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Does Religion Make You Sick? Evidence of a Negative Relationship between Religious Background and Health[*]

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Abstract: Religious beliefs and practices influence individual lives and societies in many ways. We study how religion affects self-assessed health, which in turn is important for both individual well-being and productivity. A religious background predicts worse health. As the previous literature has not been able to rule out reverse causality, we apply a novel method that does. The health of the children of immigrants in 30 European countries is related to different measures of religiosity in their mothers' birth countries. Since religiosity in the mothers' birth countries predicts children's religiosity (through transmission in the family), we can use the former as a measure of the latter. Moreover, the children's health arguably cannot affect the religiosity of their mothers' home countries (measured several decades earlier). Furthermore, the negative relationship between religious background and health is robust to accounting for a range of individual and ancestral country characteristics, to

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excluding the most and least religious ancestral countries, and to accounting for systematic differences across ancestral continents. The negative relationship, which we also find in U.S. data, suggests that the positive correlations between health and religiosity in the earlier literature are not due to religion promoting health.

JEL classification: I19, Z12.

Keywords: Health, Religion, Children of Immigrants.

I. Introduction

Religion is a powerful phenomenon across the world, although with great variation across countries. When Gallup (2009) asked representative samples in 143 countries whether religion is an important part of daily life, 100% (or close to 100%) answered "yes" in countries such as Egypt, Bangladesh, Sri Lanka, Indonesia and Congo. But even in more developed countries like Switzerland, South Korea, Canada, Singapore and Austria, 40–55% answered in the affirmative. The median share in the 27 developed countries included in the poll was 38%. The United States stands at 64% (with great variation between states: from 42% in Vermont to 85% in Mississippi). Then there are rather irreligious countries as well, with shares around 20%: Estonia, Sweden, Denmark, Norway and the Czech Republic top this list.

Since religion is important to this many people, it becomes central, from a social-science perspective, to analyze its consequences. In this study we investigate how religion affects *health*.[1] This is by no means a new topic: A few years ago, Koenig, King, and Carson (2012) estimated that the number of scientific studies on the matter exceeded 11,000! The literature is thus too vast to summarize in any detail – see, e.g., Miller and Thoresen (2003), Lee and Newberg (2005), Bonelli and Koenig (2013), Masters and Hooker (2013), Park and

[1] Religion seems to influence quite a few other outcome variables – to mention but a few: economic growth (Barro and McCleary 2003; McCleary and Barro 2006; Durlauf, Kourtellos, and Tan 2012), trust (Johansson-Stenman, Mahmud, and Martinsson 2009; Berggren and Bjørnskov 2011), the shadow economy (Schneider, Linsbauer, Heinemann 2015), financial-risk aversion (Noussair et al. 2013), prosocial behavior (Grossman and Parrett 2011; Galen 2012; Preston and Ritter 2013), criminality (Brauer, Tittle, and Antonaccio 2013), diligence in paying bills (Berggren 1997), work ethic (van Hoorn and Maseland 2013) and entrepreneurship (Wiseman and Young 2014). For a broad survey of how religion is being studied in economics, see Iyer (2016).

Slattery (2013), and Schierman, Bierman, and Ellison (2013) for reviews.[2] Suffice it to note that most studies find a positive relationship between religion (measured in some way) and health (measured in some way).

However, another feature of these studies is that they generally report correlations (Levin 1994) without any credible ability to rule out reverse causality – and so it may be that health contributes to determining people's religiosity rather than the other way around. Our main contribution consists in employing a novel method that allows us to rule out reverse causality, which goes beyond reporting a mere correlation. Another contribution is that we use data from a large number of European countries, while the great majority of studies in this area only rely on U.S. data that may yield non-generalizable results due to that country being unusually religious for its level of development. (Still, we apply U.S. data as a complement to our main analysis.)

Why focus on health? It is certainly a strong policy goal embraced not only by national governments, but also by international organizations like the World Health Organization and the World Bank. It is not hard to see why. Health is first and foremost a concern for individuals and families – without it, life is less satisfactory and can come to entail pain and suffering (Graham 2010; Binder and Coad 2013). In addition, lack of health can have inimical financial consequences that in turn reduce wellbeing. However, health is also of macroeconomic importance, by affecting government incomes (through the tax base) and expenditures (through welfare payments and healthcare) and, at least to some extent, by influencing economic growth (Weil 2007, 2014).

Hence, we study determinants of self-reported health on the individual level in 30 European countries over the period 2004–2010, using four rounds of the European Social Survey (ESS) as the main data source, with particular focus on one cultural factor, religion. In contrast to most of the preceding literature, we find evidence for a *negative* impact. Individuals with ancestry from more religious countries have poorer self-assessed health than people with more secular backgrounds. As religiosity is transmitted across generations, the results indicate that being more religious (as measured by several indicators: belonging to a religious denomination, being religious, attending services and praying) does not have current health benefits and, if anything, negative health effects.[3]

[2] For such reviews focusing on adolescents, see Cotton et al. (2005, 2006)

[3] By primarily focusing both our theoretical and empirical analysis on religiosity – the degree to which people are religious – we try to pinpoint factors that we take to be shared by most ardent believers across religions. There may exist differences between religions with regard to their effect on health as well, to the extent that

We suggest that this can be understood as the result of religious persons being more fatalistic, more focused on the eternal than the present, more prone to conflict with others, less trusting, or more inclined to feel stress and internal strife due to strict behavioral requirements and theological stances that can be hard to accept. A negative impact does not rule out that there are some positive effects of religion on health, which may, e.g., come about through avoidance of cigarettes, large quantities of alcohol and drugs; a more monogamous sex life; and through feelings of love, comfort and safety. It only means that the negative effects dominate.

