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The power of beliefs:
Evidence on the influence of trust on self-assessed health

Martin Ljunge

Øster Farimagsgade 5, Building 26, DK-1353 Copenhagen K., Denmark
Tel.: +45 35 32 30 01 – Fax: +45 35 32 30 00
http://www.econ.ku.dk

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THE POWER OF BELIEFS: EVIDENCE ON THE INFLUENCE OF TRUST ON SELF-ASSESSED HEALTH

Martin Ljunge[1]

University of Copenhagen and SITE

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Abstract

This paper estimates the influence of trust on self-assessed health. Second generation immigrants in a broad set of European countries with ancestry from across the world are studied. There is a significant positive effect of trust on self-assessed health. Health has both intrinsic and instrumental value. The finding provides evidence for one mechanism through which trust creates desirable outcomes. Individuals with high trust feel healthier. As health may promote a more productive life, it may be one channel through which trust increases national income. The results suggest policy put more emphasis on promoting social trust.

JEL codes: I12, D13, D83, Z13
Keywords: trust; self-assessed health; subjective health; intergenerational transmission; cultural transmission

1 Introduction

"A healthy man has a thousand wishes; a sick man has just one," as a proverb states. Health is complementary to most productive activities individuals engage in. Lack of health limits both desires and capabilities to produce and consume. Understanding what drives health is hence vital for learning what promotes successful outcomes of individuals, and by extension successful economies.

[1] Contact: University of Copenhagen, Department of Economics, Øster Farimagsgade 5, building 26, 1353 København K, Denmark, martinljunge@gmail.com.

Health is an outcome that is desirable in itself. Self-assessed health is a measure that is strongly associated with both current and future objective measures of health.[2] Self-assessed health has a well-established negative relationship with mortality, see for example Benjamins et al (2004) and Jylhä (2009) as well as the references therein. It also predicts other important health-related outcomes, such as health-care utilization (Pot et al, 2009) and functional ability in old age (Idler and Kasl, 1995).[3] Health is also one of the strongest correlates with subjective well-being as discussed in Graham's (2010) book, indicating that health may be important for individual well-being.

Health may be desirable beyond its intrinsic value to individuals. Health enables people to work more and harder, should they so desire. Health also opens up desires for consumption that poor health may render uninteresting. Hence, both supply and demand of goods and services may be hampered by lacking health. Indeed, a healthy population may be a prerequisite for a dynamic and growing economy.

What influences self-assessed health? A range of socio-economic factors have been studied in the literature; see for example Smith (2007). I focus on trust, a persistent cultural belief that has been shown to produce desirable outcomes at the national and regional level. Tabellini (2008 and 2010) shows how historical political institutions shape trust and in turn affect income. Algan and Cahuc (2010) measure trust among waves of immigrants to the U.S. and estimate a causal effect of trust on growth across countries.[4] The evidence points to an important role for trust in economic and social development, yet, knowledge of the mechanisms through which trust promotes growth is limited. Health is one channel through which trust could stimulate growth since better health enables individuals to be more

[2] Self-assessed health is also referred to as subjective health or self-reported health.

[3] In patients with advanced cancer, self-assessed health is a stronger predictor of mortality than performance and selected clinical indicators, symptoms, and health-related quality of life measures (Shadbolt, Barresi, and Craft, 2002). It predicts functional decline (Fleishman and Crystal, 1998) and survival in HIV patients (Dzekedzeke, Siziya, and Fylkenes, 2008).

[4] As shown in an earlier literature trust correlates with favourable economic outcomes (Knack and Keefer 1997) and with indicators of good government (La Porta et al. 1997 and 1999) in cross country data.

productive. Health may also encourage civic participation since good health allows individuals to engage in the public sphere and may explain why trust is associated with better functioning institutions.

Trust is part of the personality traits and non-cognitive skills of an individual.[5] Traits like conscientiousness and persistence have been found to influence a range of outcomes like education, labor market success, and juvenile crime as discussed by Almlund et al (2011). Relating trust to health is a novel contribution to this expanding literature.

To what extent is the positive correlation between subjective health and trust estimated in individual data causal? To address the reverse causality concern I study the subjective health of second generation immigrants and relate their health assessments to the trust in their ancestral country. Ancestral trust is strongly related to individual trust as shown in Ljunge (2011). Important, for the purposes of this study, ancestral trust is not affected by the subjective health of an individual born and residing in a different country. Using this component of individual trust that is not endogenous to the setting in which the individual lives allows me to interpret the correlation of trust and self-assessed health as causal. There is a strong positive effect of ancestral trust on self-assessed health, indicating that trust drives better health. The influence of trust is over and above a wide range of individual socio-economic characteristics that are accounted for separately.

The relationship is robust to controlling for a host of other ancestral influences. I account for the level of development and health outcomes in the ancestral country. I also examine the influence of income inequality, as well as political and legal institutions in the ancestral country. These factors don't influence the health of second generation immigrants, while the positive influence of ancestral trust remains. In addition to addressing the reverse causality issue the analysis is strengthened by using variation in ancestral trust driven by language structure.

[5] Trust is one facet of 'agreeableness' in the Big Five categorization of personality traits.

How might trust improve health? It is possible trusting individuals seek care for their ailments, and follow the prescribed treatment plans to a larger extent than individuals whose distrust may include medical personnel and advice.[6] Moreover, psychosomatic health effects are well documented in the literature.

Stress is associated with cardiovascular disease as well as other chronic diseases. Experiments inducing stress lead to atherosclerosis and hypertension in primates and mice (Henry and Stephens 1977). Stress at work is associated with greater risk of cardiovascular disease (Marmot and Wilkinson 1999), and mortality is higher for workers in low-control jobs (Amick et al 2002). Generalized trust is another psychological state that could affect bodily functions, and the causal effect of trust has not been explored in the literature. The results presented below suggest a positive psychosomatic influence of trust.

