹⁸ We now continue with a robustness analysis.

5.3. Robustness analysis

We have undertaken several robustness checks, concerning model specification, the role of values and knowledge vis-à-vis tolerance as explanatory variables, whether other cultural or political variables

¹⁸ This is in line with previous work, arguing for a link between different kinds of tolerance – see Inglehart and Abramson (1999). Indeed, Ekehammar and Akrami (2003) and Akrami et al., 2011 find that prejudice based on gender, race, sexual orientation and able-bodiedness are positively correlated and that there is “generalized prejudice” in many people, such that if they are intolerant towards one minority, they tend to be intolerant towards others as well. A factor analysis results in a generalized prejudice factor explaining 50 to 60% of the variance in prejudice.

predict climate skepticism, whether the results rather reflect integration, whether the results differ for countries depending on their climate risk, whether outliers matter, whether ordered probit gives the same results as linear probability models and whether the results generalize to natives.

First, regarding model specification, we have carried out three exercises: varying the set of control variables group-wise, varying the set of control variables through a version of extreme bounds analysis (EBA) and removing a potentially bad control variable. In Tables 1 and 2, we included the full set of control variables, and in Tables 3 and 4 we present the point estimates for the six indicators of intolerance for three other cases: one without any control variables, one with *Age*, *Age*², *Male*, *Married*, *Children*, *Good health* and one with *Age*, *Age*², *Male*, *Married*, *Children*, *Good health*, *News*, *Religious*, *Upper secondary degree*, *Tertiary degree*, *Unemployed*, *Out of labor force*. Otherwise, everything remains the same. The idea is to see if *Intolerance*, in its different manifestations, is

Table 1
LPM regression results for the outcome variable *Belief*.

Intolerance indicators →	No Muslims as neighbors	No Jews as neighbors	No different race as neighbors	No immigrants/foreign workers as neighbors	No homosexuals as neighbors	Homosexuality not justified
Intolerance (country of origin)	-0.229* [0.135]	-0.447*** [0.133]	-0.438** [0.171]	-0.081 [0.204]	-0.262*** [0.058]	-0.396*** [0.084]
Age	0 [0.005]	-0.002 [0.005]	-0.001 [0.005]	0 [0.005]	-0.002 [0.005]	-0.002 [0.005]
Age ²	0 [0.000]	0 [0.000]	0 [0.000]	0 [0.000]	0 [0.000]	0 [0.000]
Male	-0.078* [0.039]	-0.062 [0.041]	-0.071* [0.038]	-0.070* [0.038]	-0.073* [0.039]	-0.074* [0.039]
Married	-0.065* [0.035]	-0.086*** [0.031]	-0.065* [0.034]	-0.069** [0.033]	-0.066* [0.035]	-0.064* [0.034]
Children	-0.027 [0.037]	-0.03 [0.040]	-0.029 [0.036]	-0.026 [0.036]	-0.033 [0.037]	-0.03 [0.037]
Good health	-0.063** [0.031]	-0.063* [0.033]	-0.068** [0.030]	-0.068** [0.030]	-0.057* [0.031]	-0.066** [0.031]
News	-0.034 [0.032]	-0.03 [0.033]	-0.021 [0.031]	-0.024 [0.031]	-0.022 [0.030]	-0.017 [0.031]
Religious	-0.009 [0.007]	-0.007 [0.007]	-0.009 [0.007]	-0.011 [0.007]	-0.01 [0.007]	-0.009 [0.006]
Upper secondary degree	-0.104*** [0.027]	-0.109*** [0.028]	-0.090*** [0.028]	-0.089*** [0.027]	-0.096*** [0.027]	-0.090*** [0.027]
Tertiary degree	0.022 [0.036]	0.021 [0.037]	0.036 [0.037]	0.039 [0.038]	0.035 [0.036]	0.033 [0.037]
Unemployed	-0.047 [0.079]	-0.046 [0.089]	-0.04 [0.076]	-0.04 [0.077]	-0.043 [0.076]	-0.039 [0.077]
Out of labor force	-0.065* [0.037]	-0.052 [0.040]	-0.062* [0.036]	-0.060* [0.035]	-0.064* [0.038]	-0.064* [0.036]
Low income	0.021 [0.061]	0.007 [0.059]	0.026 [0.058]	0.022 [0.058]	0.036 [0.060]	0.024 [0.058]
Middle income	0.057 [0.041]	0.066 [0.045]	0.06 [0.040]	0.056 [0.040]	0.070* [0.041]	0.063 [0.041]
Working mother (at age 14)	-0.022 [0.047]	-0.018 [0.050]	-0.024 [0.044]	-0.017 [0.045]	-0.025 [0.046]	-0.027 [0.044]
Working father (at age 14)	-0.054 [0.038]	-0.032 [0.039]	-0.047 [0.040]	-0.045 [0.040]	-0.051 [0.037]	-0.04 [0.038]
Polity2 (country of origin)	-0.001 [0.005]	-0.005 [0.006]	-0.002 [0.005]	-0.001 [0.005]	-0.003 [0.005]	-0.005 [0.004]
Log GDP/capita (country of origin)	0.004 [0.019]	0.012 [0.022]	0.002 [0.018]	-0.001 [0.018]	-0.005 [0.018]	-0.007 [0.017]
Constant	0.950*** [0.229]	0.937*** [0.233]	0.973*** [0.218]	0.909*** [0.222]	1.109*** [0.229]	1.240*** [0.226]
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.088	0.092	0.09	0.085	0.093	0.096
Observations	842	768	876	875	860	875