The method we apply to rule out reverse causality uses the children of immigrants in 30 European countries, all of them born and residing there, as the objects of study and proceeds in two steps.[4] First, the individual indicators of religiosity are linked to a religiosity measure from a different context, more precisely to the share who is not religious in the home countries of the parents (who immigrated to the countries in which our study subjects now live). In a robustness exercise, we use a number of other parental home country measures of religiosity. We call these measures ancestral religiosity. The idea here is that the religiosity of the parents is shaped in their home country and correlate with average religiosity there; and, furthermore, that religiosity is transmitted in the family, from the immigrant parents to their children.[5] We show below that there is indeed a strong element of intergenerational transmission of religiosity in our sample. Second, the next step relates ancestral religiosity to the self-assessed health of the second-generation immigrants. Using ancestral religiosity

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values, beliefs and behavior differ, and for that reason we also analyze the possible diversity of effects in the empirical section.

[4] Others have used this method of regressing individual outcomes on values from the parents' country of origin (called the "epidemiological" approach by Fernández 2011) – e.g., for studying trust (Algan and Cahuc 2010; Ljunge 2014a,b,c), women's labor supply and fertility (Fernández and Fogli 2006, 2009; Guinnane, Moehling, and Gráda 2006; Alesina and Giuliano 2010), political participation (Alesina and Giuliano 2011), preferences for redistribution (Luttmer and Singhal 2011) and youth employment and mobility (Alesina and Giuliano 2010) – but it has not to our knowledge been used before in studying the religion–health relationship.

[5] There is, by now, a large literature showing that parents transmit social attitudes and values to their children – see, e.g., Bisin and Verdier (2011) and Fernández (2011). In fact, the former piece points out it that is the pervasive evidence of the resilience of not least religious traits across generations that began to motivate much of the research on vertical (i.e., intergenerational) transmission. For studies on how religion, in particular, is transmitted in (sometimes immigrant) families, see, e.g., Bisin and Verdier (2000), Bengtson et al. (2009), Güngör, Fleischmann, and Phalet (2011), Min, Silverstein, and Lendon (2012), Scourfield et al. (2012), Voas and Storm (2012), Bengtson, Putney, and Harris (2013), Jacob and Kalter (2013) and van de Pol and van Tubergen (2014).

means that we can rule out reverse causality, since the health of individuals in one country arguably cannot affect religiosity in another. This is especially the case since our main measure of ancestral religiosity is measured in 1970, some 35–40 years prior to our individual health indicator. We control for a range of other characteristics of the home country of the immigrant parents to try to make sure that the relationship is not driven by something other than religiosity, but we leave it to the reader to assess to what degree this credibly establishes causality.[6] In addition to controlling for various individual-level determinants of this outcome variable, we use fixed effects at the societal level. They account for all contextual factors that affect individuals' health, and they thereby enable us to avoid the problem of omitted contextual factors driving the results. Our findings indicate a robust negative estimate of ancestral religiosity for predicting individual self-assessed health. We do not claim that ancestral religiosity only influences the health of the children of immigrants through the children's religiosity: it might also work through other channels. The key thing is that our estimates capture all channels.

While we compare second-generation immigrants from less religious backgrounds to other second-generation immigrants from more religious backgrounds, it bears noting that this group of second-generation immigrants as a whole is similar, in terms of observable characteristics (including health), to the general population in the countries in which they were born. This makes us believe that our findings could be interpreted as applicable to the general population as well.

Our health measure is subjective, in that it builds on self-reported survey information: To the question "How is your health in general?", people replied by choosing one of five options (from "very bad" to "very good").[7] We believe this measure is suitable for studying health, for at least three reasons. First, it is comprehensive and covers all aspects of health, while objective measures tend to focus on some particular aspect (Benyamini 2011). Second, from an individual-well-being point of view, it is the individual's *perception* of her health situation that is most relevant. Third, while a subjective measure by definition expresses how healthy the individual feels, an objective measure risks being erroneous, if the individual does not remember the objective facts correctly. In any case, there are indications that subjective

[6] We wish to emphasize that we do not claim to establish causality. Ruling out reverse causality is a necessary but not sufficient condition for establishing causality, and while we attempt to control for a broad range of other possible determinants of health, as well as apply country-of-residence fixed effects, it can never be known for certain that all relevant determinants have been included.