The paper proceeds as follows. The next section discusses the empirical models, followed by a presentation of the data. The results are discussed in section 4, and the last section concludes.

2 Empirical Specifications

I run two types of regressions. The first regression is

$$Health_{ict}=\alpha_o+\alpha_1 Trust_{ict}+\alpha_2 X_i+\gamma_{ct}+\varepsilon_{ict} \qquad (1)$$

$Health_{ict}$ measures the subjective health by individual i, residing in country c, in period t. $Trust_{ict}$ is the trust reported by the individual. X_i captures individual demographic and economic controls that may influence the self-assessed health. Accounting for the socio-economic status is important, see for example Smith (2007). The country of residence-by-year fixed effect is denoted by γ_{ct}, and ε_{ict} is the error term. I present estimates from an ordinary least squares regression below but the results are robust to using an ordered Probit or Logit model.

[6] Ciechanowski et al (2004) present correlations among diabetes patients that are consistent with this mechanism.

To address the reverse causality concern, that health may shape trust, I use the 'epidemiological approach' as the method is labeled in Fernandez (2010) handbook chapter. The second type of analysis is ordinary least squares regressions of the following form:[7]

$$Health_{icat}=\beta_o+\beta_1 Mean\_Trust_a+\beta_2 X_i+\gamma_{ct}+\varepsilon_{icat} \quad (2)$$

$Health_{icat}$ captures the subjective health by individual i, born and residing in country c with a parent born in country a, and a≠c, in period t. This regression is run on a sample of second generation immigrants. The mean level of ancestral trust, $Mean\_Trust_a$, is common to all individuals with a parent born in country a. As above, X_i captures individual demographic and economic controls that may affect self-assessed health. The country of residence-by-year fixed effect is denoted by γ_{ct}, and ε_{icat} is the error term. All standard errors are clustered by the parent's birth country to allow for arbitrary correlations of the error terms among individuals with the same ancestral country.

Reverse causality is not a concern in (2) since the health of a person born and residing in country c can't affect the average value of trust in the parent's birth country a. Confounding factors are of course a concern so it is important to include an extensive list of individual controls in X_i. The inclusion of the country-by-year fixed effect γ_{ct} means that the institutional structure and all other unobserved differences which apply to all residents in country c in period t are accounted for. It also means that the variation used to identify the estimate on ancestral trust is to compare the outcomes of second generation immigrants within each country of residence and year relative to the values in their countries of ancestry.[8] Since the country fixed effects are included for each year they account for non-linear trends that may differ across countries. The method and the related literature are discussed in more detail in Fernandez (2010).

[7] The results are robust to using the ordered Logit or the ordered Probit estimator.

[8] For example, I am comparing if individuals with high trust ancestry born in France have better self-assessed health than those born in France with lower trust ancestry.

The main specification in the analysis, model (2), relates inherited trust to the relative health of immigrants within country of residence. Inherited trust, $Mean\_Trust_a$, is meant to capture a time-invariant part of trust. This is the part of trust one might expect to be transmitted across generations. The transmission channel from parent to child is labeled direct vertical transmission in Bisin and Verdier's (2001) model. Trust may also be shaped by the society the child grows up in, labeled oblique horizontal transmission in their model. These social influences may change, for example due to changes in the political system, and introduce a time-varying component of trust. As I study second generation immigrants within country and year, all individuals face similar social influences in their residence countries over time. Including the country by year fixed effects hence focuses attention on the time-invariant part of trust. This is also where there is evidence of cultural transmission of trust. Ljunge (2011) finds that the time-invariant part of trust is transmitted to second generation immigrants in Europe.[9]

Viewing trust from the perspective of a personality trait, one may expect it to capture a fixed permanent component. These traits stay fairly unchanged over the life course as discussed in Almlund et al (2011) and the references therein.

3 Data

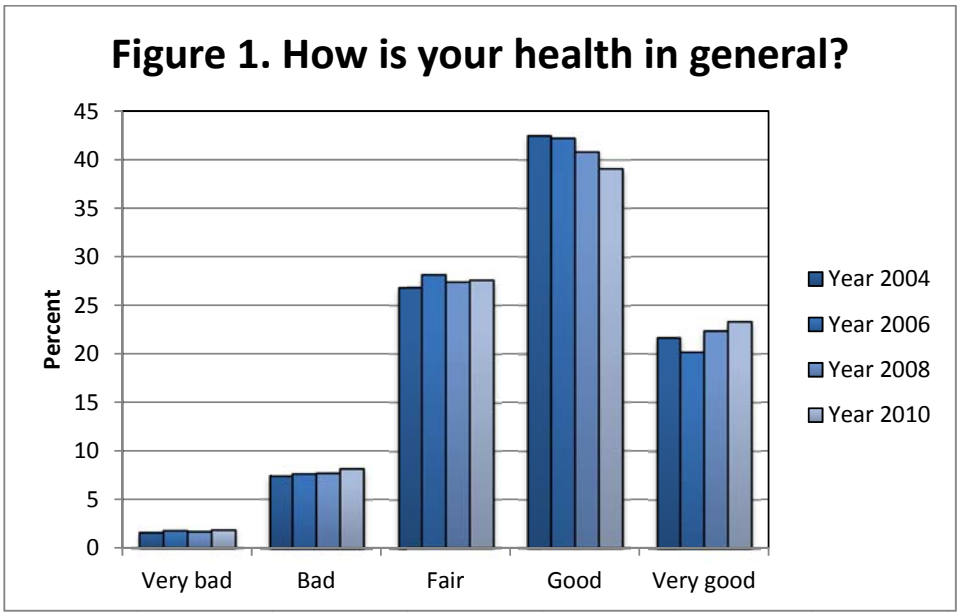
The main data set is the European Social Survey (ESS). The second to fifth rounds are used.[10] The survey asks about the country of birth of the respondent as well as the country of birth of both parents.[11] This information allows me to identify second generation immigrants and which countries their parents originate from. Looking at 29 countries of residence for second generation immigrants reduces the concern that the results are driven by conditions of one particular country.[12] Individuals with ancestry from 87 countries are observed. This reduces the concern that the results are particular to a small number of ancestral backgrounds. I focus on individuals

[9] For evidence in the US see Algan and Cahuc (2010), Tabellini (2008), and Guiso et al (2006).
[10] See Table A1 for the participating countries in each round.
[11] Extensive documentation of the data is available at http://ess.nsd.uib.no/.
[12] Luttmer and Singhal (2011) use the same data set to study preferences for redistribution.

with an immigrant mother. The summary statistics are presented in Table 1. The second generation immigrants are similar to the general population on observables.

