Temperatures and Trust*

Karin Hansson Alexander Popov

Abstract

Using survey data on 24,266 individuals from 298 regions in Europe and central Asia, we show that within a country, individuals who experienced higher temperatures when growing up exhibit higher trust in people. Such individuals are also more trusting of domestic political and non-political institutions like parliament, national and local government, political parties, courts, banks, and religious organizations. Our evidence is less consistent with economic theories whereby harsh climatic conditions promote trust via the need to cooperate with strangers, and more consistent with neoscientific and social psychology theories whereby physical warmth promotes interpersonal trust and a sense of belonging.

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*Karin Hansson: Copenhagen Business School, kaha.eco@cbs.dk. Alexander Popov: ECB and CEPR, alexander.popov@ecb.europa.eu. We thank Kamelia Kosekova for outstanding research assistance. We thank Ralph De Haas, Michael Ehrmann, Raymond Fisman, Andrew Foster, Marek Giebel, Luigi Guiso, Rohini Pande, Battista Severgnini, and seminar participants at the Copenhagen Business School and the European Central Banks for valuable comments. The opinions expressed herein are those of the authors and do not necessarily reflect those of the ECB or the Eurosystem.

1 Introduction

Economists are increasingly interested in the relation between temperatures and economic growth. While some studies have found a negative correlation between these two factors (e.g., Dell, Jones, and Olken, 2012), others have found that temperatures affect growth in a non-linear fashion (e.g., Burke, Hsiang, and Miguel, 2015), and yet others have argued that the relationship is more complex and that institutional differences play a crucial role in determining how temperatures and growth interact (e.g., Acemoglu, Johnson and Robinson, 2012). Given the complexity of this issue, and in light of the ongoing global warming, policymakers and researchers alike are eager to understand not just how changing environmental conditions might affect economic development, but also the channels whereby such interactions take place.

We go to the heart of the latter question by studying the relation between temperatures and trust. Trust is a significant determinant of long term economic growth (e.g., Knack and Keefer, 1997; Algan and Cahuc, 2010). Consequently, there is a large literature on the economic implications of trust, such as government performance, entrepreneurship, trade, and institutional quality.[1] Furthermore, researchers have also paid attention to the determinants of interpersonal trust, identifying a host of factors ranging from education (Ananyev and Guriev, 2019) and age (Gereke, Schaub, and Baldassarri, 2018) to early-life experiences (Conzo and Salustri, 2019) to information flows (Fisman and Khanna, 1999) and belonging to a marginalized group (Alesina and La Ferrara, 2002).

More recently, economic analysis has focused on historical events and conflicts, trying to pinpoint their effect on the formation and destruction of trust. Examples include the African

[1] See, e.g., Putnam, Leonardi, and Nanetti (1993), Guiso, Sapienza, and Zingales (2006, 2009), Algan and Cahuc (2009), and Aghion, Algan, Cahuc, and Shleifer (2010).

slave trades (Nunn and Wantchekon, 2011), early Christian missionary activities (Okoye, 2021), the Napoleonic Civil Code (Buggle, 2016), the Cultural Revolution in China (Bai and Wu, 2020), and the implementation of mass surveillance systems in East Germany (Jacob and Tyrell, 2010). At the same time, little is known about the long-term climatic origins of the substantial variation in trust levels within and across countries today. We are aware of only two contributions to this question. Utilizing climate data from 1500 to 2000, Buggle and Durante (2021) find that regions with greater climatic variability have higher levels of trust, suggesting societies with a better-developed ability to cooperate and coordinate arise in response to environmental challenges. Giuliano and Nunn (2021) use grid-cell paleoclimatic data on the average temperature across 20-year generations between 500-1900 AD across countries, and show that societies that emerged in more variable climatic environments place less value on tradition and cultural practices.

While these two contributions look at the effect of environmental variability on trust, we focus on the effect of *temperature levels*. The relationship between temperature and trust remains a topic of debate across different scientific fields. While economic theories appear to suggest a negative association between the two variables because harsher (colder) climates promote cooperation (e.g., Bjørnskov and Meon, 2013; Buggle and Durante, 2021), psychological and anthropological perspectives propose a positive relationship because physical warmth promotes interpersonal trust, willingness to be kind to one another, and a sense of belonging. (e.g., Ijzerman and Semin, 2009; Kang, Williams, Clark, Gray, and Bargh, 2011). Our study aims to shed light on this discrepancy and better understand the underlying mechanisms linking temperature and trust. By investigating whether the temperature in which individuals grow up affects their level of trust towards others, we aim to contribute to a more comprehensive picture of the complex interplay between environmental factors and social behavior.

We use survey evidence on 24,266 individuals from 298 regions in 27 countries in Europe and central Asia. As our main measure of temperature exposure, we calculate the average temperatures that the individual experienced when growing up. We then look at how early-age temperatures map into general trust in others, as well as trust in various political and non-political institutions. Crucially, we juxtapose the cross-country and the within-country variability in temperatures, and how they relate to interpersonal and institutional trust. The former approach relates to analyses whereby the citizens of Northern European countries are found to have on average higher levels of interpersonal trust and of trust in institutions (Algan and Cahuc, 2014). The latter approach allows us to hold constant unobservable background forces common to individuals in a country, such as institutional quality and legal tradition.

Our main finding is that when holding constant unobservable factors that are common to all individuals in a country, those who experienced higher temperatures when growing up exhibit higher trust in people in general, relative to similar individuals who grew up in a colder region in the same country. This contrasts with a strong negative relationship in a specification without country fixed effects, suggesting that looking at cross-country correlations between the climate and trust can be misleading. Numerically, the point estimate in the principal specification, with individual demographic and financial controls and country fixed effects, suggests that if an individual was to move from the 25th (6.8 degrees Centigrade) to the 75th percentile (12.1 degrees Centigrade) of temperatures when growing up, she would be around 3.6 percentage points more likely to have 'Some trust' or 'Complete trust' in others, as opposed to 'Some distrust', 'Complete distrust', or 'Neither trust nor distrust'.

We make sure that the main result in the paper is robust to a number of potential confounding factors. First, the baseline regressions include a host of demographic and financial controls

that may have an independent effect on the propensity to trust others. These include empirical proxies for the respondent's gender, age, education, family status, home ownership, urban status, religion, and income. Second, the positive correlation between young-age temperatures when growing up and trust today is a feature of the data regardless of whether we consider the region of birth or the region where the respondent went to high school, and it obtains when we exploit the long-term regional variation in temperatures when we abstract from extreme trust and mistrust, and when we exclude outlier countries in terms of number of regions and temperature amplitudes. Finally, the same results obtain regardless of whether we estimate the model using Ordinary Least Squares regression or a Probit regression, in the latter case accounting for the binary nature of the main dependent variable, as well as when we run an Ordered Probit regression, taking advantage of the underlying ordinal nature of trust, as reported in the survey.

Our second result is that compared to those who grew up in the colder part of the country, individuals who grew up in a warmer climate are more trusting of certain domestic institutions. These include both political institutions – such as parliament, national and local government, and political parties – and non-political institutions – such as courts, banks, and religious organizations. These same individuals are also more likely to think highly of domestic institutions' performance and are more likely to believe that their country has free elections, law and order, a fair court system, a strong opposition, and gender equality. The totality of our evidence implies that higher temperatures when growing up are strongly correlated not just with more trust towards people in general, but also with more trust in and more optimistic perceptions of the shared institutions of the state.