[7] We use "self-assessed", "self-reported" and "subjective" health as synonyms.

and objective health *does* overlap to a substantial degree. For example, self-assessed health has been shown to stand in a negative relation to mortality (Shadbolt, Barresi, and Craft 2002; Benjamins et al. 2004; Jylhä 2009; McFadden et al. 2009; Bopp et al. 2012), inflammatory status (Christian et al. 2011), functional decline (Fleishman and Crystal 1998) and usage of health care (Pot et al. 2009), while it is positively related to functional ability in old age (Idler and Kasl 1995) and survival in HIV patients (Dzekedzeke, Siziya, and Fylkenes 2008). Still, there are some who argue that subjective health does not coincide with its objective counterpart to any large degree (Jürges 2007; Johnston, Propper, and Shields 2009), and an additional concern might be that cultural perceptions of health differ. However, as for the latter risk, we think it is mitigated by the fact that our units of comparison are second-generation immigrants born in the same countries (all of them in Europe). Moreover, we account for individuals' overall life satisfaction in several ways, which might capture cultural differences in attitudes to life, such as optimism, and this does not affect our results noticeably.

The rest of the paper contains our theoretical considerations, a presentation of the data and the empirical strategy, the results of the empirical analysis, including extensive robustness checks, and concluding remarks.

II. Theoretical Considerations

When considering how religiosity might affect health, we will structure our discussion around figure 1. This simple figure concisely describes our theoretical perspective by relating certain phenomena with causal links (indicated by arrows). Note that we recognize the great disparity among religious (and, for that matter, among non-religious) people; all reasoning here should be seen as concerning *an average* religious person (implicitly compared with *an average* non-religious person). The relevance of the theoretical approach is demonstrated through references to empirical studies.

[Figure 1 about here]

We start with individual beliefs and values, which can be more or less religious in character.[8] These in turn shape behavior, which then produces various outcomes in life; in our

[8] This way of viewing things relates to the economic study of culture. In fact, Roland (2015) defines culture as the values and beliefs people have (as well as the norms of behavior these entail).

case we focus on the effects on health. In addition, values and beliefs can have a direct impact on health, e.g., through psychological processes influenced by religion. Let us discuss the various stages of this model of a link from religiosity to self-assessed health in some more detail.

First, *values*. This refers to what is considered good and bad, or desirable and undesirable, and the weights attached to such assessments. It is reasonable to assume that the character and content of the set of values differ, on average, between a religious and a non-religious person. What is characteristic for a religious person is a commitment (of some sort) to a supernatural agent (of some sort), and this agent is thought to dictate or at least express opinions about how life should be lived (Perzycki and Sosis 2011). The will of the higher power is sometimes believed to exist in the form of written documents, sometimes to have been revealed in more personal ways and transmitted through tradition. The religious person will arguably try to follow, internalize, spread and enforce the "divine" value system, which is often rooted in older times, where the people who formulated these values had moral intuitions that were generally different from those that are typical of non-religious people today. In addition, to the extent that the values of the religious and non-religious differ, one can expect behavior to differ, since behavior is a function of, among other things, values that indicate to the individual what should and should not be done.

Value differences have been identified empirically (see not least Norris and Inglehart 2012, chs. 6, 7). To mention a few examples, religious people tend to hold different views of what sexual behavior that is acceptable compared to non-religious people – typically, the former are more restrictive. Closely related are views on marriage, where the religious generally strive towards monogamy and oppose same-sex marriage. There is furthermore a more negative view of gender equality among the religious. They also take a more negative position on the usage of various substances, such as alcohol and drugs. In the realm of bioethics, the religious are more prone to oppose abortion, surrogacy, IVF, euthanasia etc. Positions on probity, honesty and work ethics differ among the religious but also probably compared to the non-religious. Guiso, Sapienza, and Zingales (2003, 249) find that religious people are more intolerant of people of different background than themselves, compared to the non-religious; but also that being religious, especially Christian, is related to a positive view of the market economy. One can also imagine that the time perspective of the religious is different: the future is valued higher than the present compared to non-religious people, since there are aspects of "eternity" (often with ideas of ultimate perfection regarding health)

in most religious perspectives. This may lead to reduced attention to aspects of life that concern health here and now.[9]

Second, *beliefs*. Religiosity affects beliefs as well – by which is meant ideas about how the (natural and social) world works. Where values are normative, beliefs are non-normative and stem from experience and instruction from early childhood onwards from parents, peers, schools, religious teachers, media etc. If different ideas about how the world works are transmitted to religious children, and perhaps to adults as well, it is plausible that they will internalize those ideas and view the world, in certain respects, in a different way than non-religious people. This will, in turn, affect behavior. Let us highlight some indications of belief differences.

Social trust is a widespread expectation in society that people will behave well towards them, at least if they themselves behave well, which includes being honest and reliable – and it can thus be seen as a belief (about how others will behave). It affects behavior in that cooperative ventures come with lower transaction costs if there is trust; and without trust, one tends to view the world with more suspicion. Research indicates that religiosity is related to lower social trust (Berggren and Bjørnskov 2011).[10,11]

Beliefs regarding free will/fatalism could also differ between the religious and non-religious. To the extent that the religious believe that some deity or cosmic force has constituted the world in a certain way, they may feel that whatever happens to them is in accordance with the divine will and that it is not really possible to change fundamental parts of one's life (at least not without divine intervention). However, belief in a divine purpose may provide empowerment instead; and it does seem as if belief in free will is quite universal (Sarkissian et al. 2010).