Note: The outcome variable *Belief* is a dummy variable taking the value 1 if the respondent chose reply 4, “Definitely changing”, to the question “You may have heard the idea that the world’s climate is changing due to increases in temperature over the past 100 years. What is your personal opinion about this? Do you think the world’s climate is changing?” and taking the value 0 if the respondent chose any of the replies 1–3. The sample consists of second-generation immigrants in 22 European countries and Israel. Standard errors are in parenthesis and are clustered on the parents’ birth country. If both parents are immigrants, but from different countries, the clustering is done on the father’s birth country.

- * p < 0.1.
- ** p < 0.05.
- *** p < 0.01.

robust over the different models.¹⁹ If one applies the robustness criterion “statistical significance at 10% or lower and an unchanged sign in the three models that contain control variables”, the following *Intolerance* indicators are robust predictors of *Belief* with a negative sign: *No Muslims as neighbors*, *No Jews as neighbors*, *No homosexuals as neighbors* and *Homosexuality not justified*. As for the other outcome variable, *Impact*, robust predictors with a negative sign are: *No Muslims as neighbors*, *No different race as neighbors*, *No immigrants/foreign workers as neighbors* and *No homosexuals as neighbors*. We see that intolerance towards Muslims and homosexuals are robust predictors, both of not having a strong belief in climate change and in not thinking its impact very bad.

¹⁹ In addition to changing the model specification, this exercise also entails a greater number of observations, suggesting greater generalizability. To take one example, while the regressions with *No Muslims as neighbors* in Tables 1 and 2 makes use of 842 observations, the number of observations increases to 2642 in the corresponding regressions without any control variables in Tables 3 and 4.

Even these variations in the set of controls may be too limited if we want strong evidence of the robustness of *Intolerance*. Perhaps other combinations yield different results. Therefore, we have applied a variant of the EBA developed by Young and Holsteen (2017), in which each regression contains one indicator of intolerance, all possible combinations of the control variables *Age*, *Age²*, *Male*, *Married*, *Children*, *Good health*, *News*, *Religious*, *Upper secondary degree*, *Tertiary degree*, *Unemployed*, *Out of labor force* (our second most comprehensive set of controls – see the last row of Tables 3 and 4) and fixed effects.²⁰ This yields 8192 regressions for each *Intolerance* measure. Table 5 contains the overall results for each outcome variable, where the examined *Intolerance* measures in each case are the ones found to be robust in our preceding model-specification analysis.

As can be seen, if we apply two criteria for robustness here – a share

²⁰ The reason for not applying the full set of control variables is that the number of regressions becomes immensely large (over half a million).

of 100% with the same sign and a share of 90% or higher with statistical significance at the 10% level or lower – all variables except *No Jews as neighbors* remain robust.²¹

Lastly, we removed a potentially “bad control”: whether the individual is religious.²² It may be the case that religiosity is co-determined with climate views and that it is itself an outcome variable, in which case our intolerance point estimates could have become biased. We have therefore re-run the models of Tables 1 and 2, as well as the models partly shown in the bottom panels of Tables 3 and 4, without religiosity and without changing anything else. This exercise does not change the results in any substantial way, indicating that religiosity does not introduce bias (results are available on request).

Second, since our theoretical framework in Section 2 presents knowledge and values as determinants of intolerance, we test if intolerance retains its statistical significance when including indicators of knowledge and values. In other words, we ask whether intolerance, as we suggest on theoretical grounds, continues to be a predictor of climate views when its posited main determinants are included as well. In order to check this, we include measures of the educational level in the respondents’ country of origin (*Education*, the average number of years in schooling, from Barro and Lee, 2013) and two value indicators from the country of origin (one at a time): *Self-enhancement* and *Conservation*.²³ The former is an indicator of the degree to which one prioritizes oneself as opposed to valuing more transcendent aspects of life; the latter is an indicator of the degree to which one values traditionalism and stability as opposed to valuing openness and change. The regression results are presented in Table 6, where the model specification we use is the last one of Tables 3 and 4: the one with the second highest number of control variables.²⁴ For reasons of brevity, we do not report the point estimates of the control variables.

Table 6 shows that for *Belief*, intolerance (on the basis of race and sexual orientation) remains statistically significant also when *Education* and the two values are included. The posited determinants themselves are not robustly related to *Belief* in these regressions. For *Impact*, virtually all intolerance indicators remain statistically significant when

²¹ As a sensitivity check we have applied a more traditional EBA and included the same set of control variables in all possible combinations of three (but then, for data-program reasons, without fixed effects). Reassuringly, the same variables are identified as robust in that case. Results are available on request.