3.1 Subjective Health

Subjective, or self-assessed, health is measured by one question in the ESS. The interviewer asks "How is your health in general? Would you say it is ..." and reads out the categories "Very good," "Good," "Fair," "Bad," "Or, very bad." I code "Very good" with a 5 and each following category with a lower digit. The variable health is hence increasing in health status. The distribution is plotted in Figure 1.



3.2 Individual Trust

Generalized trust for the individual is measured with the standard trust question, "Using this card, generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?." The respondent is asked to respond on a scale, "Please tell me on a score of 0 to 10, where 0 means you can't be too careful and 10 means that most people can be trusted."

3.3 Trust in the Mother's Country of Birth

Average trust in the mother's country of birth is computed in the integrated European Values Survey and the World Values Survey (EVS/WVS). This allows me to

expand the analysis of second generation immigrants beyond those with ancestry in the countries covered by the ESS. The EVS/WVS trust measure can be matched with immigrants from 94 nations in the ESS. Moreover, the countries in the EVS/WVS are much more diverse and include countries from Africa, the Americas, and Asia.[13]

The generalized trust question has the standard formulation in the EVS/WVS, "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?." The answers are coded 1 for "Most people can be trusted" and 0 for "You can't be too careful". Averages are computed for all countries and across the waves.[14] The average is multiplied by 10 so the scale is the same as in the ESS. For the ancestral trust levels by country see Table A2.

Table 1. Summary statistics.

	General population sample		Immigrant mother sample	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Self-assessed health	3.74	.94	3.84	.94
Trust	4.86	2.51	4.93	2.48
Trust in the mother's birth country			2.89	1.11
Age	47.5	18.5	44.0	18.02
Female	.542	.498	0.535	0.499
Married	0.532	0.499	0.480	0.500
Never married	0.272	0.445	0.329	0.470
Upper secondary degree	0.447	0.497	0.507	0.500
College/university degree	0.240	0.427	0.273	0.446
Out of labor force	0.476	0.499	0.446	0.497
Unemployed	0.040	0.196	0.046	0.210
Low income	0.254	0.435	0.222	0.415
Middle income	0.300	0.458	0.306	0.461
Catholic	0.289	0.453	0.196	0.397
Protestant	0.115	0.319	0.074	0.262
Observations	186080		7652	

Notes: Data from the European Social Survey, rounds 2 through 5. The immigrant mother sample refers to individuals born in the country of residence whose mother is born in a different country.

[13] Extensive documentation is available at www.worldvaluessurvey.org.

[14] Johnson and Mislin (2012) provide experimental validation that trust elicited in the EVS/WVS trust question correlate with trusting behavior. The ESS uses the same question.

3.4 Additional Ancestral Country Characteristics

Ancestral trust, the variable of main interest in the analysis below, is related to other ancestral country characteristics. There is a positive relationship between trust and income across countries. We don't want to confound the effect of ancestry from a more developed country with the effect of a higher trusting country. The log of the ancestral country's gross domestic product is used to measure the effect of ancestry from a higher income nation.

It may also be argued that ancestral health outcomes can be transmitted to second generation immigrants. I account for this by measuring life expectancy at birth. Additional measures of the health status in the ancestral country are infant mortality (per 1 000 births) and the probability per 1,000 that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates. I also account for inequality through the Gini coefficient for income, as well as the ratio between the incomes of the top compared to the bottom 20%. All these measures are taken from the World Development Indicators (WDI) provided by the World Bank.[15] Institutional features of the ancestral country are measured by the rule of law (from the WDI) and the degree of democracy (measured by the polity2 variable from the Polity IV project).

3.5 Individual Control Variables

The ESS includes a rich set of individual controls. Age, gender, marital status, education, employment status, income, and religious affiliation are observed. Marital status is captured by two dummies for married and never married, with widowed and divorced being the excluded category. Education is captured by one dummy for tertiary (university) degree and above, and one dummy for upper secondary as the highest attained degree. Lower education is the excluded category. One dummy captures individuals who are out of the labor force (students, not employed and not looking for work, and retired), and another dummy for unemployed who look for work. The employed is the omitted category. Income is measured by income decile, based on the country specific income distribution. I

[15] I use the data set compiled by Samanni et al (2010).

create one dummy for the bottom three deciles, Low Income, and one dummy for the middle four deciles, Middle Income. Religion dummies for being a Catholic or a Protestant are included while other religious denominations are in the excluded category.

4 Results

The baseline results are presented in Table 2. First I examine the association between self-assessed and trust among individuals in the full ESS sample. The point estimate in column (1) is 0.036 and it is strongly significant. The estimate accounts for a range of demographic and economic controls. Country-by-year fixed effects are also included, which account for non-linear trends in unobserved factors that affect health across time and countries. The estimated coefficient is consistent with a causal effect of trust on self-assessed health but we cannot rule out that causality also runs in the direction from health to trust.

How can the reverse causality concern be addressed? We need a measure of trust that does not depend on self-assessed health. Second generation immigrants offer a helpful 'natural experiment.' The second generation immigrants have different ancestral influences of trust. Given that there is cultural transmission of trust, which has been shown in Ljunge (2011), one can use the ancestral trust as a proxy for individual trust. Since the health of a second generation immigrant born and residing in one country have no way of determining the average trust level in the parent's birth country there is no reverse causality concern. I take this approach.