Coherence may be greater among the religious, if it is perceived that there is a grand plan behind the universe and a sense of meaning. This would probably be conducive to

[9] As noted above, values are largely transmitted from parents to children: this has been shown for, e.g., female labor force participation (Fernández, Folgi, and Olivetti 2004), work ethic (Bogt, Raaijmakers, and van Wel 2005), attitudes towards euthanasia, homosexuality and ethnic minorities (Jaspers 2008), generosity (Wilhelm et al. 2008), trust (Dohmen et al. 2012; Ljunge 2014b) and risk attitudes (Dohmen et al. 2012). To the extent that the parents adhere to religiously influenced values, the probability is high that children will as well.

[10] One reason can be a distrust of the non-religious because they are thought not to have seen the "moral truth" or feel bound by divine instruction or fearful of divine sanctions (Gervais, Shariff, and Norenzayan 2011). But it can also be about distrust of people of other religions or of people in general, because all are regarded as basically "sinful".

[11] Ljunge (2014c) identifies a positive link from social trust to health.

harmony and an ability to handle difficult episodes in life, but the evidence seems mixed (Yakushku 2005; George, Ellison, and Larson 2009). There is some support for religious people experiencing meaning in life to a greater degree (Steger and Frazier 2005). In contrast, if a religious person goes through a tough time personally or observes suffering in the world, he or she may view the world as *less* coherent: "Why did my god allow this to happen?", with ensuing tensions and stressful concerns. More generally, similar sentiments could arise from pondering the problem of evil, pointing at an incompatibility between an almighty, all-good and all-powerful god and the existence of evil in the world.

One type of belief concerns *enforcement* of formal and informal institutions. Given certain values or rules that dictate how to behave, the degree to which they are followed will be a function of beliefs about enforcement. If the probability of being caught is low for some form of behavior, its prevalence, all else equal, can be expected to be higher. Since religious people tend to believe in a supernatural system of justice, often with an overseer (or many overseers) that are able to discern one's actions, they are less likely to violate codes of behavior to the extent that they are thought to be in alignment with the wish of the higher being(s) (Berggren 1997).

Lastly, it could be that beliefs are affected by *cognitive skills*. If there are systematic differences between religious and non-religious people with regard to, e.g., IQ, this could influence how receptive people are, in each group, to more advanced, not least science-based, knowledge. There are some indications that IQ is lower and analytic thinking is weaker among religious people (Lynn, Harvey, and Nyborg 2009; Gervais and Norenzayan 2012; Zuckerman, Silberman, and Hall 2013). If so, this may entail less reliance on evidence, e.g., with regard to how to live in order to achieve certain goals (such as health).[12]

Third, *behavior*. Behavior is shaped by a combination of values and beliefs. The values specify what goals to obtain in life; the beliefs clarify (subjectively) how those goals can be obtained. The values motivate action; the beliefs provide guidance on what to do. The ensuing behavior affects health in many cases – and, as mentioned, to the extent that religious people have different values and beliefs than others, it is arguably the case that their (health-relevant) behavior is different.

One area where behavior may differ between the religious and non-religious is *consumption of various addictive substances* – alcohol, drugs and cigarettes. Most studies

[12] There are also indications that cognitive skills are transmitted from parents to children (Coneus, Laucht, and Reuß 2012).

indicate a more limited intake by religious people (see, e.g., Wallace et al. 2007; Adamczyk and Palmer 2008; Chitwood, Weiss, and Leukefeld 2008; Yong et al. 2009; Feinstein et al. 2010; Ulmer et al. 2012; Fletcher and Kumar 2014).[13] In contrast, Horton et al. (2012) differentiate between three different types of relationship to God (secure, anxious and avoidant) and report that the two latter in fact are associated with higher levels of drinking and that anxious attachment to God is associated with marijuana use (for men only in each case). This suggests that some types of religiosity may be associated with higher substance use. In any case, it might be that moderate alcohol consumption generates better cardiovascular health and decreased mortality (Holahan et al. 2010; Ronksley et el. 2011). If so, to the extent that the religious do not drink any alcohol, this could adversely influence their health compared to moderate drinkers.

A second area of behavior concerns exercise and eating, with effects on *obesity*. There are indications that religious people in the United States are fatter (Feinstein et al. 2010); this is confirmed for African Americans using measures of church attendance and prayer (Dodor 2012). In Australia, being a member of a religious denomination was related to a higher BMI (Kortt and Dollery 2014).

When it comes to *sexual behavior*, there are indications to the effect that religious people have less premarital sex, later sexual debuts and fewer sex partners (Barkan 2006; Simons, Burt, and Peterson 2009; Landor et al. 2011). However, it seems as if porn consumption is higher in the most religious U.S. states (Edelman 2009) – it might serve as a substitute for "real" sex.

Another area where religion may affect behavior is *criminality* (which is arguably related to health both for the criminally active and for victims). The general picture is that religion exerts a somewhat deterrent effect on criminal behavior (Baier and Wright 2001), but a study that takes endogeneity problems seriously finds the effect to be negligible – rather, there is a negative effect of crime on religion (Heaton 2006).

Some religious people engage in *treatment of children* with possible health consequences. Among the most serious type is bodily mutilation (Cappa et al. 2013). Religious parents, especially Protestant Christians, seem more inclined to engage in corporal punishment (Grogan-Kaylor and Otis 2007), which tends to come with negative health effects

[13] However, Harden (2010) finds that it is not religiosity as such that explain why religious youths begin to drink alcohol later than others but living in an environment where teen drinking is frowned upon.