Our evidence is therefore less consistent with economic theories whereby harsh climatic conditions promote general trust via the need to cooperate with strangers, and more consistent

with neoscientific/social psychology theories whereby physical warmth promotes interpersonal trust and a feeling of social belonging. This is important for two reasons. First, the prevailing consensus is that the differences in trust between Northern and Southern regions in Europe is largely explained by different institutions in place, which in turn may have resulted from higher cooperation in the North in the face of harsher climatic conditions (e.g., Acemoglu, Johnson, and Robinson, 2005). Our results imply that certain climatic conditions – in particular average temperatures – may have an effect on trust that goes through different channels than economic cooperation. They also suggest that in the absence of this alternative channel, the observed North-South differences in trust would be even larger. Second, the ostensible lack of a purely economic mechanism at present that predicts a positive relation between temperatures and trusts suggests that there is at least some scope for economic theory to incorporate insights from psychology when trying to explain salient empirical observations about the link between the climate and economic interactions.

The paper proceeds as follows. Section 2 outlines the theoretical mechanisms, drawing on insights from both economics and neuroscience / social psychology. Section 3 describes the construction of the dataset. Section 4 outlines the empirical methodology. Section 5 presents our analysis on the correlation between early-life temperatures and trust in people and institutions. Section 6 concludes.

2 Theoretical mechanism

Weather variability is traditionally a significant source of agricultural risk. Despite modern agrotechnological advancements, weather variability still accounts for a large share of year-to-year variation in crop yields and failure rates (Lobell and Field, 2007; Mendelsohn, 2007). Buggle

and Durante (2021) propose that variations in historical weather variability during the growing-season months are a significant determinant of variations in long-term trust. To reduce the risk of crop failure, individuals had to cooperate with other farmers, often strangers or those living far away. Through these interactions, individuals were able to dampen the economic effects of climate shocks, as well as build trust and establish social networks that extended beyond their immediate families and communities.[2] Dean, Euler, Gumerman, Plog, Hevly, and Karlstrom (1985) and Studer (2015) emphasize the significance of trade partnerships between communities located in environmentally diverse regions, to facilitate the supply of food to regions during times of crop shortages and famines (Studer, 2015).

While this line of research has focused on the variability of climatic conditions, average climatic conditions are likely to have had a considerable impact on livelihood strategies and patterns of cooperative behavior throughout history as well. The idea that winter intensity impacts cultural traits such as social trust dates back to Aristoteles and Hippocrates. They theorized that enduring harsh winters required help from strangers, leading to a dominant evolutionary strategy of expanding trust to unknown people in cold regions (see also Bjørnskov and Meon, 2013). The climato-economic theory of culture builds on this rationale to posit that in colder climates, meeting basic needs is more challenging, leading to a greater emphasis on positive goal interdependence and shared responsibilities across generations (Van de Vliert, 2013; Enke, 2019).

This discussion gives rise to our first hypothesis:

H1. By fostering the need for cooperation, both within and across communities, lower temperatures are associated with higher levels of trust.

[2]See McCloskey (1976) for an earlier discussion.

At the same time, the outside temperature is an ubiquitous environmental factor that deeply affects individuals not only on a physical, but also on a psychological level. Research in development and social psychology has long recognized the impact of physical warmth on social behavior and interpersonal relationships (Ijzerman and Semin, 2009). The imperative to belong is perceived as a biological urge, compelling individuals to establish affectionate and nurturing bonds with others.

According to theories within development psychology, physical warmth orients people toward each other. For example, attachment theory (Bowlby, 1969) suggests that infants need to form bonds and maintain close physical contact with caregivers to obtain food and physical warmth for survival, as well as a sense of security and belonging in society. Harlow's (1958) classic finding that infant monkeys prefer to stay with a cloth mother that provides physical warmth over a wire monkey that provides food further highlights the role of physical warmth in shaping attachment and the need of a feeling of belonging among primates.

Empirical studies in this line of research (Bowlby, 1969) have demonstrated that fundamental concepts stemming from human interaction with the physical environment display associative links with more complex psychological concepts, emphasizing the interconnectedness of our physical and psychological experiences (e.g., Williams and Bargh, 2008, Zhong and Leonardelli, 2008, Ijzerman and Semin, 2009). Storey and Workman (2013) argue that temperature can impact interpersonal evaluations and the perception of closeness, ultimately leading to higher levels of cooperation among individuals. In line with this theory, Ijzerman and Semin (2009) find that individuals seated in a warm room during a game felt more closely connected to the experimenter, in comparison to those seated in a cold room.

Similarly, Kang, Williams, Clark, Gray, and Bargh (2011) find that individuals who touched

a cold object prior to playing a game of co-operation were less likely to engage with an anonymous partner, compared to those primed with a warm object. These findings suggest that temperature can impact interpersonal evaluations and the perception of closeness, and from there the incentives to cooperate, leading participants to be less cooperative in colder conditions and more cooperative in warmer ones.

In a related work, Wilde, Apouey, and Jung (2017) show that individuals conceived during high temperatures have higher educational attainment and literacy, and find evidence for biological and behavioral mechanisms such as intensified fetal selection. This line of research suggests that another psychological channel whereby higher temperature can affect trust is that of higher human capital due to both nature and nurture.

The discussion of theories from social psychology gives rise to our second hypothesis:

H2. By satisfying the neuro-physiological need for physical warmth, higher temperatures are associated with higher levels of trust.

3 Data

We take advantage of three data sources to construct the dataset used in the analysis. The first is the 2016 Life in Transition Survey (LITS). The second is the Berkeley's Earth Global Temperatures database. The third is a composition of country-level datasets that capture a country's level of economic and political development. All data are summarized in Table 1.

3.1 Individual data

The LITS is a nationally representative survey conducted by the European Bank for Reconstruction and Development and the World Bank in transition countries (i.e., those in the former Soviet Bloc) which was run three times: in 2006, 2010, and 2016. We use the latest vintage of the survey, which includes 31 transition countries plus Germany, Italy, and Turkey which were included for the sake of comparison. Respondents to the survey were drawn randomly, using a two stage sampling method, with census enumeration areas as Primary Sampling Units (PSUs) and households as secondary sampling units.[3]

A total of 31,124 individuals are included in the 2016 LITS survey. For a start, we drop 6 countries which at the time were classified as "authoritarian" by the The Economist (Azerbaijan, Belarus, Kazakhstan, the Russian Federation, Tajikistan, and Uzbekistan), as well as Turkey, where the President had just assumed emergency powers after a failed coup. We do so because honest answers to questions about trust cannot be reliably elicited from people living in dictatorships. This leaves us with 24,266 respondents in 27 countries.

There are two types of information that we are interested in. The first concerns the individual's demographic and financial situation. Among others, the survey reports individual age, education, marital status, number of children, urban status, home ownership, religion, and total income. This information is available for everyone in the survey. We create dummy variables for secondary school education and for university education (the omitted category being those who did not finish secondary school), for married and single (the omitted category being those who are divorced, separated, or widowed), and for atheists (the omitted variable being members of any religious denomination).

[3]We will be using "PSU" and "region" interchangeably.

The summary statistics in Table 1 suggest that the median respondent in the survey is male, 48 years old, married, has no children currently residing in the household, lives in a city, and is a home owner. There is no dominant education level, with around 36% having at most a secondary-school degree and 36% having a university degree. Around 9% of the respondents are atheists.

The second type of information that we take advantage of is derived from answers to questions gauging the individual's level of trust towards others. The main question we use is "Do you agree with the statement 'People can be trusted'?". There are five possible answers: 'Complete distrust', 'Some distrust', 'Neither trust nor distrust', 'Some trust', and 'Complete trust'. We create a dummy variable equal to 1 if the individual responds 'Some trust' or 'Complete trust', and to 0 if the individual responds 'Complete distrust', 'Some distrust', or 'Neither trust nor distrust'. We lose 658 individuals who did not answer this question. In robustness tests later, we also exclude those who responded 'Neither trust nor distrust' and contrast the moderate and the extreme components of trust. Table 1 reports that 30% of respondents have 'Some trust' or 'Complete trust' in people.