Next, I consider a sample of second generation immigrants with an immigrant mother.[16] In order to keep all but one aspects of the analysis constant I first estimate the model in the first column but restricted to the immigrant mother sample. The estimates in column (2) of Table 2 are very similar to the previous column. It indicates that studying these individuals doesn't change the findings, since the immigrant mother sample behaves in a similar way to the full sample. The

[16] I refer to this sample as the immigrant mother sample.

association between trust and self-assessed health is of similar magnitude and significance in the first two columns. All the significant estimates display similar magnitudes in column (2), although a few of the estimated effects of the demographic variables are no longer significant in the smaller sample.

In the main specification I regress the individual's self-assessed health on the mean trust in the mother's country of birth, along with the other controls. The estimate of the effect of trust on health is 0.029 and strongly significant, as seen in column (3) of Table 2. The result indicates that trust influences self-assessed health.[17]

Self-assessed health is declining with age in close to linear way, although at a slightly decreasing rate. Men are healthier than women, and marriage has a positive association. The strongest predictors for better health are high education, not low income, and a strong labor force attachment. Protestants express better health than others.

The associations between the control variables and self-assessed health are similar in the general population and among the second generation immigrants. This indicates that their behaviors are similar along the observable dimensions. It provides further assurance that the second generation immigrant sample is similar to the general population.

The estimated effect is quantitatively significant. An increase in the ancestral trust of one standard deviation corresponds to the half the effect of having an upper secondary education or moving one decile higher in the low end of the income distribution.

In the fourth column of Table 2 I study the sample with an immigrant father. I relate the self-assessed health to trust in the father's country of birth, as well as the other controls. The estimated coefficient is positive as expected, but lower in magnitude and not statistically significant. The results suggest heterogeneity between mothers

[17] The results are qualitatively similar for the sample with an immigrant father, although less precisely estimated. This mirrors the finding in Ljunge (2011) that cultural transmission of trust is stronger on the mother's side.

and fathers in the transmission of trust on health. It also indicates that the effect is not purely genetic, as such a mechanism would be expected to work equally through mothers and fathers. The stronger influence of mothers also mirrors the stronger transmission of trust from mothers in Ljunge (2011).

Although the main reason for studying second generation immigrants is that it allows separating the cultural influence from institutions there are implications for for immigration and integration policy. The results show that trust in the ancestral country affects the behavior of the second generation immigrant. It suggests that the health of a country may be influenced by the composition of immigrants. The results also suggest that one of the benefits of policy that builds trust may be to make individuals healthier.

4.1 Robustness

4.1.1 Sorting

Selection of immigrants is not necessarily a problem for the analysis. First, the second generation immigrants have not chosen to emigrate, and being born and raised in the country of residence they are integrated in society. The second generation immigrants also look similar to the general population on observables. Even so, the estimates would not be affected by selection if it is uniform. For example, if only high trust individuals choose to emigrate it would not necessarily affect the estimate since only variation in differences, not levels, across ancestries is used to identify the estimate in column (3) of Table 2. Furthermore, if there is positive sorting so that high trust individuals move to high trust countries, and there is cultural transmission from trust to self-assessed health, this would compress the variation in the left hand side variable, attenuate the estimate, and bias it toward zero.[18]

[18] If parents of similar trust levels migrate to a certain country, and their trust is transmitted to the health of second generation immigrant children, this would produce similar health assessments for their children no matter their ancestry. The variation in the dependent variable health is in this case smaller (compared to if the parents had the average trust in

Yet, there may be a concern that ancestry from a high trust country captures a more developed country ancestry, and that the level of development may transmit to health. To address this I add the logarithm of gross domestic product (gdp) per capita in the mother's birth country to the specification. The results are robust as seen in column (1) of Table 3, and the estimate on gdp is insignificant. It is hence trust and not level of development that drive the results.

Another approach to address parental sorting is to account for parental education. This shuts down any transmission of ancestral trust through parental education. I include dummies for upper secondary and tertiary education for the mother in column (2) of Table 3. The estimate on trust in the mother's birth country is robust to these added controls. The coefficients on the mother's education are positive and significant. In the third column I add indicators for the father's education as well. The influence of ancestral trust is not affected by controlling for father's education. The estimated influence of father's education is strong and positive on health, and the influence of mother's education is now insignificant. The positive influence of parental education on health is also present in the full sample and is in line with previous studies such as Ross and Mirowsky (2011) and Flores et al (1999).

The last two columns in Table 3 add controls for if, in turn, the mother and father were working when the respondent was age 14. These controls have a negligible influence on the other estimates. The results are hence robust to these controls that might capture an influence of migrant sorting.

These results also point to an important role of parental education as a driver of health. High education of the father transmits into improved health use beyond the effect of the individual's education and other controls. Policy promoting higher education could hence have a pay-off in promoting health in both the current and future generations.

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their ancestral country), which leads to a weaker relationship with ancestral trust, and hence leads to an estimate biased toward zero.

In Table 2 I use all the available data. There may be a concern that the results in column (3) are influenced by ancestries with few second generation immigrants in the data. The results are robust to including ancestral countries with at least 5, 10, 15, or 25 observations. The result is not driven by small immigrant groups.

The dependent variable self-assessed health is a discrete ordinal variable. The linear model estimated in Table 2 has the advantage of a straightforward estimation and interpretation of coefficients. I have also estimated the model with ordered Probit and ordered Logit models. The results are similar to those presented in Table 2.