(Gershoff 2010). There may also be a relatively high risk of sexual abuse in certain religious contexts (Terry 2008), as well as opposition to vaccination (Jegede 2007).

Behavior for the religious can entail *social interaction*, both with the non-religious and with religious people with different values and beliefs. Such interaction can entail either support or conflict. Within a religious context, the religious often engage in social activities that can provide a feeling of safety and comfort and also actual help in times of need (Larson and Larson 2003; Lim and Putnam 2010; McFarland 2010). On the other hand, there is also a risk for conflict: internally, if a religious person finds him- or herself to not be able to accept some teachings; and externally, by there being resistance to religious ideas and practices among the non-religious, entailing, among other things, distrust (Uslaner 2002; Putnam and Campbell 2010, 459).

Another type of behavior that may be influenced by religiosity is *marriage patterns*. Most religions stress the importance of long-time commitments in the area of relationships, and since marriage seems related to substantial positive health outcomes (Wilson and Oswald 2005), there could be a link from religion to health through such a mechanism.

There could also be a link from religion to *income* through behavior pertaining to education and work. One would expect such effects to differ depending on the type of teaching – while some religious traditions stress the importance of higher education and hard work, others disparage it and see education as a threat and hard work as taking time away from family and the religious organization. Indeed, Bettendorf and Dijkgraaf (2010) identify a heterogeneous pattern between church membership and income: it was found to be positive in high-income but negative in low-income countries. If income tends to promote health (which we find indications of below), then this suggests that religion, working through the income channel, can stimulate health in certain contexts but worsen it in others. The net effect is theoretically unclear, depending on the background of the people studied.

In all, it appears as if several areas of behavior, as shaped by values and beliefs, differ between the religious and non-religious in a potentially health-affecting way. But as shown in figure 1, there could also be a direct effect from individual beliefs and values, entailed by religiosity, and health. When individuals experience social or inner conflict on religious grounds, they tend to experience distress and inner turmoil (Krause et al. 2000; Exline 2002; Ellison and Lee 2010). There are also indications that religious people with weak faith experience lower subjective well-being than both strong believers and non-believers, which could affect their mental health status (Mochon, Norton, and Ariely 2011). One might,

however, point out that reverse causality could be at work: Social people may be(come) more religious, and people with inner turmoil may also be(come) more religious.

Through the links identified in figure 1 and discussed above, we are able to make the case that religiosity influences health (via values, beliefs and behavior).[14] In summary, what speaks in favor of a positive and what speaks in favor of a negative relation?

As for *a positive relation*, certain values could be expected to contribute to this end, e.g., those that restrict risky sexual behavior, those that restrict consumption of cigarettes, larger quantities of alcohol and drugs and those that put a premium on a long-term perspective. Certain beliefs can also be expected to entail positive health effects in the end, e.g., viewing the world as coherent and as part of a grand plan and believing that there is divine enforcement of various rules. When it comes to behavior, the interaction of values and beliefs indicate that the religious in fact tend to engage less in risky behavior when it comes to sex and substance abuse, and that they are less prone to criminality. They also engage in social activities to a larger degree that tend to provide comfort and protection.

As for *a negative relation*, some values may lead to behavior that is bad for one's health, e.g., if the focus on "the eternal" leads to a reduced willingness to prioritize well-being "here and now" and if moderate drinking is considered immoral. When it comes to beliefs, the lower social trust of religious people can be an important reason for worse health; likewise, if there is a tendency to regard life in fatalist terms, this may decrease individual responsibility for taking care of one's body. Worse cognitive skills among the religious may also explain a reduced awareness of how to lead a healthy life. Lastly, among behaviors more typical of religious people, some seem related to worse health outcomes, such as insufficient exercise and dietary habits that induce obesity and abstaining from moderate drinking. Children may also experience worse health as a result of religiously induced harsh treatment. In addition, religiosity often comes with internal and external conflict that can induce stress, unhappiness and anxiety, with detrimental health effects.

[14] It bears noting that there are certain problems with virtually all of the studies cited above when it comes to using them to infer links with health. First, there is almost no serious attempt to rule out reverse causality. This is a serious problem in the literature. Second, almost all studies have been conducted using U.S. data, thus focusing on a very unusual country in the world, both when it comes to religion (where religiosity is greater than in other rich countries) and health care system. Third, there may be a risk using only self-assessed health: If the religious care about the image of their religion, they may answer incorrectly and downplay religion-related health problems. Still, these points do not invalidate the theoretical links that have been proposed.

Whether the dominant effect is positive or negative cannot, however, be determined on theoretical grounds; hence, we now turn to the empirical analysis.