²² When deciding what control variables to include, one has to balance the risk of not including “good” controls, in which case omitted variable bias arises, and the risk of including “bad” controls. As Angrist and Pischke (2009, p. 64) write: “Some variables are bad controls and should not be included in a regression model, even when their inclusion might be expected to change the short regression coefficients. Bad controls are variables that are themselves outcome variables in the notional experiment at hand. That is, bad controls might just as well be dependent variables too. Good controls are variables that we can think of having been fixed at the time the regressor of interest was determined.” Our approach to tackle this trade-off is to include four model specifications with different sets of control variables, to conduct extreme bounds analysis with a systematic variation of all controls and to add and remove different variables in the robustness analysis.

²³ These variables are from Schwartz (1992), who defines them on the basis of ten human values. *Self-enhancement* is a net measure ((Gross) *Self-enhancement* – (Gross) *Self-transcendence*, as defined by Schwarz) based on a combination of achievement, power, universalism and benevolence; and *Conservation* is a net measure ((Gross) *Conservation* – (Gross) *Openness*, as defined by Schwarz) based on a combination of hedonism, stimulation, self-direction, security, conformity and tradition.

²⁴ We prefer this specification to the one with all control variables to avoid an influence from the two macro variables from the country of origin included in that model. However, we have carried out all the regressions of Table 6 for the three other model specifications of Tables 1–4 as well. In addition, we have tried different combinations of including education and the two values. In all these exercises, the results are very similar irrespective of the model and are available on request.

including *Education* and the two values, indicating even more strongly the relevance of intolerance as a predictor of a reduced propensity to embrace pro-environmentalist views. Here as well, neither *Education* nor the values are robustly related to the outcome variable (and *Education* appears with an unexpected negative sign). We conclude, on the basis of this test, that intolerance adds predictive power over and above its posited main determinants, which themselves are not directly robustly related to climate views. This finding is broadly in line with what Kahan et al. (2012) report to hold for Americans: science literacy as such does not predict correct beliefs about climate change – instead cultural-psychological characteristics, and wanting to conform to the views of one’s own group, do.

As an additional exercise, aiming to see whether our intolerance measures predict a generally “conservative” attitude rather than climate skepticism, we used the *Conservation* variable as the outcome variable in our otherwise unchanged baseline models. It turns out that all intolerance indicators are insignificant with this specification, lending support to a connection between intolerance (rather than a general attitude of resisting change) and climate skepticism.

Third, as mentioned in the literature review, other studies suggest that political orientation is a predictor of climate skepticism; and one can also imagine that other cultural background variables than intolerance are related to climate skepticism (see, e.g., Baiardi and Morana, 2021). We therefore undertake an analysis in which we add political orientation (the average position of the left-right scale of the country of origin), social trust (the share in the country of origin stating that most people can be trusted), and the six Hofstede cultural variables for the country of origin (individualism, pragmatism, uncertainty avoidance, power distance, masculinity and indulgence). Data for the first two variables are from the WVS/EVS; data for the Hofstede variables are from Hofstede (2021). When adding these variables, one at a time, to our baseline models, they are almost always statistically insignificant, and importantly, the intolerance indicators retain their statistical significance and size effects. The exception is pragmatism, which quite consistently predicts *Belief*: the more pragmatist the country of origin, the more likely our individuals are to believe in climate change. Hence, we interpret previous findings of a role for political orientation as possibly being explained by omitted variable bias, as intolerance is not taken into account; and we furthermore find that intolerance is the most robust predictor among the cultural variables tested of climate skepticism.²⁵ Results are available on request.

Fourth, a possible concern is that our findings are spurious in that they may reflect whether the second-generation immigrants are integrated or not, rather than the intolerance of their background countries. If integration relates to climate skepticism and more intolerant individuals tend to integrate less in the societies where they reside, (a lack of) integration rather than intolerance could be the actual determinant. To check this, we have added an individual-level indicator of integration, a dummy variable taking the value 1 if the second-generation immigrant speaks the language of the country in which they were born and in which they reside at home (indicating successful integration) and 0 otherwise. Reassuringly, the point estimate of this variable is virtually never statistically significant, when added to our full set of baseline regressions, and none of the other results change when including it. We take this to indicate that our results are not driven by integration but, rather, country-of-origin intolerance. Results are available on request.

Fifth, we have used the Global Climate Risk Index (Eckstein et al., 2021) to create a dummy variable taking the value 1 for the 1/5 of the countries of residence in our sample that have the highest climate risk

²⁵ In line with the reasoning about bad controls above, we also note that political preferences may be a variable of that kind. Still, it bears noting that it is only included in this robustness test and that it does not really change our main results.

Table 2
LPM regression results for the outcome variable *Impact*.