The survey also contains more detailed questions about trust in various institutions. The first sub-set of questions gauges the individual's trust in political institutions, such as the parliament, the president, national, regional, and local government, and political parties. The second sub-set of questions is about trust in non-political institutions, such as the courts, the army, the policy, NGO, unions, religious institutions, and banks. The survey also asks individuals about their perceptions regarding how their country is doing in terms of legal and social progress (e.g., does it have free and fair elections, law and order, freedom of speech, fair courts, equal rights for women, etc.).

Importantly, the survey also contains information about the individual's region of residence (PSU). There are a total of 298 PSUs in the dataset, or about 11 per country.[4] This allows us to incorporate historical and contemporaneous information about local temperatures.

Because data on the region in which the individual was born and on the region in which they went to secondary school is missing for 80% of the individuals, we assume throughout the paper that individuals currently reside in the region in which they grew up. This is true for 76% of individuals for whom we have full information. Nevertheless, we also perform robustness tests later on.

3.2 Regional temperature data

The second dataset contains historical data on temperatures at the geocode level. There are many such datasets. The main data we use come from Berkeley's Earth Global Temperatures dataset. However, we cross-check temperatures against other similar datasets, such as WolframAlpha and WorldClim. The data start in 1750.

Because geocodes are finer than regions, we average the information across geocodes in a region. We extract several pieces of information for each of the 298 regions in the data. Namely, we calculate, for each region-year and starting in 1900, minimum, maximum, and average annual temperature. The main variable we use is the average temperature in the individual's region between the year when they were born and the year when they turned 18. However, we also use in the analysis temperatures in 1900 and in the year right before the survey (2015).[5]

Figure 1 shows the substantial regional variation in temperatures and trust within three

[4]See Appendix Table 1 for details.

[5]See Appendix Table 2 for regional temperature ranges within countries.

countries in our dataset: Georgia, Italy and Armenia. A large difference in both trust and average temperatures levels becomes readily apparent.

Table 1 reports summary statistics on temperatures which are consistent with the fact that the region we study is to the North of the global average. The median person in the survey grew up in a region with average temperature of 9.5 degrees Celsius. There is, however, substantial variation, with a minimum of -3.4 and a maximum of 28.9.

3.3 Country-level data

Finally, we use data from various sources to control for standard determinants of trust among a country's citizens (see, e.g., Algan and Cahuc, 2010). We include a measure of the country's level of economic development, proxied by GDP per capita. We also include a measure of the country's democratic tradition, proxied by a democracy score from the Polity IV project. We also include a measure of the country's human capital, proxied by average years of schooling. Finally, we include a measure of ethnic fractionalization, which has also been shown to have a material impact on interpersonal trust.

4 Empirical model and identification

We are interested in whether variations across individuals in temperatures while growing up are correlated with variations in individuals' propensity to trust people. To that end, we estimate the following linear probability model:

$$Trust_i = \beta_1 Temperatures_r + \beta_2 X_i + \phi_c + \varepsilon_{ir} \tag{1}$$

The variable $Trust_i$ is a dummy variable equal to 1 if individual i has 'Some trust' or 'Complete trust' in other people or institutions, and to 0 if she has 'Complete distrust', 'Some distrust', or 'Neither trust nor distrust'.

The variable $Temperatures_r$ measures each respondent's exposure to regional temperatures during the first 18 years of their life.

The vector X_i incorporates individual demographic controls that include sex, age, education, marital status, number of children, urban status, home ownership status, and the natural logarithm of total income. The inclusion of these observable characteristics controls for standard individual characteristics that may have an independent effect on the propensity to trust others. It also eliminates the possibility that the estimated coefficient on exposure to various temperatures will be biased due to a correlation between unobserved individual attributes and unobservable such attributes, like ability and risk taking. These tend to be correlated with observable characteristics such as education or income. As is standard, we restrict the sample to individuals who are at least 18 years of age.

In specifications without country fixed effects, we include a vector Z_c which incorporates country-level controls that include the natural logarithm of GDP per capita, the Polity IV score, average secondary schooling, and ethnic fractalization. These control for the possibility that temperatures are correlated with other country-specific factors that may have an independent effect on individuals' average trust.

In specifications where we try to gauge the within-country cross-region effect of temperatures, we exclude the vector Z_c and include instead country dummies ϕ_c. This is important for two separate reasons. First, there can be country factors that do not vary over time and that might influence trust. These include, but are not limited to, institutional quality and long-standing

cultural beliefs that emerged due to factors other than the climate and that may result in higher or lower levels of average trust. Any one of these country characteristics could be correlated with the experience of sovereign default. By including country dummies, we ensure that the effect of regional temperatures on individual propensity to trust others is measured holding country heterogeneity fixed. As an example, in this specification we are not comparing – in terms of trust – the European North to the European South, but the German North to the German South.

Finally, we cluster the standard errors by region. This allows us to account for the plausible correlation across observations for individuals who reside in the same narrowly defined geographic locality.

The coefficient of interest is β_1. A negative (positive) coefficient β_1 would imply that all else equal, the propensity to trust others is lower (higher) for individuals who experienced warmer temperatures when growing up, relative to similar individuals from the same home country who experienced colder temperatures as children.

5 Empirical evidence

5.1 Temperatures and general trust

We report the principal evidence in Table 2.[6] We start with a version of Equation (1) without demographic controls, country-specific controls or country dummies. The evidence implies that individuals who grew up in regions that were on average warmer have lower levels of trust towards others. The coefficient -0.0075 suggests that if an individual was to move from the 25th

[6]For brevity, we only report the point estimates on the main variable of interest. The full model is reported in Appendix Table 3.

percentile of temperatures when growing up (6.8 degrees Centigrade) to the 75th percentile of temperatures when growing up (12.1 degrees Centigrade), she would be 4 percentage points less likely to have 'Some trust' or 'Complete trust' in others. The point estimate is significant at the 5-percent statistical level. The evidence is thus consistent with prior evidence that via the channel of cooperation, a harsher climate may be more conducive to interpersonal trust (Buggle and Durante, 2021). It is also consistent with the common wisdom that in Europe, there is more trust in the North than in the South, potentially because of differences in the quality of institutions and the history of self-government (Guiso, Sapienza, and Zingales, 2016).

The same effect continues to obtain in column (2) where we control for individual demographic characteristics (Sex, Age, Age squared, Education, Marital status, Number of Children, Urban dummy, Home owner dummy, Orthodox dummy, and atheist dummy) and individual income. This remains true once we also include country-specific controls, namely Log GDP per capita, Polity IV score, Secondary schooling rates, and Ethnic fractalization (column (3)). In the latter case, the point estimate declines to -0.0044, suggesting that if an individual was to move from the 25th to the 75th percentile of temperatures when growing up, she would be 2.4 percentage points less likely to have 'Some trust' or 'Complete trust' in others. The point estimate is still significant, at the 10-percent statistical level.

Crucially, the relationship between temperatures and trust becomes positive once we add country dummies in the place of the country-specific controls (column (4)). This time, the point estimate is significant at the 1-percent statistical level. At 0.0067, it suggests that if an individual was to move from the 25th to the 75th percentile of temperatures when growing up, she would be around 3.6 percentage points *more* likely to have 'Some trust' or 'Complete trust' in others. Given a 30-percent share in the sample of those who say they trust people (see Table

1), this corresponds to a 12% increase in overall trust.