III. Empirical Approach

Our empirical approach is based on the theoretical outline of figure 1, which explains why religion can be expected to affect health, but expands it in a way illustrated in figure 2. The new, non-shaded parts illustrate – on the basis of the theory of cultural transmission of Bisin and Verdier (2000, 2001, 2011) – how individual beliefs and values are formed. As shown, such formation derives both from horizontal transmission (from the culture of the society in which one grows up) and vertical transmission (from the beliefs and values of parents, which in turn are influenced by the culture of the society in which they grew up). In order to rule out reverse causality in the religiosity-health relationship, we make use of immigrant data and link – as illustrated by the dashed arrow – the degree to which the ancestral culture (the culture in which their parents' beliefs and values were formed) is religious to the health of their children, who have grown up in the new country. By controlling for a number of other potential influences, both individual and aggregate, we try to make sure that the identified relationship is not spurious.[15]

[Figure 2 about here]

To be more specific, the main type of analysis is ordinary least squares (OLS) regressions of the following form:

$$Health_{icat}=\beta_0+\beta_1 Fraction\_non\text{-}religious_a+\beta_2 X_i+\gamma_{ct}+\varepsilon_{icat} \quad (1)$$

$Health_{icat}$ captures the subjective health of individual i, born and residing in country c with a parent born in country a, and $a \neq c$, in period t. This regression is run on a sample of second

[15] While our main focus is on how the beliefs and values of the children affect their health, directly and through behavior, there is also the possibility that the parents' beliefs and values (influenced by their religiosity) affects the health of the children as well (as shown in figure 2). This could be a direct effect or an indirect effect (working, e.g., through the lifestyle of the parents, with biologically transmitted consequences). These effects should be seen as complementary to the main ones we discuss. Note that our empirical analysis does not allow us to differentiate between them, apart from a few mediating channels, such as the individual's marital status and income, that are included as control variables in some specifications.

generation immigrants. The fraction of non-religious in the ancestral home country a, $Fraction\_non\text{-}religious_a$, is common to all individuals with a parent born in this country. Since it is important to account for socio-economic status (e.g., Smith 2007), we include X_i, which captures individual demographic and economic controls that may affect self-assessed health. The country of residence-by-year fixed effects 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.[16] Estimates presented below are, as mentioned, from OLS regressions, but the results are robust to using an ordered Probit or Logit model.[17]

Reverse causality is not a concern in (1) since the health of a person born and residing in country c cannot affect the fraction non-religious in the parent's birth country a. Confounding factors are however 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 the ancestral share of non-religious is to compare the outcomes of second generation immigrants within each country of residence and year with the values in their countries of ancestry.[18] Since the country fixed effects are included for each year, they account for non-linear trends that may differ across countries. The method, labelled the "epidemiological approach", and the related literature, are discussed in more detail in Férnandez (2011).[19]

Model (1) corresponds to a "reduced-form" or intention-to-treat model of a two-stage model, where ancestral religiosity is used as an instrument for the individual's religiosity. Estimating the two-stage model does, however, require a stronger assumption, since all the influence of ancestral religiosity must work through the measure of individual religiosity. The

[16] We have also tried two-way clustering of the standard errors, clustering on the country of residence as well, and the standard errors do not change much when doing this.

[17] In line with what we find, whether one specifies measures like subjective health or happiness as cardinal or ordinal can be regarded as relatively unimportant, according to Ferrier-i-Carbonell and Frijters (2004) and Cuesta and Budría (2015). The advantage with using OLS is that estimated coefficients are easier to interpret.

[18] For example, the comparison is about comparing the self-assessed health of individuals born in France with less religious ancestry with the self-assessed health of those born in France with more religious ancestry.

[19] The method has been applied to a range of outcomes, including women's work and fertility (Férnandez and Fogli 2006, 2009).

main hypothesis is that ancestral religiosity works through the individual's religiosity, but it could also work in ways not captured by the individual religiosity question. For example, the health of the child could be directly affected by the religiosity of the parents, in the way they treat and behave in front of the child. The reduced-form model is less restrictive in how ancestral religiosity influences health; it allows for broader influences than through the individual's religiosity. The interpretation that non-religiosity promotes health holds in the reduced form; and notably, the two-stage model produces qualitatively similar results (available on request).

The main specification in the analysis, model (1), relates ancestral religiosity to the relative health of children of immigrants within the country of residence. Ancestral religiosity, $\text{Fraction\_non-religious}_a$, is meant to capture a persistent part of the individual's religiosity. The transmission channel from parent to child is labeled direct vertical transmission in Bisin and Verdier's (2001) model. Religiosity 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 religiosity. As children of immigrants are studied 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 persistent part of religiosity. We also present evidence that religiosity is transmitted across generations, as suggested by our theory. This is done by replacing health as the dependent variable in (1) with four different measures of the individual's religiosity (in separate regressions). The four measures are if the individual is a member of a religious denomination, the degree to which they are religious and the frequencies of religious attendance and prayer.

IV. Data

The main data set is the European Social Survey (ESS). Representative samples are drawn for each country and round. The survey includes information on the country of birth of each respondent as well as of both parents. From this it is possible to identify children of immigrants and which countries they originate from. Looking at 30 European countries of residence reduces the concern that the results are driven by conditions of one country. Individuals with ancestry from 144 countries across all continents are observed. The broad range of ancestries reduces the concern that the results are particular to a small number of ancestral backgrounds. The robustness of the results is examined both by excluding ancestral continents and by including ancestral continent fixed effects; reassuringly the results hold.