Intolerance indicators →	No Muslims as neighbors	No Jews as neighbors	No different race as neighbors	No immigrants/foreign workers as neighbors	No homosexuals as neighbors	Homosexuality not justified
Intolerance (country of origin)	-0.261*** [0.083]	-0.164 [0.125]	-0.430*** [0.122]	-0.229** [0.114]	-0.097* [0.049]	-0.059 [0.084]
Age	-0.001 [0.006]	0.003 [0.006]	-0.001 [0.006]	0 [0.006]	0 [0.006]	0 [0.006]
Age ²	0 [0.000]	0 [0.000]	0 [0.000]	0 [0.000]	0 [0.000]	0 [0.000]
Male	-0.042 [0.028]	-0.048 [0.031]	-0.037 [0.027]	-0.034 [0.027]	-0.039 [0.028]	-0.039 [0.027]
Married	-0.036 [0.035]	-0.068** [0.033]	-0.04 [0.035]	-0.044 [0.034]	-0.036 [0.035]	-0.042 [0.034]
Children	0.016 [0.028]	0.01 [0.030]	0.009 [0.029]	0.011 [0.029]	0.014 [0.028]	0.012 [0.029]
Good health	-0.031 [0.022]	-0.028 [0.023]	-0.041* [0.023]	-0.041* [0.023]	-0.031 [0.022]	-0.041* [0.023]
News	-0.017 [0.025]	-0.018 [0.027]	-0.017 [0.023]	-0.02 [0.024]	-0.015 [0.025]	-0.021 [0.024]
Religious	-0.001 [0.005]	0 [0.005]	-0.001 [0.004]	-0.002 [0.004]	-0.001 [0.005]	-0.002 [0.004]
Upper secondary degree	-0.004 [0.030]	-0.019 [0.031]	-0.016 [0.029]	-0.014 [0.029]	-0.011 [0.030]	-0.017 [0.029]
Tertiary degree	0.099** [0.037]	0.090** [0.041]	0.095** [0.036]	0.099** [0.036]	0.100*** [0.037]	0.093** [0.036]
Unemployed	-0.064 [0.075]	-0.077 [0.085]	-0.041 [0.077]	-0.039 [0.075]	-0.041 [0.076]	-0.04 [0.076]
Out of labor force	0.001 [0.033]	0.023 [0.033]	0.011 [0.032]	0.012 [0.032]	0.012 [0.032]	0.012 [0.032]
Low income	0.045 [0.047]	0.044 [0.049]	0.019 [0.047]	0.018 [0.047]	0.037 [0.047]	0.014 [0.047]
Middle income	-0.019 [0.047]	-0.011 [0.051]	-0.029 [0.046]	-0.032 [0.046]	-0.021 [0.047]	-0.036 [0.046]
Working mother (at age 14)	0.008 [0.029]	0.011 [0.035]	0.004 [0.027]	0.011 [0.028]	0.006 [0.030]	0.008 [0.029]
Working father (at age 14)	-0.02 [0.037]	-0.016 [0.037]	-0.031 [0.037]	-0.031 [0.036]	-0.017 [0.037]	-0.029 [0.036]
Polity2 (country of origin)	-0.008** [0.004]	-0.010** [0.004]	-0.013*** [0.004]	-0.011*** [0.004]	-0.013*** [0.004]	-0.010** [0.004]
Log GDP/capita (country of origin)	0.038** [0.016]	0.047*** [0.017]	0.049*** [0.015]	0.048*** [0.017]	0.046*** [0.017]	0.042** [0.017]
Constant	0.138 [0.200]	-0.007 [0.210]	0.132 [0.196]	0.069 [0.197]	0.093 [0.203]	0.129 [0.211]
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.058	0.066	0.078	0.073	0.07	0.071
Observations	842	768	876	875	860	875

Note: The outcome variable *Impact* is a dummy variable taking the value 1 if the respondent chose replies 9 or 10, where 10 is “Extremely bad”, to the question “How good or bad do you think the impact of climate change will be on people across the world?” and taking the value 0 if the respondent chose replies 0–8. The sample consists of second-generation immigrants in 22 European countries and Israel. Standard errors are in parenthesis and are clustered on the parents’ birth country. If both parents are immigrants, but from different countries, the clustering is done on the father’s birth country.

- * p < 0.1.
- ** p < 0.05.
- *** p < 0.01.

and 0 otherwise. The idea is to see whether the influence of intolerance is restricted to such countries, where potential climate problems are the greatest. When adding it to our baseline models, it is never significant, and the other results do not really change. Hence, the findings do not only apply to countries with high climate risk. Results are available on request.

Sixth, in order to see whether the results are sensitive to outliers, we have applied a jackknife analysis, removing one country at a time. This exercise shows that *No Muslims as neighbors* is somewhat sensitive to outlier countries for *Belief*, and that *No homosexuals as neighbors* is somewhat sensitive to outlier countries for *Impact*. Otherwise, the results from the main analysis in Section 5.2 remain robust to outliers, indicating a continued clear relationship between intolerance and a weakened pro-environmentalism. Results are available on request.

Next, as an alternative to using linear probability models, we have undertaken analysis by ordered probit and fully ordered dependent variables. The results, which are available on request, are largely consistent, but with ordered probit, the estimates for *Impact* are a bit less

precise.