The switch of sign between columns (1)-(3) and column (4) of Table 2 is the main novel contribution of our analysis. It suggests that – at least in the case of European countries – the common wisdom of "more trust in the North" is wrong, as it is driven by comparison between countries which may be prone to omitted variable bias related to institutional quality and cultural differences. Once the latter is properly accounted for with country dummies, the relationship reverses, whereby within a country and all else equal, a warmer climate when growing up is associated with more trust.

In Appendix Table 3, we report the coefficients for all other individual control variables. Taking the evidence from the preferred specification in column (4), we document a convex relationship between age and trust, with trust in others at its lowest level for those individuals who are 38-years-old. Married respondents are more likely to have high trust in others than those who are divorced, separated or widowed. We also find that trust increases monotonically with years of schooling, and individuals with secondary school education (some university education) are 2.2% (7.1%) more likely to trust other people than those who did not finish secondary school. Atheists are more likely to have some trust or complete trust in others than those who subscribe to a religious denomination. Finally, there is a strong positive correlation between income and trust, with a doubling in income increasing trust in others by about 2.8%.

5.2 Robustness

In Tables 3-7, we show that the evidence in Table 2, column (4), is not an artefact of a particular sample or measurement choice.

For a start, recall that we match individuals to the evolution of temperatures in the region

where they currently reside. Given substantial mobility over the lifetime, this is not necessarily the region where the respondents grew up. And while the LITS contains information both on the PSU where the respondent was born and on the PSU where they went to secondary school, this information is only available for 20% of the sample. At the same time, 76% of the individuals for whom it is available reside in the region in which they were born and went to school, suggesting that our matching assumption is not unreasonable. Nevertheless, in Table 3 we show that the main result of the paper still holds in the sample of the 3,500 or so individuals for whom we know the PSU where they were born (column (1)) and the PSU they went to secondary school (column (2)). In this case, the effect is larger by a magnitude of three than the one reported in Table 2, column (4), and is once again significant at least at the 5-percent statistical level.

In Table 4, we document that temperatures and trust in others are positively correlated, and this relation is significant at least at the 5-percent statistical level, when instead of temperatures when growing up, we use historical (1900) and contemporaneous (2015) temperatures. Moreover, the same result are found regardless of whether we look at average temperatures (columns (1) and (3)) or at maximum temperatures (columns (2) and (4)). The evidence thus suggests that the main empirical regularity in the paper still obtains when studying the long-term component of temperature differences. This is important because "temperatures when growing up" may reflect recent dramatic changes in temperature related to global warming, inducing extreme responses. We show that these are not necessarily driving our results, which instead appear to be driven by long-term differences in average temperature levels across regions within a country.

In Table 5, we slice the concept of "trust in people" in order to gauge the main source of differences in responses across individuals. In column (1), "People can be trusted" is defined as a dummy variable equal to one if, when asked about their trust in others, they respond "Some

trust", and to 0 if they respond "Some distrust". In contrast, in column (2), "People can be trusted" is defined as a dummy variable equal to one if, when asked about their trust in others, they respond "Complete trust", and to 0 if they respond "Complete distrust". In this way, we contrast moderate and extreme trust/distrust. The main coefficient of interest is positive in both cases, but in column (1) it is economically meaningful and significant at the 5-percent statistical level, while in column (2) it is indistinguishable from zero both economically and statistically.

The evidence in Table 5 thus strongly suggests that the positive correlation we uncover between temperatures when growing up and trust in people today is mostly relevant for moderate (some trust versus some distrust), as opposed to extreme (complete trust versus complete distrust), levels of trust. Importantly, in column (3) we show that the main result of the paper is robust to excluding the answer "Neither trust nor distrust" from the 0 category of the variable 'People can be trusted'.

One additional concern is that our results are driven by a few outliers in terms of observations, number of regions, and temperature amplitudes. We address this possibility in Table 6. We first exclude Croatia and Kyrgyzstan (column (1)), the two countries in the sample for which there is too little within-country variation in temperatures when growing up because they have fewer than 3 regions. In column (2) we exclude Germany and Moldova, the two countries with fewer than 30 observations per region, to rule out the possibility that a few sparsely populated regions are driving the results. In column (3), we drop the warmest country (Cyprus) and the coldest country (Mongolia). And finally, in column (4), we drop Czechia, Estonia, Kyrgyzstan, Latvia, and Lithuania, i.e. the countries with less than 3 degrees difference in 'Average temperature age 0-18' between the coldest and the warmest region. In all cases, we continue documenting that temperatures when growing up are positively correlated with trust in people today, when

accounting for factors that are common to all individuals in a country.

Finally, recall that we have so far estimated Equation (1) using OLS. At the same time, the main dependent variable $Trust_{ir}$ is defined as an indicator variable (1 if 'Some trust' or 'Complete trust', 0 if 'Complete distrust', 'Some distrust', or 'Neither trust nor distrust'). In such cases, OLS estimates of parameters may be inefficient and nominal significance levels associated with the test statistics may be unreliable (see, e.g., Amemiya 1981). With dummy dependent variables, non-linear models are theoretically attractive alternatives.

To address this point, in Table 7 we use two non-linear models to estimate Equation (1). In column (1), we use a Probit model. The positive association between temperatures when growing up and trust in people today still obtains, and is significant at the 5-percent statistical level. The reported coefficient should be understood as the marginal change in the probability of exhibiting trust for others for an infinitesimal change in temperatures when growing up, holding all other covariates constant. Therefore, the coefficient 0.0073 suggests that if an individual was to move from the 25th to the 75th percentile of temperatures when growing up, her propensity to have 'Some trust' or 'Complete trust' in people would increase by 3.9%. In column (2), we report estimates from an ordered probit where the dependent variable now is defined as the five underlying categories of $Trust_{ir}$ ('Complete distrust', 'Some distrust', 'Neither trust nor distrust', 'Some trust', and 'Complete trust'). Once again, the point estimate of β_1 is positive and significant, suggesting strictly higher trust in others by those who *ceteris paribus* experienced warmer temperatures when growing up.

5.3 Temperatures and trust in institutions

The literature has drawn a distinction between two types of trust, "generalized" and "limited". Surveys often focus on the former type of trust, which is characterized by cultural norms that encourage individuals to behave in a positive manner towards those outside of their immediate family or close network. This form of trust enables individuals to see themselves as part of a larger society of abstract individuals or institutions (Algan and Cahuc, 2010). Limited trust, on the other hand, is defined by a restricted circle of persons whom an individual trusts, while not expecting to be trusted by those outside of this circle. Empirical evidence has shown a negative correlation between these two forms of trust (Alesina and Guiliano, 2013).

In communities where trust and collaborative efforts with strangers is encouraged, such as areas with high climate variability, family ties are on average weaker (Buggle and Durante, 2021). Anthropologists have long emphasized that the way in which a society organizes its kinship system is a crucial factor in determining social organization. Kinship refers to the system of relationships established through mating and birth and is broader than the Western idea of the nuclear family. In societies with tight kinship, cooperation typically occurs within familiar sub-groups, and those outside the group are distrusted (Henrich, 2020). This may also include the institutions of the state which are remote to the individual.

To test for this, we next look at the relationship between temperatures and trust in various institutions in the country. The idea is to gauge whether the individual's assessment of whether people can be trusted and her assessment of the quality of national and local institutions has a similar relation to temperatures. If trust is general, there should be a similar positive correlation between temperatures when growing up and trust in "remote" institutions. If, however, trust is limited to the one's "kin," no such relation should be observed in the data.

5.3.1 Political institutions

In Table 8, we look at survey answers about trust in political institutions. First, we find that individuals who grew up in warmer regions are more likely to believe that the President (column (1)) and the regional government (column (3)) can be trusted. At the same time, these effects are not significant at any reasonable statistical level.