The summary statistics are presented in table 1. The children of immigrants are similar to the general population in the countries in which they were born on observables, including their self-reported health – a finding that is reinforced in Ljunge (2016). He finds that not only are the health levels similar for immigrants and natives – the socio-economic gradient of health is also similar across natives and immigrants. This provides, in our view, reason to regard our findings below as potentially generalizable and not only applicable to children of immigrants.

[Table 1 about here]

We use individual data from the second to the fifth rounds of the ESS (from 2004, 2006, 2008 and 2010).[20] The residence countries included are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom. Extensive documentation of the data is available at http://ess.nsd.uib.no/. The ancestral countries are listed in table A1 in the Appendix (along with their shares of non-religious people). Table A2 shows the rounds in which the residence countries participated in the ESS.

A. Self-Reported Health

Self-reported 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." "Very good" is coded with a 5 and each following category with a lower digit.

B. Ancestral Country Religion

The main source for ancestral country religious measures are Barro and McCleary (2003), which in turn are based on Barrett (1982) and Barrett, Kurian, and Johnson (2003). The data include population shares adhering to a wide range of denominations as well as shares of non-religious people (agnostics and atheists). In our baseline specification, we use the latter measure, interpreting (1-the non-religious share) as the share of religious people, since it may

[20]The second to fifth rounds of the ESS data are stacked for the analysis. The first round does not include information on parental birth country so we are unable to identify children of immigrants in that round.

be that people may not wish to call themselves religious even though they in some sense are. Data are available at three points in time: 1900, 1970 and 2000. The 1970 measures are our baseline as this year can be expected to most accurately reflect the religiosity when the parent(s) left the birth country.

The second source of information on ancestral country religiosity is the European Values Study (EVS) and the World Values Survey (WVS). First, four different measures of religiosity are used. The first is the fraction in each country that considers themselves a religious person. The second is the share that considers religion an important part of life. The third is the fraction that belongs to a denomination. The last measure is the frequency of attending religious service. Averages are computed across the five first waves of the combined EVS/WVS collected between 1981 and 2009. We consider these valuable complements to our main measure, the share of non-religious, as they all arguably capture slightly different aspects of the degree of religiosity. Second, five types of religious beliefs are captured by variables in EVS/WVS. Individuals are asked "Which, if any, of the following do you believe in?", and the questions then list "God", "life after death", "people have a soul", "hell", and "heaven". Individual answers are binary (yes or no).[21]

C. Individual Religious Variables

Individual religiosity is captured by four survey questions. First, individuals are asked: "Do you consider yourself as belonging to any particular religion or denomination?" Answers are "no", coded as 0, and "yes", coded as 1. The second question asks: "Regardless of whether you belong to a particular religion, how religious would you say you are?" The answer is given on a ten-point scale from "not at all religious", coded as 0, to "very religious", coded as 10. The third question concerns religious attendance: "Apart from special occasions such as weddings and funerals, about how often do you attend religious services nowadays?" Possible answers and their coding are as follows; "Every day" (7), "More than once a week" (6), "Once a week" (5), "At least once a month" (4), "Only on special holy days" (3), "Less often" (2), and "Never" (1). The final question is: "Apart from when you are at religious services, how often, if at all, do you pray?" The answers and their coding are as in the previous question on religious attendance.

[21] The analysis uses country averages over five EVS/WVS waves. The EVS/WVS variables are averaged across waves for two reasons: long time averages may be better measures of persistent levels of the beliefs, and using five waves greatly increases the number of countries available.

D. Individual Variables

Age, gender, marital status, education, income and employment status are recorded in the ESS. 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 a 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 income in the top three deciles (high income) of the resident country in the particular year, and one dummy is for the middle four deciles (middle income). Low income 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 is used for unemployed who look for work. Those employed is the omitted category.

Happiness is measured with the question "Taking all things together, how happy would you say you are?" Answers, coded from 0 to 10, range from "Extremely unhappy" to "Extremely happy". Life satisfaction is assessed with the question "All things considered, how satisfied are you with your life as a whole nowadays?" Answers range from "Extremely dissatisfied" to "Extremely satisfied" and are coded from 0 to 10.

E. Parental Characteristics

We have information on the education and labor supply of the individual's parents (labor supply refers to labor market status being market work, either employed or self-employed). Dummies are created for both the mother and father if the parent has an upper secondary or tertiary degree. Dummies are also created for the father or mother working when the survey respondent was 14 years old.[22]

F. Additional Ancestral Country Characteristics

The log of the ancestral country's gross domestic product (GDP) per capita is used to measure the effect of ancestry from a more developed nation. It may also be argued that ancestral health outcomes can be transmitted to second generation immigrants. To account for health outcome differences, life expectancy at birth is used. An additional measure that we use of the health status in the ancestral country is infant mortality (per 1,000 births). Also accounted for

[22] Data on the subjective health of the parents are not available.

is inequality through the Gini coefficient for income. The measures are taken from the World Development Indicators (WDI) provided by the World Bank.[23] 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). Communist regime in 1970 is measured by one variable from Barro and McCleary (2003).

The average health assessment in the parents' country of birth is computed in the integrated European Values Study and the World Values Survey (EVS/WVS). This allows for expanding the analysis of immigrants beyond those with ancestry in the countries covered by the ESS. The EVS/WVS health measure can be matched with immigrants from 91 nations across the globe. Extensive documentation is available at www.worldvaluessurvey.org.