Lastly, we conduct an exercise to see whether the results generalize, by changing the sample from second-generation immigrants to natives in the 23 countries. This comes at a cost: we can no longer use the epidemiological method, and hence the results are subject to possibly reflecting reverse causality. We use the following two intolerance indicators from the ESS: *Intolerance gays* and *Intolerance refugees*. The first indicator is the response to the following statement: “Gays and lesbians should be free to live life as they wish”, where the response ranges from 1 (the most tolerant: “strongly agree”) to 5 (the least tolerant “strongly disagree”). The second indicator is the response to the statement: “The government should be generous in judging people’s application for refugee status”, where the response choices are identically constructed. We then largely keep our main model, but make a couple of necessary adjustments since we now conduct a cross-country analysis with individual-level data: the standard errors are therefore no longer clustered on the country level and *Log GDP/capita* and *Polity2* are left out of the model (as they referred to the country of origin of the second-

Table 3
LPM regression results for the outcome variable *Belief*, three further model specifications.

Intolerance indicators →	<i>No Muslims as neighbors</i>	<i>No Jews as neighbors</i>	No different race as neighbors	No immigrants/foreign workers as neighbors	<i>No homosexuals as neighbors</i>	<i>Homosexuality not justified</i>
Model: As in Table 1 but with no control variables						
Intolerance (country of origin)	-0.276*** [0.098]	-0.209* [0.106]	-0.282** [0.139]	-0.209* [0.119]	-0.133** [0.063]	-0.057 [0.071]
Model: As in Table 1 but with these control variables: Age, Age ² , Male, Married, Children, Good health						
Intolerance (country of origin)	-0.300** [0.138]	-0.284* [0.149]	-0.304 [0.186]	-0.174 [0.151]	-0.187** [0.077]	-0.160* [0.081]
Model: As in Table 1 but with these control variables: Age, Age ² , Male, Married, Children, Good health, News, Religious, Upper secondary degree, Tertiary degree, Unemployed, Out of labor force						
Intolerance (country of origin)	-0.294** [0.136]	-0.314* [0.158]	-0.309* [0.184]	-0.172 [0.157]	-0.207*** [0.071]	-0.185** [0.080]

Note: Cf. Table 1, which contains the point estimates for *Intolerance* with all control variables included. See note to Table 1. Full estimates are available on request. Indicators in italics are considered robust on the basis of being statistically significant at 10% or less in all three model specifications with control variables (in Tables 1 and 3).

* p < 0.1.
** p < 0.05.
*** p < 0.01.

Table 4
LPM regression results for the outcome variable *Impact*, three further model specifications.

Intolerance indicators →	<i>No Muslims as neighbors</i>	No Jews as neighbors	<i>No different race as neighbors</i>	<i>No immigrants/foreign workers as neighbors</i>	<i>No homosexuals as neighbors</i>	Homosexuality not justified
Model: As in Table 2 but with no control variables						
Intolerance (country of origin)	-0.097 [0.068]	-0.013 [0.114]	-0.205** [0.087]	-0.172* [0.097]	-0.056 [0.040]	-0.043 [0.048]
Model: As in Table 2 but with these control variables: Age, Age ² , Male, Married, Children, Good health						
Intolerance (country of origin)	-0.152* [0.079]	-0.051 [0.089]	-0.298*** [0.088]	-0.306*** [0.105]	-0.113** [0.043]	-0.094* [0.053]
Model: As in Table 2 but with these control variables: Age, Age ² , Male, Married, Children, Good health, News, Religious, Upper secondary degree, Tertiary degree, Unemployed, Out of labor force						
Intolerance (country of origin)	-0.152** [0.074]	-0.096 [0.091]	-0.319*** [0.086]	-0.325*** [0.107]	-0.123*** [0.043]	-0.115** [0.053]

Note: Cf. Table 2, which contains the point estimates for *Intolerance* with all control variables included. See note to Table 2. Full estimates are available on request. Indicators in italics are considered robust on the basis of being statistically significant at 10% or less in all three model specifications with control variables (in Tables 2 and 4).

* p < 0.1.
** p < 0.05.
*** p < 0.01.

Table 5
EBA results.

Intolerance indicator	Belief		Impact	
	Same sign (%)	Significant (%)	Same sign (%)	Significant (%)
No Muslims as neighbors	100	93	100	91
No Jews as neighbors	100	8	-	-
No different race as neighbors	-	-	100	100
No immigrants/foreign workers as neighbors	-	-	100	100
No homosexuals as neighbors	100	100	100	100
Homosexuality not justified	100	100	-	-

Note: The *Intolerance* indicators that are statistically significant at the 10% level or lower in the three regressions of Tables 1–4 that contain control variables for each outcome variable are included in the EBA. The columns show the share of all 8192 regressions in which the sign of the point estimate of the included *Intolerance* indicators remains the same and the share of the same regressions in which the point estimate is statistically significant at the 10% level or lower.

generation immigrants). Country fixed effects are retained. We present the findings, to be compared with Tables 1 and 2, in Table A4 in the Appendix. They clearly show that intolerance among natives, either towards gays or refugees, is robustly and negatively associated with a rejection of a pro-environmental outlook. The same findings appear with

the three other model specifications of Tables 3 and 4 and when using the full sample (natives and immigrants; those results are available on request). Thus, even though we would be careful to interpret the findings for the native sample as causal, they do seem to confirm that our findings using the epidemiological method generalize.