However, we find that these same individuals are more likely to have 'Some trust' or 'Complete trust' in the national government (column (2)), the local government (column (4)), national parliament (column (5)), and political parties (column (6)). In all cases, the effect is significant at the 5-percent statistical level. Numerically, if an individual was to move from the 25th to the 75th percentile of temperatures when growing up, she would be between 2 percentage points and 3 percentage points more likely to have 'Some trust' or 'Complete trust' in these institutions.

As in the baseline analysis, these results are obtained after controlling for individual demographic and financial factors, as well as for country dummies which hold constant background forces common to all individuals in the country.

5.3.2 Non-political institutions

In Table 9, we in turn look at survey answers about trust in various non-political institutions in the country. In particular, we look at how likely respondents are to have 'Some trust' or 'Complete trust' in the courts, the army, the police, banks, NGOs, trade unions, and the church. More importantly, we gauge how this trust varies with temperatures when growing up.

In this case, we find a somewhat weaker statistical association between temperatures and trust than in the case of political institutions. Only in the case of courts (column (1)), banks

(column (4)) and religious organizations (column (8)), individuals who grew up in warmer climates are more likely to trust the particular institution. Moreover, in two of the three cases the point estimate is significant only at the 10-percent statistical level. For all other institutions, the point estimates are statistically indistinguishable from zero.

The estimates presented in Tables 8 and 9 thus broadly suggest that within the same country, and controlling for demographic and financial factors, individuals who grew up in a warmer climate are more likely to trust not just people in general, but also a range of national and regional political (strongly) and non-political (weakly) institutions as well. Our results thus continue being consistent with neuroscientific theories that predict a positive relation between physical warmth, one the one hand, and generalized trust and a feeling of belonging, on the other hand.

5.4 Temperatures and perceptions of institutional quality

In Table 10, we look at a slightly different aspect of attitudes towards own country's institutions: perceptions about institutional performance. In this case, the dependent variable in Equation (1) is a dummy equal to one if the respondent says that she 'Agrees' or 'Strongly agrees' with the statement that a particular phenomenon exists in the country, and to 0 if she 'Disagrees' or 'Strongly disagrees' with that statement.

The evidence suggests that within the same country, and controlling for demographic and financial characteristics, individuals who grew up in warmer climates are more likely to believe that important aspects of civil society and institutional quality are in place. In particular, such individuals are more likely to 'Agree' or 'Strongly agree' that in the country, there are free and fair elections (column (1)), law and order (column (2)), a strong opposition (column (6)), fair

courts (column (7)), and gender equality (column (8)). The point estimates are remarkably similar across the five regressions. Numerically, if an individual was to move from the 25th to the 75th percentile of temperatures when growing up, she would be between 3 and 4 percentage points more likely to have a positive view of the performance of domestic institutions with regard to these phenomena. At the same time, we do not find a statistically meaningful correlation between temperatures when growing up and perceptions about freedom of speech, peace and stability, and the press.

In all, the evidence in Tables 8-10 strongly suggests that in relation to temperature experience when growing up, 'trust in people' has numerous aspects that extend to a number of political and non-political institutions, as well as civil society and institutional quality. In all of these cases, there is a positive statistical association between warmer temperatures when growing up and trust in and perception of the quality of a number of domestic institutions.

6 Conclusion

Economic research has recently provided strong evidence that the climate may be a fundamental determinant of economic development and social institutions. In this paper, we ask whether temperatures when growing up affect individuals' trust of fellow humans. The question is important because trust has been causally linked to economic growth, and global warming is changing the climatic conditions in which humans grow up and later engage in economic interactions. Moreover, there are conflicting theories guiding the empirical relationship. On the one hand, economic theories of the value of cooperation in the face of harsh natural conditions predict a negative relationship between temperatures and trust. At the other extreme, neuroscientific, social psychology, and development psychology theories of how temperatures affect the brain

predict a positive relation between physical warmth and generalized trust.

Using data on around 24,266 individuals from 298 regions in Europe and central Asia, we find that in a regression without country fixed effects (i.e., when comparing individuals across countries), there is a strong negative correlation between temperatures when growing up and general trust in people. This is consistent with arguments about those in the European "North" being more trusting than those in the European "South" because of superior institutions that emerged to facilitate cooperation in harsher climates. However, in regressions with country fixed effects (i.e., when comparing individuals across regions within a country and controlling for unobservable factors common to all individuals in the same country, including institutional quality) we find that individuals who experienced higher temperatures when they were growing up exhibit significantly higher trust in people in general. Such individuals also are more trusting of certain domestic institutions, like parliament, national and local government, political parties, courts, banks, and the church. They are also more likely to believe that domestic institutions are performing well, as a result of which the country has free elections, law and order, a fair court system, and gender equality. Our evidence is thus less consistent with economic theories whereby harsh climatic conditions – such as very low temperatures – promote trust via the need to cooperate with strangers, and more consistent with neoscientific and social psychology theories whereby physical warmth promotes interpersonal trust and a sense of social belonging.

Our analysis also has implications – albeit more speculative ones – for the complex effects that the ongoing global warming will likely have on societies. Researchers have recently documented the negative implications of rising temperatures on inequality (e.g., Desmet and Rossi-Hansberg, 2015; Costinot, Donaldson, and Smith, 2016; Burzyński, Deuster, Docquier, and De Melo, 2022), migration (e.g., Missirian and Schlenker, 2017; Desmet, Kopp, Kulp, Nagy, Oppenheimer, Rossi-

Hansberg, and Strauss, 2021) and violence (Kim, 2014; Baysan, Burke, González, Hsiang, and Miguel, 2019), both in Europe and in the rest of the world. Our results suggest that at least in the dimension of trust in people and institutions, gradual rises in temperatures – whereby most countries in Europe will see a reduction in the number of cold days per year – may turn out to not be detrimental to the fabric of society. While capturing the complex interaction between various socio-economic factors and changing climatic conditions is beyond the scope of this paper, it does present itself as an exciting avenue of future research.

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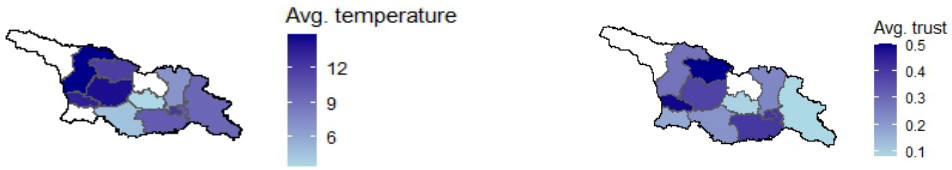
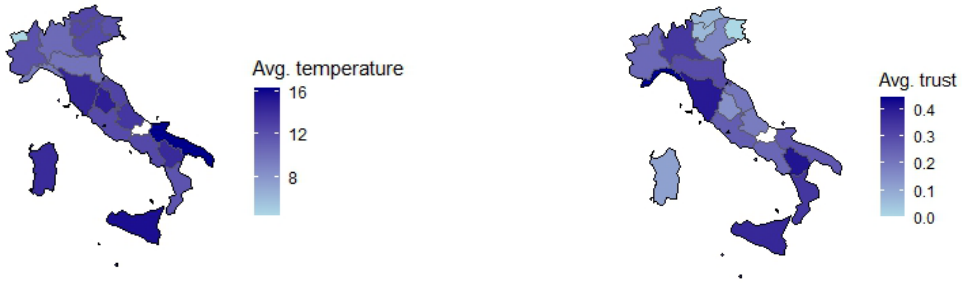
Figure 1. Regional temperatures and trust in selected countries

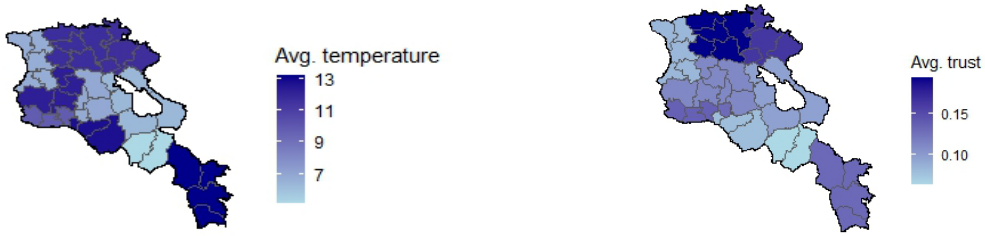
Georgia



Italy



Armenia



Notes: The trust data was obtained from the EBRD Life in Transition Survey, and temperature data comes from Berkeley Earth Global Temperatures database. For Italy, the Eurostat's NUTS area classification system was applied, whereas for Georgia, Slovenia and Armenia, we used the regional classification system according to each country's national statistical office. All calculations are the authors' own.