4.1.2 Ancestral health outcomes

Trust could be correlated with health outcomes in the ancestral countries, which suggests an alternative explanation to my finding that trust promotes health. To address this issue I include several measures of health in the ancestral country. I keep the control for GDP per capita in the ancestral country since it may capture the general level of development in the country of which health is one aspect. My first direct measure of ancestral health is life expectancy in years at birth.[19] The results are presented in column (1) of Table 4. Both life expectancy and GDP in the ancestral country are insignificant while trust remains strongly significant. In column (2) I account for infant mortality and in column (3) the probability that a child dies before turning 5 year of age.[20] Also these health measures are insignificant while the main estimate on trust is unchanged. In column (4) of Table 4 I include all the measures of ancestral health outcomes with similar results: the estimate on trust remains similar while the estimates on the health outcomes are insignificant. The results suggest that my results are driven by trust and not ancestral health outcomes.

4.1.3 Ancestral institutions

Health is of course influenced by many institutional factors. Wilkinson and Pickett (2009) have for example suggested that income inequality has a number of undesirable consequences, one of which is to hurt health. I examine this hypothesis by controlling for inequality in the ancestral country. In column (1) of Table 5 I

[19] Trust and life expectancy are positively correlated across countries.
[20] Both the child mortality measures are negatively correlated with trust across countries.

include the Gini coefficient, which is a common measure of income inequality. I also account for GDP in the ancestral country, as it may influence other institutional factors. The estimate on the Gini is insignificant and the influence of trust remains strong. Wilkinson and Pickett (2009) used a slightly different measure of inequality: the ratio of the income share of the top 20% to the bottom 20%. In column (2) of Table 5 I use this measure instead of the Gini. The result is similar, although the estimated influence of trust is now even larger.

Trust is correlated with well-functioning institutions. It could hence be that health is driven by these institutions rather than trust. To account for such influences I include 'Rule of Law' as a control in column (3) of Table 5. The influence of trust remains strong. More democratic countries also tend to have higher trust. To account for influences of democratic institutions on health I control for the polity2 variable (which is increasing the more democratic institutions a country has). The estimates in column (4) of Table 5 show that it does not account for the influence of trust, and the influence of democracy is insignificant. Column (5) of Table 5 includes all the three last controls to account for them jointly.[21] The influence of trust is robust to this specification, and the additional ancestral influences are insignificant.

4.2 Determinants of Ancestral Country Trust

Ancestral country trust has been taken as given thus far. Below I explore language as a factor that may shape the ancestral trust levels. The approach is to study if linguistic features have an influence on trust levels, and to estimate how the health of second generation immigrants is influenced by ancestral trust shifted by these "deep" features. I combine the approach of relating language structure to trust with the epidemiological approach and apply it to the influence of trust on health; a novel contribution to the literature. Evidence of cultural transmission of trust using language structure as a shifter is given in Ljunge (2011), which indicates the relevance of this approach for studying health outcomes.

[21] The Gini is highly collinear with the relative income share variable indicating that they capture the same variation across countries. The collinearity precludes including both variables in the same specification.

4.2.1 Language

Language structure is used as a shifter of trust. Languages have features that put different emphasis on how to relate to other people. The grammatical language structures are stable and slow moving, arguably more so than cultural beliefs like trust.

The use of first and second pronouns in conversations is one feature that differs across languages. In Italian, for example, it is allowed to drop the pronoun while in English it is mandatory to use the pronoun. Languages where dropping the first-person pronoun is forbidden are typical of cultural traditions that gave more emphasis to the individual relative to his social context and thus were more respectful of the individual and his rights as argued by Kashima and Kashima (1998, 2005). This grammatical rule is used by Licht, Goldschmidt, and Schwartz (2007) to examine how individualism affects the rule of law across countries. Tabellini (2008) use the rule to examine how trust affects institutions across countries. None of these authors use language structure to study individual outcomes as I do. I follow Tabellini (2008) and define the variable "No pronoun drop" as 1 if the language forbids the drop of pronouns and 0 otherwise. The variable is expected to be positively related to trust.

The second grammatical rule I consider is the differentiation between singular and plural personal pronouns, in keeping with Tabellini (2008). French, for example, distinguishes between the singular and plural You, the Tu and Vous (T-V for short), depending on the social distance between the subjects. Many languages had the T-V distinction historically but later dropped it. Languages who kept the T-V distinction are indicative of cultures that put stronger emphasis on hierarchy and social distance, which may have a negative influence on generalized trust. The variable "2nd person differentiation" is defined as 1 if the number of second person pronouns that might be used in spoken language varies according to the social

proximity between speakers and 0 otherwise.[22] I expect the variable to have a negative relationship with trust.

Based on these two variables capturing grammatical rules "Language" is defined as No pronoun drop minus 2nd person differentiation. Language is expected to be positively related to trust. The variable is defined by country. In a handful countries with several language groups the variable is a weighted average of the respective language groups, where possible.[23] The exact definitions follow Tabellini (2008), with one modification.[24, 25] The association between language structure and ancestral country trust is presented in Table 6. The estimated coefficient on language structure is positive and strongly significant.[26] The positive sign is as expected. Trust is higher in countries where the language puts less emphasis on hierarchy, and more emphasis on the individual's rights. The strong influence of language structure is robust across the mother and father samples as well as across specifications discussed below.

4.2.2 Results

I use the grammatical structure, as captured by the Language variable, in the parent's country of birth as a shifter of the trust in the parent's country of birth. The baseline result for the self-assessed health of second generation immigrants with an immigrant mother is presented in specification 1 in Table 7. The point estimate on trust in the mother's birth country is about double the magnitude compared to Table 1. The standard errors increase and the estimate remains significant at conventional levels.

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[22] The variable distinguishes between languages where the grammar allows for 2nd person differentiation compared to those that don't. The variable does not capture if the differentiation is common in practice, where allowed, which may affect the accuracy of the variable. However, such mismeasurement would not invalidate the use of the variable, but rather only attenuate the relationship between language structure and trust.

[23] The weighting applies to Canada, Singapore, South Africa, and Switzerland.

[24] The data is generously made available at http://didattica.unibocconi.it/mypage/index.php?IdUte=48805&idr=5112.

[25] I adjust the coding of Danish to allow for second person differentiation.