6. Concluding discussion

Climate skepticism poses a challenge to those who want as many people as possible to accept the scientific consensus about climate change: for example, that global warming is taking place, that it is largely the result of human activities, that consequences if business continues as usual are detrimental and that political and individual action that improve the long-term situation is possible. In order to better understand the basis for questioning of such positions, research that identifies determinants of climate skepticism is important. We have identified one such determinant: *intolerance towards various minorities*. This factor has not been examined in the literature so far. We hypothesized that intolerance results from a combination of insufficient or biased knowledge and values that entail putting a low weight on the welfare of others, especially when those others are distinctly different from oneself or the group(s) to which one belongs. These underlying factors result in absence of respect – which connects to the basis for climate skepticism. It is also characterized by poor or biased knowledge, not least provided in social media, and of a propensity of not caring for

Table 6
LPM regression results when including education and values from the countries of origin.

Intolerance indicators →	No Muslims as neighbors	No Jews as neighbors	No different race as neighbors	No immigrants/foreign workers as neighbors	No homosexuals as neighbors	Homosexuality not justified
Outcome variable: Belief						
Intolerance (country of origin)	-0.145 [0.185]	-0.219 [0.174]	-0.377* [0.209]	-0.017 [0.189]	-0.184*** [0.059]	-0.207*** [0.063]
Education (country of origin)	0.018* [0.010]	0.014 [0.011]	0.010 [0.008]	0.017* [0.010]	0.010 [0.009]	0.009 [0.009]
Self-enhancement (country of origin)	0.019 [0.039]	-0.006 [0.031]	0.019 [0.036]	-0.008 [0.039]	0.032 [0.038]	0.009 [0.033]
Outcome variable: Belief						
Intolerance (country of origin)	-0.077 [0.164]	-0.129 [0.234]	-0.365* [0.211]	-0.026 [0.162]	-0.224** [0.097]	-0.433*** [0.153]
Education (country of origin)	0.018 [0.011]	0.017 [0.012]	0.010 [0.009]	0.016* [0.010]	0.008 [0.008]	0.003 [0.009]
Conservation (country of origin)	-0.049 [0.042]	-0.053 [0.055]	0.013 [0.050]	-0.028 [0.043]	0.064 [0.063]	0.150* [0.076]
Outcome variable: Impact						
Intolerance (country of origin)	-0.312** [0.128]	-0.268** [0.1056]	-0.582*** [0.144]	-0.401** [0.193]	-0.181** [0.070]	-0.168* [0.087]
Education (country of origin)	-0.012 [0.008]	-0.020** [0.010]	-0.015** [0.007]	-0.007 [0.007]	-0.013 [0.008]	-0.011 [0.008]
Self-enhancement (country of origin)	-0.062 [0.042]	-0.083* [0.043]	-0.062** [0.030]	-0.057 [0.034]	-0.053 [0.036]	-0.092*** [0.032]
Outcome variable: Impact						
Intolerance (country of origin)	-0.276* [0.153]	-0.276* [0.153]	-0.648*** [0.161]	-0.338*** [0.119]	-0.297*** [0.085]	-0.177 [0.145]
Education (country of origin)	-0.017 [0.012]	-0.017 [0.012]	-0.013* [0.007]	-0.010 [0.009]	-0.014* [0.009]	-0.007 [0.010]
Conservation (country of origin)	-0.050 [0.047]	-0.050 [0.047]	-0.026 [0.039]	-0.068* [0.037]	0.060 [0.054]	-0.027 [0.072]

Note: Each regression includes the following control variables: Age, Age², Male, Married, Children, Good health, News, Religious, Upper secondary degree, Tertiary degree, Unemployed, Out of labor force. Full estimates are available on request.

* p < 0.1.

** p < 0.05.

*** p < 0.01.

the welfare of those that will be most strongly hit by global warming (in poor and warm countries, especially) or of those that will inhabit the earth in the future.

Our empirical analysis reveals that intolerance indeed is a predictor of climate skepticism, and for some indicators robustly so. For the outcome variable capturing a firm belief in climate change, we find that it varies robustly and negatively with not wanting gay people as neighbors, and with the view that homosexuality is not justified. For the outcome variable capturing a firm conviction that climate change has a really bad impact, we find that it varies robustly and negatively with not wanting Muslims, people of a different race, or immigrants/foreign workers as neighbors. We consider all our six intolerance indicators manifestations of “generalized prejudice”, suggesting that it is not all that important which ones turn out significant: Any of them help identify a certain kind of personality, formed by a certain knowledge and certain values, that also implies certain views on climate change.

These results were derived using the epidemiological method, linking the climate attitudes of second-generation immigrants in 22 European countries plus Israel to average-intolerance measures in the countries from which their parents migrated. The methodology arguably constitutes another contribution to the literature, in addition to being the first to identify tolerance as a predictor of climate skepticism, as we can convincingly reject reverse causality. It lastly bears noting that other cultural characteristics proposed to explain climate skepticism in previous studies – in particular, self-enhancement and self-transcendence, on the one hand, and political orientation, on the other – did not turn out to be robust when included in our analysis. Neither were the six Hofstede cultural variables (with the possible exception of pragmatism) or social trust, while intolerance retained its “economic” and statistical significance when they were added. Thus, we demonstrate the strong relevance of a new type of cultural characteristic, intolerance.