Table 1. Summary statistics, individual demographics characteristics

Variable	#	Mean	Median	St. dev.	Min	Max
Panel A. Individual trust						
People can be trusted	23,608	0.30	0	0.46	0	1
Panel B. Individual controls						
Male	24,266	0.54	1	0.50	0	1
Age	24,266	47.99	46	16.84	18	95
Married	24,266	0.72	1	0.45	0	1
Single	24,266	0.16	0	0.37	0	1
# children	24,266	0.85	0	1.29	0	8
Secondary school	24,266	0.36	0	0.48	0	1
University	24,266	0.36	0	0.48	0	1
Urban	24,266	0.56	1	0.50	0	1
Home owner	24,266	0.86	1	0.35	0	1
Atheist	24,266	0.09	0	0.28	0	1
Log (Total income)	24,266	8.44	8.01	2.18	0	21.49
Panel C. Temperatures						
Average temperature age 0-18	22,964	9.54	9.59	4.57	-3.38	28.78
Average temperature in 1900	298	9.90	9.90	4.74	-2.10	27.70
Maximum temperature in 1900	298	20.87	21.15	2.94	9.50	32.20
Average temperature in 2015	298	10.97	11.05	3.33	0.30	28.70
Maximum temperature in 2015	298	22.63	23.00	3.27	10.70	33.80
Panel D. Country controls						
Log (GDP per capita)	27	9.77	10.00	0.65	8.14	10.78
Polity IV score	27	8.33	9.00	3.16	-6.00	10.00
Secondary schooling rates	27	97.52	0.97	9.96	80.00	100.00
Ethnic fractalization	27	0.32	0.29	0.16	0.05	0.64

Notes: In Panel A, 'People can be trusted' is a dummy variable equal to one if, when asked about their trust in others, they respond "Complete trust" or "Some trust", and to 0 if they respond "Some distrust", "Complete distrust", or "Neither trust nor distrust". In Panel B, 'Male' is a dummy variable equal to one if the respondent is male. 'Age' denotes the respondent's age, in years. 'Married' is a dummy variable equal to one if the respondent is married. 'Single' is a dummy variable equal to one if the respondent is not married yet. '# children' denotes the number of respondent's children living in the household. 'Secondary school' is a dummy equal to one if the respondent has high-school education at most. 'University' is a dummy equal to one if the respondent has a university degree. 'Urban' is a dummy variable equal to one if the respondent has an urban residential status. 'Home owner' is a dummy variable equal to one if the respondent owns his/her own dwelling. 'Atheist' is a dummy variable equal to one if the respondent belongs to no religious denomination. 'Log (Total income ('000))' is the natural logarithm of the respondent's total income. Data from LITS. In Panel C, 'Average temperature age 0-18' is the average temperature in the respondent's region, from the time they were born until the time they turned 18. 'Average temperature in 1900' is the average temperature in the respondent's region in 1900. 'Max temperature in 1900' is the maximum temperature in the respondent's region in 1900. 'Average temperature in 2015' is the average temperature in the respondent's region in 2015. 'Max temperature in

2015' is the maximum temperature in the respondent's region in 2015. Data from the Berkeley's Earth Global Temperatures dataset. In Panel D, 'Log (GDP per capita)' is the natural logarithm of GDP per capita in the respondent's country, from the Penn Tables. 'Polity IV score' is the democracy score in the respondent's country, from Polity IV. 'Secondary schooling rates' is the share of the population that has finished high school, from the World Bank. 'Ethnic fractionalization' denotes the probability that two randomly drawn individuals from the same country belong to two different ethnic groups. Data from the World Bank.

Table 2. Young-age temperatures and general trust

	People can be trusted			
	(1)	(2)	(3)	(4)
Average temperature age 0-18	-0.0075**	-0.0062**	-0.0044*	0.0067***
	(0.0025)	(0.0026)	(0.0025)	(0.0026)
Country controls	No	No	Yes	No
Individual controls	No	Yes	Yes	Yes
Country dummies	No	No	No	Yes
Clustering	Region			
Observations	22,324	22,324	22,324	22,324
Countries	27	27	27	27
Regions	298	298	298	298
R-squared	0.01	0.01	0.02	0.06

Notes: The dependent variable is a dummy variable equal to one if, when asked about their trust in others, they respond "Complete trust" or "Some trust", and to 0 if they respond "Some distrust", "Complete distrust," or "Neither trust nor distrust." 'Average temperature age 0-18' is the average temperature in the respondent's region, from the time they were born until the time they turned 18. 'Country controls' include 'Log (GDP per capita)', 'Polity IV score', 'Secondary schooling rates', and 'Ethnic fractalization'. 'Individual controls' include 'Male', 'Age', 'Age squared', 'Married', 'Single', '# children', 'Years of schooling', 'Urban', 'Home owner', and 'Log (Total income)'. See Appendix Table 1 for definitions and summary statistics of the control variables. The model is estimated using OLS. All regressions include fixed effects as specified. Standard errors clustered by region are included in parentheses, where ***, **, and * indicate significance at the 1, 5, and 10 percent statistical level, respectively.

Table 3. Young-age temperatures and general trust: Robust region

	People can be trusted	
	(1)	(2)
Average temperature age 0-18	0.0160**	0.0157***
	(0.0063)	(0.0057)
Individual controls	Yes	Yes
Country dummies	Yes	Yes
Clustering	Region	
Observations	3,548	3,459
Countries	17	16
Regions	127	126
R-squared	0.10	0.09

Notes: The dependent variable is a dummy variable equal to one if, when asked about their trust in others, they respond "Complete trust" or "Some trust", and to 0 if they respond "Some distrust", "Complete distrust", or "Neither trust nor distrust". 'Average temperature age 0-18' is the average temperature in the respondent's region, from the time they were born until the time they turned 18. 'Country controls' include 'Log (GDP per capita)', 'Polity IV score', 'Secondary schooling rates', and 'Ethnic fractalization'. 'Individual controls' include 'Male', 'Age', 'Age squared', 'Married', 'Single', '# children', 'Years of schooling', 'Urban', 'Home owner', and 'Log (Total income)'. See Appendix Table 1 for definitions and summary statistics of the control variables. In column (1), we match individuals to the region where they were born. In column (1), we match individuals to the region where they went to secondary school. The model is estimated using OLS. All regressions include fixed effects as specified. Standard errors clustered by region are included in parentheses, where ***, **, and * indicate significance at the 1, 5, and 10 percent statistical level, respectively.