[26] The F-statistic for the exclusion of the Language variable is at least 16 across the specifications in Table 6.

As language structure shapes ancestral trust there may be a concern that language has a direct influence on the individual's self-assessed health, although it may be somewhat challenging to argue for such a link. One flexible approach to address this is to account for language fixed effects. In the second column of Table 7 a full set of fixed effects for the first language spoken at home is included. The point estimate drops a bit while the standard errors increase. The estimate is no longer significant at conventional levels (p=0.15). The language effects could of course capture many cultural factors not related to grammar, which render the estimate less significant. Column 3 of Table 7 adds also fixed effects for the second language spoken at home. The categories of second language also include one category for no second language spoken at home. The results are similar to the previous specification.

The rest of Table 7 studies the immigrant father sample. Column 4 estimates the baseline model using language structure as a shifter of ancestral trust. The point estimate on ancestral is higher than in the previous analysis, as is the case for the immigrant mother sample. The estimate is also highly significant. The fixed effects for the first language spoken at home are added in column 5 of Table 7, which yields similar and highly significant estimates. Moreover, adding the fixed effects for the second language spoken in column 6 also produce estimates of similar magnitude and significance.

Why are the point estimates higher? As there is an attenuation bias built into the epidemiological approach using Language as an exogenous shifter may address the mismeasurement, which would lead to a higher estimate of the transmission of trust.

The evidence on trust's influence on health is hence robust to using long established grammatical rules to provide variation in ancestral trust. It is reassuring that the results are robust to including language fixed effects. These effects account for any unobserved direct impact of language on health, including an influence from grammar structure. There is of course no way to be certain that the assumption of

the model are true, but the robustness of the results lend some plausibility to the identifying assumptions.

5 Conclusion

I find evidence that trust promotes health. Self-assessed health and trust exhibit a positive association in the general population. In order to address the reverse causality concern, that health may shape trust, I study second generation immigrants in Europe. I find that health is positively affected by trust in the mother's birth country, which provides evidence of a causal effect of trust on health.

The finding is robust. It is not explained by contemporaneous individual factors like income or education, by ancestry from more developed nations, or parental education. Moreover, the finding is robust to accounting for ancestral health outcomes like longevity and infant mortality.

Trust and health have been analyzed in the health literature, although those studies have been based on aggregate or individual associations (see for example Kim, Subramanian, and Kawachi, 2006).[27] Such studies are challenging to interpret since the causality could go in either direction. By studying second generation immigrants and relating their health to trust in the ancestral country my estimates establish a clear direction of causality from trust to health.

Health may be an intrinsically desirable social objective and knowledge about trust as a driver of health has policy implications. My findings point to a pay-off from trust not discussed in the literature. Policy that affects trust should be evaluated with the effect on health in mind.

The results provide evidence of one mechanism through which trust can promote successful societies beyond the direct effect on health. The recent literature has found a positive effect of average trust on income per capita, but how this success

[27] Another strand of the health literature has focused on particularized trust, in particular trust between the patient and the physician or health care provider (see for example Ciechanowski et al, 2004).

comes about is not well understood.[28] Trusting individuals are thought to be more likely to interact with others. Health enables interactions among individuals. Cultural beliefs like trust can hence affect health and behavior of individuals. The paper provides evidence of an individual behavioral mechanism in the black box between trust and national income.

[28] See Algan and Cahuc (2010) and Tabellini (2010).

Table 2. Subjective health and trust. Baseline results.

Dependent variable: Subjective health status				
Sample:	General population	2nd generation immigrants with an immigrant mother	2nd generation immigrants with an immigrant mother	2nd generation immigrants with an immigrant father
	(1)	(2)	(3)	(3)
Trust	**0.036**	**0.033**		
	(0.002)***	(0.004)***		
Trust, mother's birth country			**0.029**	
			(0.014)**	
Trust, father's birth country				**0.018**
				(0.014)
Age	-0.035	-0.039	-0.040	-0.037
	(0.002)***	(0.004)***	(0.004)***	(0.004)***
Age squared/100	0.017	0.019	0.020	0.018
	(0.002)***	(0.005)***	(0.005)***	(0.004)***
Female	-0.049	-0.069	-0.069	-0.050
	(0.015)***	(0.024)***	(0.024)***	(0.027)*
Married	0.086	0.061	0.066	0.059
	(0.009)***	(0.025)**	(0.025)**	(0.031)*
Never married	0.019	-0.060	-0.055	-0.042
	(0.011)*	(0.037)	(0.036)	(0.036)
Upper secondary	0.102	0.072	0.080	0.110
	(0.012)***	(0.030)**	(0.030)***	(0.031)***
College or university	0.192	0.190	0.217	0.269
	(0.014)***	(0.027)***	(0.028)***	(0.033)***
Out of labor force	-0.222	-0.199	-0.201	-0.190
	(0.015)***	(0.027)***	(0.027)***	(0.030)***
Unemployed	-0.126	-0.133	-0.144	-0.088
	(0.014)***	(0.049)***	(0.050)***	(0.041)**
Low income	-0.167	-0.162	-0.168	-0.126
	(0.009)***	(0.031)***	(0.032)***	(0.030)***
Middle income	-0.046	-0.025	-0.024	-0.044
	(0.008)***	(0.024)	(0.025)	(0.020)**
Catholic	0.038	0.035	0.029	-0.016
	(0.018)**	(0.028)	(0.029)	(0.027)
Protestant	0.077	0.077	0.084	0.104
	(0.015)***	(0.033)**	(0.033)**	(0.036)***
Country-by-year fixed effects	Yes	Yes	Yes	Yes
R-squared	0.315	0.295	0.289	0.299
Observations	186080	7625	7652	7942

Notes: The dependent variable is self-assessed Health, which ranges from 1, 'very bad' to 5 'very good.' Column (1) estimates the association between Health and generalized trust of the individual in the general population. Column (2) restricts the sample to second generation immigrants with an immigrant mother. Column (3) studies second generation immigrants and estimates the effect of trust in the mother's country of birth on health. Column (4) studies second generation immigrants and estimates the effect of trust in the father's country of birth on health. Low income is a dummy for the bottom three deciles. Middle income is a dummy for the middle four deciles. Data is from the second to fifth waves of the European Social Survey. Standard errors in parenthesis. Standard errors allow for clustering on the mother's birth country. Significance stars, * p<0.1, ** p<0.05, *** p<0.01.