Pondering the policy implications of our findings, a key insight is that to affect people’s views in the area of climate change, it is probably insufficient to present facts as such. There are epistemic and normative reasons for why some people take a climate-skeptic position, and although facts may help, it is plausible that more is needed. Since it seems that intolerance results in less pro-environmentalist views, one might consider measures that can reduce intolerance.

One measure could be contact-based interventions on the individual level. According to the meta-analysis of Lemmer and Wagner (2015), programs in real-world settings in which people with different ethnicities meet face-to-face or through virtual contact have been shown to reduce ethnic prejudice, also over time and in a way that encompasses other outgroups than the ones focused on in the programs. Hence, it could be explored how such programs that stimulate contact across group demarcations can be set up. Another measure that can potentially reduce intolerance is education (Vural-Batik, 2020), both by providing contacts between people who are different (which may speak in favor of a school system that encourages diversity in the student population) and through providing knowledge and cognitive tools that reduce stereotypes about others. Yet another development that can mitigate the spread intolerance is a reduction in certain kinds of religiosity (Berggren et al., 2019). Such a personal factor is perhaps not one for policy to try to affect directly, but measures that mitigate at least more fervent manifestations of religiosity (e.g., through the removal of subsidies) could be considered.

There are also likely to be country-level reforms that can be undertaken. Studies indicate that the strengthening of the quality of the legal system, including making institutions impartial, is beneficial for tolerance in the population (Berggren and Nilsson, 2013, 2021; Berggren et al., 2019). The potential for success should be greater in countries characterized by low confidence in government institutions, partiality in

the legal treatment of citizens and corruption. It is certainly not easy to combat such (often deeply rooted) patterns of behavior among public officials, but the gains, if measures succeed in so doing, are substantial. Moreover, further social and economic globalization between countries tends to make people more willing to teach children tolerance (Berggren and Nilsson, 2015). Reforms of increased openness, for individuals, capital, goods and services, make people realize that the new generation will benefit from numerous forms of interactions with people in other countries if they are tolerant of differences. The appealing aspect is that through measures of this kind, it could be possible to improve both environmental and social attitudes at the same time.

A final measure that we wish to highlight does not address intolerance but climate skepticism directly. It is related to our theory of how intolerance breeds climate skepticism in that it focuses on equipping people with better cognitive tools for evaluating knowledge claims. The idea is to counteract poor and biased knowledge. Lutzke et al. (2019) conducted an online experiment with online guidelines encouraging critical thinking. Those exposed to such guidelines were less likely to trust, like and share fake news about climate change on Facebook. At the same time, their propensity to trust, like or share legitimate news about the climate was not affected. This suggests that measures aiming to

improve the processing of information can be beneficial for taking the climate threat seriously – and maybe, as an added bonus, such better critical-evaluation skills can lead to less stereotypical thinking about people who are different as well.

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Appendix A

Table A1

Descriptive statistics for the two dependent variables.

Variable	Our sample			Native sample			Full sample		
	N	Mean	Std. dev.	N	Mean	Std. dev.	N	Mean	Std. dev.
Belief	3875	0.57	0.50	35,813	0.55	0.50	44,387	0.55	0.50
Impact	3875	0.20	0.40	35,813	0.20	0.40	44,387	0.20	0.40

Table A2

Descriptive statistics for the intolerance indicators (main analysis).

Variable	Our sample		
	N	Mean	Std. dev.
No Muslims as neighbors	2642	0.22	0.11
No Jews as neighbors	2468	0.13	0.09
No different race as neighbors	2828	0.14	0.10
No immigrants/foreign workers as neighbors	2827	0.15	0.09
No homosexuals as neighbors	2800	0.56	0.23
Homosexuality not justified	2820	0.65	0.19

Table A3

Descriptive statistics for the explanatory/control variables.

Variable	Our sample			Native sample			Full sample		
	N	Mean	Std. dev.	N	Mean	Std. dev.	N	Mean	Std. dev.
Age	3858	45.53	18.13	35,704	49.56	18.74	44,232	49.14	18.61
Male	3875	0.47	0.50	35,805	0.47	0.50	44,378	0.47	0.50
Married	3875	0.47	0.50	35,813	0.48	0.50	44,387	0.49	0.50
Children	2431	0.46	0.50	23,644	0.52	0.50	28,786	0.52	0.50
Good health	3875	0.69	0.47	35,813	0.65	0.48	44,387	0.66	0.48
News	3875	0.58	0.49	35,813	0.62	0.49	44,387	0.61	0.49
Religious	3845	4.50	3.22	35,491	4.43	3.09	43,984	4.50	3.12
Upper secondary degree	3860	0.40	0.49	35,669	0.36	0.48	44,170	0.36	0.48
Tertiary degree	3860	0.26	0.44	35,669	0.23	0.42	44,170	0.24	0.43
Unemployed	3811	0.04	0.20	35,392	0.03	0.18	43,827	0.04	0.19