Table 4. Robustness: Temperatures

	People can be trusted			
	(1)	(2)	(3)	(4)
Average temperature in 1900	0.0071***			
	(0.0026)			
Max temperature in 1900		0.0058**		
		(0.0027)		
Average temperature in 2015			0.0065**	
			(0.0026)	
Max temperature in 2015				0.0052**
				(0.0026)
Individual controls	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Clustering			Region	
Observations	22,324	22,324	22,324	22,324
Countries	27	27	27	27
Regions	298	298	298	298
R-squared	0.06	0.06	0.06	0.06

Notes: The dependent variable is a dummy variable equal to one if, when asked about their trust in others, they respond "Complete trust" or "Some trust", and to 0 if they respond "Some distrust", "Complete distrust", or "Neither trust nor distrust". 'Average temperature in 1900' is the average temperature in the region in 1900. 'Max temperature in 1900' is the maximum temperature in the region in 1900. 'Average temperature in 2015' is the average temperature in the region in 2015. 'Max temperature in 2015' is the maximum temperature in the region in 2015. 'Individual controls' include 'Male', 'Age', 'Age squared', 'Married', 'Single', '# children', 'Years of schooling', 'Urban', 'Home owner', and 'Log (Total income ('000))'. The model is estimated using OLS. All regressions include fixed effects as specified. Standard errors clustered by region are included in parentheses, where ***, **, and * indicate significance at the 1, 5, and 10 percent statistical level, respectively.

Table 5. Robustness: Trust

	People can be trusted		
	Moderate trust	Extreme trust	Excluding 'Neither'
	(1)	(2)	(3)
Average temperature age 0-18	0.0100**	-0.0009	0.0089**
	(0.0040)	(0.0049)	(0.0040)
Individual controls	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Clustering		Region	
Observations	11,988	3,587	15,575
Countries	27	27	27
Regions	298	298	298
R-squared	0.07	0.18	0.10

Notes: The dependent variable is a dummy variable equal to one if, when asked about their trust in others, they respond "Some trust", and to 0 if they respond "Some distrust" (column (1)), a dummy variable equal to one if, when asked about their trust in others, they respond "Complete trust", and to 0 if they respond "Complete distrust" (column (2)), and excluding "Neither trust nor distrust" from the 0 category (column (3)). 'Average temperature age 0-18' is the average temperature in the respondent's region, from the time they were born until the time they turned 18. 'Individual controls' include 'Male', 'Age', 'Age squared', 'Married', 'Single', '# children', 'Years of schooling', 'Urban', 'Home owner', and 'Log (Total income ('000))'. The model is estimated using OLS. All regressions include fixed effects as specified. Standard errors clustered by region are included in parentheses, where ***, **, and * indicate significance at the 1, 5, and 10 percent statistical level, respectively.

Table 6. Robustness: Sample

	People can be trusted			
	Excluding countries with less than 3 regions	Excluding countries with fewer than 30 observations per region	Excluding temperature outliers	Excluding countries with less than 3 degrees difference
	(1)	(2)	(3)	(4)
Average temperature age 0-18	0.0068***	0.0067***	0.0065**	0.0067**
	(0.0026)	(0.0026)	(0.0026)	(0.0026)
Individual controls	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Clustering			Region	
Observations	21,264	20,971	19,983	19,119
Countries	25	25	25	22
Regions	295	248	288	262
R-squared	0.06	0.06	0.06	0.05

Notes: The dependent variable is a dummy variable equal to one if, when asked about their trust in others, they respond "Complete trust" or "Some trust", and to 0 if they respond "Some distrust", "Complete distrust", or "Neither trust nor distrust". Average temperature age 0-18' is the average temperature in the respondent's region, from the time they were born until the time they turned 18. 'Individual controls' include 'Male', 'Age', 'Age squared', 'Married', 'Single', '# children', 'Years of schooling', 'Urban', 'Home owner', and 'Log (Total income ('000))'. The model is estimated using OLS. All regressions include fixed effects as specified. In column (1), we drop countries with less than 3 regions (Croatia and Kyrgyzstan). In column (2), we drop countries with fewer than 30 observations per region (Germany and Moldova). In column (3), we drop the warmest country (Cyprus) and the coldest country (Mongolia). In column (4), we drop countries with less than 3 degrees difference in 'Average temperature age 0-18' between the coldest and the warmest region (Czechia, Estonia, Kyrgyzstan, Latvia, and Lithuania). Standard errors clustered by region are included in parentheses, where ***, **, and * indicate significance at the 1, 5, and 10 percent statistical level, respectively.

Table 7. Young-age temperatures and general trust: Robust model

	People can be trusted	
	Probit	Ordered probit
	(1)	(2)
Average temperature age 0-18	0.0073**	0.0140*
	(0.0029)	(0.0081)
Individual controls	Yes	Yes
Country dummies	Yes	Yes
Clustering	Region	
Observations	22,342	22,324
Countries	17	16
Regions	127	126
Pseudo R-squared	0.05	0.03

Notes: The dependent variable is a dummy variable equal to one if, when asked about their trust in others, they respond "Complete trust" or "Some trust", and to 0 if they respond "Some distrust", "Complete distrust", or "Neither trust nor distrust". 'Average temperature age 0-18' is the average temperature in the respondent's region, from the time they were born until the time they turned 18. 'Country controls' include 'Log (GDP per capita)', 'Polity IV score', 'Secondary schooling rates', and 'Ethnic fractalization'. 'Individual controls' include 'Male', 'Age', 'Age squared', 'Married', 'Single', '# children', 'Years of schooling', 'Urban', 'Home owner', and 'Log (Total income)'. See Appendix Table 1 for definitions and summary statistics of the control variables. The model is estimated using Probit (column (1)) and Ordered Probit (column (2)). All regressions include fixed effects as specified. Standard errors clustered by region are included in parentheses, where ***, **, and * indicate significance at the 1, 5, and 10 percent statistical level, respectively.

Table 8. Young-age temperatures and trust in political institutions

	[…] can be trusted					
	President	National government	Regional government	Local government	National parliament	Political parties
	(1)	(2)	(3)	(4)	(5)	(6)
Average temperature age 0-18	0.0028	0.0037**	0.0019	0.0055**	0.0042**	0.0040**
	(0.0025)	(0.0018)	(0.0023)	(0.0025)	(0.0017)	(0.0016)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	Region					
Observations	22,287	22,402	18,092	22,348	22,322	22,208
Countries	27	27	27	27	27	27
Regions	298	298	298	298	298	298
R-squared	0.08	0.06	0.05	0.06	0.05	0.04

Notes: The dependent variable is a dummy variable equal to one if the individual has "Complete trust" or "Some trust", and to 0 if they have "Some distrust", "Complete distrust", or "Neither trust nor distrust" in the respective institution. 'Average temperature age 0-18' is the average temperature in the region where the respondent grew in, from the time they were born until the time they turned 18. 'Individual controls' include 'Male', 'Age', 'Age squared', 'Married', 'Single', '# children', 'Years of schooling', 'Urban', 'Home owner', and 'Log (Total income)'. See Appendix Table 1 for definitions and summary statistics of the control variables. The model is estimated using OLS. All regressions include fixed effects as specified. Standard errors clustered by region are included in parentheses, where ***, **, and * indicate significance at the 1, 5, and 10 percent statistical level, respectively.