Table 3. Robustness checks.

Dependent variable: Self-assessed health status					
Alternative specification:	Add ancestral GDP	Mother's education	Parental education	Parental education + working mom	Parental education + working parents
	(1)	(2)	(3)	(4)	(5)
Trust,	**0.036**	**0.034**	**0.033**	**0.033**	**0.033**
mother's birth country	(0.016)**	(0.015)**	(0.015)**	(0.015)**	(0.015)**
log of GDP per capita,	-0.010	-0.013	-0.014	-0.014	-0.014
mother's country of birth	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)
Upper secondary education,		0.078	0.041	0.038	0.038
mother		(0.029)***	(0.037)	(0.036)	(0.036)
Tertiary education, mother		0.093	0.043	0.038	0.039
		(0.039)**	(0.048)	(0.047)	(0.047)
Upper secondary education, father			0.069	0.070	0.068
			(0.029)**	(0.029)**	(0.029)**
Tertiary education, father			0.097	0.099	0.096
			(0.037)**	(0.037)***	(0.036)***
Working mother (at age 14)				0.021	0.021
				(0.023)	(0.022)
Working father (at age 14)					0.016
					(0.030)
Individual controls	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.285	0.286	0.286	0.286	0.286
Observations	7245	7245	7245	7245	7245

Notes: The dependent variable is self-assessed Health, which ranges from 1, 'very bad' to 5 'very good.' All specifications study second generation immigrants and estimates the effect of trust in the mother's country of birth on self-assessed health. Individual controls include age, age squared, gender, education, labor force attachment, income, and religious denomination. Country of residence-by-year fixed effects are included in all specifications. Data is from the second to fifth waves of the European Social Survey. Standard errors in parenthesis, which allow for clustering on the mother's birth country. Significance stars, * p<0.1, ** p<0.05, *** p<0.01.

Table 4. Ancestral health influences.

Dependent variable: Self-assessed health status				
Alternative specification:	Life expectancy	Infant mortality	Child mortality	Cumulative model
	(1)	(2)	(3)	(4)
Trust,	**0.036**	**0.035**	**0.036**	**0.032**
mother's birth country	(0.016)**	(0.015)**	(0.016)**	(0.015)**
log of GDP per capita,	-0.012	-0.037	-0.028	-0.035
mother's country of birth	(0.023)	(0.028)	(0.026)	(0.027)
Life expectancy at birth,	0.000			-0.001
mother's country of birth	(0.004)			(0.005)
Infant mortality (per 1000 live births)		-0.002		-0.006
mother's country of birth		(0.001)		(0.004)
Mortality rate under 5 years of age,			-0.001	0.003
mother's country of birth			(0.001)	(0.002)
Individual controls	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes
R-squared	0.285	0.285	0.285	0.285
Observations	7245	7245	7245	7245

Notes: The dependent variable is self-assessed Health, which ranges from 1, 'very bad' to 5 'very good.' All specifications study second generation immigrants and estimates the effect of trust in the mother's country of birth on self-assessed health. Individual controls include age, age squared, gender, education, labor force attachment, income, and religious denomination. Country of residence-by-year fixed effects are included in all specifications. Data is from the second to fifth waves of the European Social Survey. Standard errors in parenthesis, which allow for clustering on the mother's birth country. Significance stars, * p<0.1, ** p<0.05, *** p<0.01.

Table 5. Ancestral institutional factors.

Dependent variable: Self-assessed health status					
Alternative specification:	Gini	Relative income shares	Rule of law	Democracy	Cumulative model
	(1)	(2)	(3)	(4)	(5)
Trust,	**0.035**	**0.039**	**0.034**	**0.034**	**0.035**
mother's birth country	(0.015)**	(0.016)**	(0.016)**	(0.016)**	(0.016)**
log of GDP per capita,	-0.013	-0.011	-0.025	-0.007	-0.025
mother's country of birth	(0.016)	(0.015)	(0.026)	(0.016)	(0.023)
Gini coefficient,	-0.002				
mother's country of birth	(0.002)				
Income share of top 20 vs bottom		-0.000			0.001
20%, mother's country of birth		(0.005)			(0.005)
Rule of law,			0.020		0.023
mother's country of birth			(0.024)		(0.025)
Democracy (polity2),				-0.000	-0.001
mother's country of birth				(0.003)	(0.003)
Individual controls	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.285	0.285	0.285	0.285	0.285
Observations	7188	7188	7245	7102	7071

Notes: The dependent variable is self-assessed Health, which ranges from 1, 'very bad' to 5 'very good.' All specifications study second generation immigrants and estimates the effect of trust in the mother's country of birth on self-assessed health. Individual controls include age, age squared, gender, education, labor force attachment, income, and religious denomination. Country of residence-by-year fixed effects are included in all specifications. Data is from the second to fifth waves of the European Social Survey. Standard errors in parenthesis, which allow for clustering on the mother's birth country. Significance stars, * p<0.1, ** p<0.05, *** p<0.01.

Table 6. Ancestral Trust on Language Structure.