(continued on next page)

Table A3 (continued)

Variable	Our sample			Native sample			Full sample		
	N	Mean	Std. dev.	N	Mean	Std. dev.	N	Mean	Std. dev.
Out of labor force	3811	0.41	0.49	35,392	0.44	0.50	43,827	0.44	0.50
Low income	3193	0.35	0.48	29,337	0.31	0.46	36,445	0.33	0.47
Middle income	3193	0.43	0.50	29,337	0.44	0.50	36,445	0.43	0.50
Working mother (at age 14)	3793	0.64	0.48	35,044	0.60	0.49	43,415	0.60	0.49
Working father (at age 14)	3717	0.88	0.33	34,490	0.89	0.31	42,703	0.89	0.32
Global Climate Risk Index	3875	0.26	0.44						
Intolerance gays				34,851	2.14	1.21	43,184	2.14	1.22
Intolerance refugees				34,795	3.14	1.18	43,113	3.11	1.19
Variables, country of origin									
Polity2	2478	1.74	7.73						
Log GDP/capita	2736	6.88	1.50						
Education	2778	5.39	2.66						
Self-enhancement	2616	-1.10	0.43						
Conservation	2616	0.82	0.34						
Political orientation	1907	0.04	0.02						
Social trust	2828	0.31	0.10						
Hofstede cultural variables									
Power distance	2326	55.64	19.79						
Individualism	2326	57.11	19.58						
Masculinity	2326	54.26	17.50						
Uncertainty avoidance	2323	68.36	19.20						
Pragmatism	2289	47.52	20.93						
Indulgence	2274	41.93	16.80						

Table A4

LPM regression results with a native sample, baseline model specification with a full set of controls (non-epidemiological method).

Outcome variable →	Belief		Impact	
	Intolerance gays	Intolerance refugees	Intolerance gays	Intolerance refugees
Intolerance	-0.038*** [0.004]	-0.015*** [0.003]	-0.018*** [0.003]	-0.012*** [0.003]
Age	0.001 [0.001]	0.001 [0.001]	0.003*** [0.001]	0.003*** [0.001]
Age ²	-0.000*** [0.000]	-0.000*** [0.000]	-0.000*** [0.000]	-0.000*** [0.000]
Male	-0.019*** [0.007]	-0.028*** [0.007]	0.001 [0.006]	-0.002 [0.006]
Married	-0.024*** [0.009]	-0.022** [0.009]	-0.019*** [0.007]	-0.019*** [0.007]
Children	0.010 [0.010]	0.011 [0.010]	0.018** [0.008]	0.018** [0.008]
Good health	-0.010 [0.008]	-0.009 [0.008]	-0.017** [0.007]	-0.018** [0.007]
News	0.034*** [0.008]	0.032*** [0.008]	0.014** [0.007]	0.015** [0.007]
Religious	-0.001 [0.001]	-0.003** [0.001]	-0.004*** [0.001]	-0.005*** [0.001]
Upper secondary degree	0.012 [0.009]	0.011 [0.009]	0.009 [0.007]	0.009 [0.007]
Tertiary degree	0.072*** [0.010]	0.077*** [0.010]	0.036*** [0.009]	0.038*** [0.009]
Unemployed	-0.010 [0.021]	-0.004 [0.021]	0.004 [0.018]	0.005 [0.018]
Out of labor force	0.026*** [0.010]	0.021** [0.010]	0.028*** [0.008]	0.026*** [0.008]
Low income	-0.004 [0.012]	-0.008 [0.012]	0.022** [0.010]	0.020** [0.010]
Middle income	0.002 [0.010]	-0.002 [0.010]	-0.005 [0.008]	-0.006 [0.008]
Working mother (at age 14)	0.013 [0.008]	0.014* [0.008]	0.007 [0.007]	0.006 [0.007]
Working father (at age 14)	0.001 [0.012]	0.002 [0.012]	-0.001 [0.009]	0.001 [0.009]
Constant	0.585*** [0.038]	0.594*** [0.040]	0.176*** [0.031]	0.194*** [0.032]
Country fixed effects	Yes	Yes	Yes	Yes
R ²	0.075	0.070	0.040	0.040
Observations	17,751	17,787	17,751	17,787

Note: The outcome variable *Belief* is a dummy variable taking the value 1 if the respondent chose reply 4, “Definitely changing”, to the question “You may have heard the idea that the world’s climate is changing due to increases in temperature over the past 100 years. What is your personal opinion about this? Do you think the

world's climate is changing?" and taking the value 0 if the respondent chose any of the replies 1–3. The outcome variable *Impact* is a dummy variable taking the value 1 if the respondent chose replies 9 or 10, where 10 is "Extremely bad", to the question "How good or bad do you think the impact of climate change will be on people across the world?" and taking the value 0 if the respondent chose replies 0–8. The sample consists of native citizens in 22 European countries and Israel. Standard errors are in parentheses.

* $p < 0.1$.

** $p < 0.05$.

*** $p < 0.01$.

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