Table 9. Young-age temperatures and trust in non-political institutions

	[…] can be trusted						
	Courts	Army	Police	Banks	NGOs	Unions	Religious institutions
	(1)	(2)	(3)	(4)	(6)	(7)	(8)
Average temperature age 0-18	0.0030*	-0.0027	-0.0004	0.0058**	0.0017	-0.0006	0.0046*
	(0.0018)	(0.0026)	(0.0029)	(0.0025)	(0.0024)	(0.0020)	(0.0028)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering				Region			
Observations	21,872	22,164	22,594	22,256	20,818	20,541	21,634
Countries	27	27	27	27	27	27	27
Regions	298	298	298	298	298	298	298
R-squared	0.07	0.10	0.09	0.11	0.02	0.04	0.05

Notes: The dependent variable is a dummy variable equal to one if the individual has "Complete trust" or "Some trust", and to 0 if they have "Some distrust", "Complete distrust", or "Neither trust nor distrust" in the respective institution. 'Average temperature age 0-18' is the average temperature in the region where the respondent grew in, from the time they were born until the time they turned 18. 'Individual controls' include 'Male', 'Age', 'Age squared', 'Married', 'Single', '# children', 'Years of schooling', 'Urban', 'Home owner', and 'Log (Total income)'. See Appendix Table 1 for definitions and summary statistics of the control variables. The model is estimated using OLS. All regressions include fixed effects as specified. Standard errors clustered by region are included in parentheses, where ***, **, and * indicate significance at the 1, 5, and 10 percent statistical level, respectively.

Table 10. Young-age temperatures and perceptions of institutional quality

	[…] exists in the country							
	Free and fair elections	Law and order	Freedom of speech	Peace and stability	Independent press	Strong opposition	Fair court system	Equal rights for women
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Average temperature age 0-18	0.0061**	0.0072**	-0.0025	0.0014	0.0025	0.0056*	0.0062***	0.0071**
	(0.0024)	(0.0034)	(0.0034)	(0.0037)	(0.0028)	(0.0031)	(0.0022)	(0.0033)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	Region							
Observations	22,327	19,214	19,454	19,440	17,963	18,049	19,186	19,014
Countries	27	27	27	27	27	27	27	27
Regions	298	298	298	298	298	298	298	298
R-squared	0.19	0.14	0.12	0.16	0.08	0.08	0.11	0.08

Notes: The dependent variable is a dummy variable equal to one if the individual says “Strongly agree” or “Agree”, and to 0 if they say “Strongly disagree” or ‘Disagree” that the respective phenomenon exists in the country. ‘Average temperature age 0-18’ is the average temperature in the region where the respondent grew in, from the time they were born until the time they turned 18. ‘Individual controls’ include ‘Male’, ‘Age’, ‘Age squared’, ‘Married’, ‘Single’, ‘# children’, ‘Years of schooling’, ‘Urban’, ‘Home owner’, and ‘Log (Total income)’. See Appendix Table 1 for definitions and summary statistics of the control variables. The model is estimated using OLS. All regressions include fixed effects as specified. Standard errors clustered by region are included in parentheses, where ***, **, and * indicate significance at the 1, 5, and 10 percent statistical level, respectively.

Appendix Table 1. Countries and regions

Country	# PSUs	# observations
Albania	12	1,102
Armenia	11	1,080
Bosnia and Herzegovina	7	821
Bulgaria	28	944
Croatia	2	941
Cyprus	5	1,126
Czechia	14	643
Estonia	5	820
Georgia	10	1,109
Germany	16	427
Greece	10	894
Hungary	20	770
Italy	19	1,143
Kosovo	7	1,138
Kyrgyzstan	1	141
Latvia	6	808
Lithuania	10	813
Moldova	34	937
Mongolia	5	1,223
Montenegro	3	843
North Macedonia	8	1,067
Poland	16	554
Romania	7	800
Serbia	4	744
Slovakia	8	754
Slovenia	12	783
Ukraine	18	539
Total	298	22,964

Notes: Countries, number of regions (PSUs) per country, and number of observations per region (PSU). Data from LITS.

Appendix Table 2. Countries and temperature ranges

Country	Mean average temperature age 0-18	Lowest regional average temperature age 0-18	Highest regional average temperature age 0-18
Albania	13.59	9.28	17.93
Armenia	8.95	4.79	14.11
Bosnia and Herzegovina	8.94	1.52	14.31
Bulgaria	9.40	-0.06	12.48
Croatia	11.23	9.45	15.27
Cyprus	18.65	16.80	19.89
Czechia	7.97	6.92	9.38
Estonia	5.46	4.34	7.13
Georgia	10.70	3.17	15.31
Germany	8.79	6.22	10.59
Greece	15.95	13.19	17.51
Hungary	10.23	8.19	11.29
Italy	12.60	2.65	17.86
Kosovo	8.96	1.71	13.58
Kyrgyzstan	6.17	5.31	7.03
Latvia	5.86	4.18	7.39
Lithuania	6.51	5.34	8.14
Moldova	9.21	7.76	10.93
Mongolia	-0.22	-3.38	3.23
Montenegro	9.48	1.62	16.43
North Macedonia	9.21	6.78	15.71
Poland	7.85	5.03	9.83
Romania	9.49	3.08	16.43
Serbia	10.97	9.42	12.52
Slovakia	7.11	4.84	11.10
Slovenia	9.75	5.37	28.78
Ukraine	8.30	5.83	11.48

Notes: Average temperatures per country (column (1)), lowest regional average temperature (column (2)), highest regional average temperature (column (3)). Data from the Berkeley's Earth Global Temperatures dataset.

Appendix Table 3. Young-age temperatures and general trust: Full model

	People can be trusted			
	(1)	(2)	(3)	(4)
Average temperature age 0-18	-0.0075**	-0.0062**	-0.0044*	0.0067***
	(0.0025)	(0.0026)	(0.0025)	(0.0026)
Male		-0.0013	-0.0013	0.0018
		(0.0064)	(0.0062)	(0.0061)
Age		-0.0023	-0.0025*	-0.0017
		(0.0014)	(0.0014)	(0.0014)
Age squared		0.0000*	0.0000*	0.0000*
		(0.0000)	(0.0000)	(0.0000)
Married		0.0252**	0.0275**	0.0229**
		(0.0113)	(0.0112)	(0.0107)
Single		0.0115	0.0070	0.0093
		(0.0157)	(0.0152)	(0.0144)
# children		0.0026	0.0036	0.0028
		(0.0040)	(0.0038)	(0.0032)
Secondary school		0.0329**	0.0299**	0.0221**
		(0.0132)	(0.0129)	(0.0112)
University		0.0844***	0.0747***	0.0688***
		(0.0167)	(0.0149)	(0.0124)
Urban		-0.0176	-0.0227	-0.0134
		(0.0142)	(0.0138)	(0.0128)
Home owner		0.0260**	0.0278**	0.0140
		(0.0106)	(0.0106)	(0.0099)
Atheist		0.0615**	0.0272	0.0379**
		(0.0255)	(0.0197)	(0.0158)
Log (Total income)		0.0014	0.0126**	0.0277***
		(0.0054)	(0.0053)	(0.0059)
Log (GDP per capita)			0.0172	
			(0.0197)	
Polity IV score			-0.0049	
			(0.0034)	
Secondary schooling rates			0.0039***	
			(0.0012)	
Ethnic fractalization			0.2364***	
			(0.0736)	
Country dummies	No	No	No	Yes
Clustering			Region	
Observations	22,324	22,324	22,324	22,324

Countries	27	27	27	27
Regions	298	298	298	298
R-squared	0.01	0.01	0.02	0.06

Notes: The dependent variable is a dummy variable equal to one if, when asked about their trust in others, they respond "Complete trust" or "Some trust", and to 0 if they respond "Some distrust", "Complete distrust", or "Neither trust nor distrust". 'Average temperature age 0-18' is the average temperature in the respondent's region, from the time they were born until the time they turned 18. See Appendix Table 1 for definitions and summary statistics of the control variables. The model is estimated using OLS. All regressions include fixed effects as specified. Standard errors clustered by region are included in parentheses, where ***, **, and * indicate significance at the 1, 5, and 10 percent statistical level, respectively.