Dependent variable: Trust in the mother's or father's country of birth						
Sample:	Immigrant mother	Immigrant mother	Immigrant mother	Immigrant father	Immigrant father	Immigrant father
	(1)	(2)	(3)	(4)	(5)	(6)
Language structure, mother's birth country	0.073	0.069	0.067			
	(0.017)***	(0.016)***	(0.015)***			
Language structure, father's birth country				0.068	0.065	0.063
				(0.016)***	(0.016)***	(0.015)***
1st language spoken at home fixed effects		Yes	Yes		Yes	Yes
2nd language spoken at home fixed effects			Yes			Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6286	6286	6286	6409	6409	6409

Notes: The dependent variable is average trust in the parent's birth country. All specifications study second generation immigrants; columns (1) to (3) study those with an immigrant mother and columns (4) to (6) those with an immigrant father. All regressions include a full set of country of residence-by-year fixed effects. Individual controls include age, age squared, gender, education, labor force attachment, income, and religious denomination. Data is from the second to fifth waves of the European Social Survey. Standard errors in paranthesis, which allow for clustering on the parent's birth country. Significance stars, * p<0.1, ** p<0.05, *** p<0.01.

Table 7. Language Structure as Shifter of Ancestral Trust and Health.

Dependent variable: Self-assessed health status						
Sample:	Immigrant mother	Immigrant mother	Immigrant mother	Immigrant father	Immigrant father	Immigrant father
	(1)	(2)	(3)	(4)	(5)	(6)
Trust, mother's birth country	0.533	0.414	0.366			
	(0.293)*	(0.290)	(0.290)			
Trust, father's birth country				0.894	0.925	0.845
				(0.350)**	(0.373)**	(0.384)**
1st language spoken at home fixed effects		Yes	Yes		Yes	Yes
2nd language spoken at home fixed effects			Yes			Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6271	6271	6271	6397	6397	6397

Notes: The dependent variable is self-assessed Health, which ranges from 1, 'very bad' to 5 'very good.' All specifications study second generation immigrants; columns (1) to (3) study those with an immigrant mother and columns (4) to (6) those with an immigrant father. 2nd language at home includes one category for no 2nd language spoken at home. All regressions include a full set of country of residence-by-year fixed effects. Individual controls include age, age squared, gender, education, labor force attachment, income, and religious denomination. Data is from the second to fifth waves of the European Social Survey. Standard errors in paranthesis, which allow for clustering on the parent's birth country.

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7 Appendix Tables

Table A1. Countries Participating in the ESS by Survey Round.

	Survey Round:				
Country	1	2	3	4	5
Austria	X	X	X		
Belgium	X	X	X	X	X
Bulgaria			X	X	X
Cyprus			X	X	X
Czech Republic	X	X		X	X
Denmark	X	X	X	X	X
Estonia		X	X	X	X
Finland	X	X	X	X	X
France	X	X	X	X	X
Germany	X	X	X	X	X
Greece	X	X		X	X
Hungary	X	X	X	X	X
Ireland	X	X	X	X	X
Israel	X			X	X
Italy	X	X			
Luxembourg	X	X			
Netherlands	X	X	X	X	X
Norway	X	X	X	X	X
Poland	X	X	X	X	X
Portugal	X	X	X	X	X
Russian Federation			X	X	X
Slovakia		X	X	X	X
Slovenia	X	X	X	X	X
Spain	X	X	X	X	X
Sweden	X	X	X	X	X
Switzerland	X	X	X	X	X
Turkey		X		X	
Ukraine		X	X	X	X
United Kingdom	X	X	X	X	X

Note: Edition 2.0 of ESS round 5 is used, and the cumulative file for earlier rounds.

Table A2. Countries of Ancestry on the Mother's Side and Summary Statistics.

Country Code	Trust, mother's country of birth	Count of 2nd generation immigrants	Country Code	Trust, mother's country of birth	Count of 2nd generation immigrants	Country Code	Trust, mother's country of birth	Count of 2nd generation immigrants
AD	2.07	1	FI	5.65	204	MY	0.88	7
AL	2.56	9	GB	3.59	158	NG	2.19	9
AM	2.47	10	GE	1.85	29	NL	5.06	104
AR	1.96	25	GH	0.85	7	NO	6.64	66
AT	3.27	179	GR	2.37	75	NZ	5.00	4
AU	4.46	11	GT	1.57	1	PE	0.75	5
AZ	2.05	17	HR	2.29	97	PH	0.71	17
BA	2.19	67	HU	2.69	145	PK	2.74	54
BD	2.22	7	ID	4.56	82	PL	2.33	437
BE	3.13	79	IE	4.15	113	PR	1.24	1
BG	2.70	52	IL	2.35	2	PT	1.74	121
BR	0.64	35	IN	3.46	86	RO	1.68	192
BY	2.86	121	IQ	4.40	147	RU	2.76	1039
CA	4.45	24	IR	3.36	70	SE	6.35	63
CH	4.38	32	IS	4.13	8	SG	1.47	2
CL	2.03	14	IT	3.17	472	SI	1.82	7
CN	5.42	12	JO	2.95	4	SK	2.13	180
CO	1.20	4	JP	4.16	5	TH	4.15	10
CS	2.76	47	KG	1.67	5	TR	1.13	376
CSS	1.53	1	KR	3.17	2	TW	2.96	1
CY	1.28	11	LT	2.62	34	TZ	0.81	2
CZ	2.67	160	LU	2.48	14	UA	2.95	255
DE	3.41	666	LV	2.06	31	UG	0.78	1
DK	5.88	51	MA	1.94	365	US	4.11	137
DO	2.64	2	MD	1.82	19	UY	2.48	8
EE	2.42	17	MK	1.11	28	VE	1.48	5
EG	2.80	56	ML	1.75	3	VN	4.78	13
ES	3.28	142	MT	1.88	4	ZA	1.98	10
ET	2.44	18	MX	2.41	3	ZW	1.12	2

Note: Country codes according to ISO-3166. Trust is measured between 0 and 10, where 10 corresponds to 'most people can be trusted.' Country averages of trust are computed from the integrated European Values Survey and World Values Survey. The average across countries is 2.7, and the standard deviation is 1.35 (both unweighted). The count of 2nd generation immigrants refers to the number of individuals with an immigrant mother in the European Social Survey.