The health assessment question has the following formulation in the EVS/WVS: "All in all, how would you describe your state of health these days? Would you say it is...". The answers are coded 1 for "Very poor", 2 "Poor", 3 "Fair", 4 "Good" and 5 "Very good." Averages are computed for all countries and across the first five waves (collected between 1981 and 2008) to capture persistent mean health assessments.[24]

Ancestral country social trust predicts health, as found in Ljunge (2014c). Trust is measured by the fraction of the population that express that "most people can be trusted". The averages of health assessments and trust are computed across the first five waves of the EVS/WVS conducted between 1981 and 2008.[25] To measure attitudes toward hierarchy, a component of some religions, we use the question if obedience is considered an important child quality. The variable is the average by country across the first five waves of the EVS/WVS. Data on average IQ in the ancestral country are from Lynn et al. (2009). [26]

G. U.S. Data

[23] We use the data set compiled by Samanni et al. (2010). Using Gini data from The Standardized World Income Inequality Database yields similar results as the WDI.

[24] As clarified in Section III, we treat subjective health as a cardinal variable, which enables us to calculate a national average.

[25] The ancestral country control variables are from the 2000s, due to much better data availability. When we later, in the empirical analysis, try using ancestral country GDP per capita measured as the average between years 1960 and 1980 instead, this yields similar results as when using the baseline, contemporaneous measure. Yet, with the historical measure we lose a dozen ancestries and thus prefer to use the contemporaneous one.

[26] The national IQ measure used is calculated from a variety of tests for each country, and it has been validated by Lynn and Meisenberg (2010) as a measure of cognitive ability by relating it to the educational attainment of school students in math, science and reading comprehension.

Data for the United States is from the General Social Survey (GSS), including the 22 waves from 1977 to 2014. Self-assessed health is measured on a scale with four options: "Poor", "Fair", "Good", and "Excellent", coded from 1 to 4. Ancestry is determined based on the variable "ethnic", asking "From what countries or part of the world did your ancestors come?" If more than one country is mentioned there is the follow-up question "Which one of these countries do you feel closer to?" The closest ancestry is what is used. The ancestral countries mostly include Europe but also China, India, Mexico and Canada are in the data. There are 27 ancestries in the analysis. The GSS sample is restricted to second- and higher-order immigrants, that is, individuals born in the United States who report foreign ancestry. The same measures of religiosity in the ancestral countries as in the European analysis are used. General happiness is measured in three steps: "Not too happy", "Pretty happy", and "Very happy", coded from 1 to 3.

V. Results

A. Baseline Results

The non-religious fraction in the mother's birth country positively and significantly predicts health among children of immigrants. Those with more secular ancestry have better health. The baseline results are presented in table 2.

[Table 2 about here]

The main independent variable is the fraction that is non-religious in 1970 in the mother's birth country. Only the most exogenous individual controls – age, its square and gender – are included in the first specification of table 2. The estimate on the non-religious fraction is positive and significant, indicating that those with a less religious background express that they have better health.

Accounting for a range of individual characteristics (education, income, marital and labor force status) yields similar results. The estimate of the non-religious fraction is positive and strongly significant, as seen in column 2 of table 2.[27] The third specification accounts, in

[27] The lower point estimate of the non-religious fraction in column 2 indicates that some of the full effect of religiosity estimated in column 1 works through individual characteristics such as marital status and income. Another issue with the added individual controls is that they could be endogenous to health and bias the non-religious estimate (similar concerns apply to local characteristics). Our preferred specification therefore only accounts for the exogenous individual characteristics (age, its square, and gender).

addition, for parental characteristics: education and the labor market status of the mother and father. The estimate on non-religious share in column 3 of table 2 is similar to the previous specification. Being young, married, highly educated, currently working and having high income correlate with good health.[28] A father with a tertiary degree also predicts better health.

The estimate of the non-religious share is virtually unchanged when accounting for nine occupational categories for the mother, in addition to parental education and labor supply. The controls account for maternal human capital and labor market status, and plausibly capture a large part of income variation among mothers. The robustness of the non-religious estimate to these additional controls indicate that the non-religious variation does not correlate with labor market related parental characteristics that could influence child health.

The baseline regressions are done using OLS, for ease of interpreting the coefficients. The results are similar when using the possibly more appropriate Ordered Logit estimator – see the estimated coefficients in column 4 of table 2. It illustrates that the estimation method does not drive the results.

The estimated effect is economically significant. A one standard deviation increase in the non-religious fraction corresponds to 60% of the upper secondary degree estimate (compared to less education). Education is one of the strongest predictors of health, and the estimated influence of religiosity is of a comparable magnitude. Another comparison can be made with the health premium of marriage, where one a one standard deviation increase in the non-religious fraction is akin to a little less than 50% of this premium.

When studying the fraction non-religious in the father's birth country, among children of immigrant fathers, the estimate is positive, as for the mother's side. The estimate is not significant at conventional levels once the more extensive list of individual controls is included. This indicates a stronger link between religiosity and health on the mother's side compared to the father's. The analysis presented here focuses on the strong link found on the mother's side.[29]

[28] One might be concerned that if older people are more religious and more sick, we could pick up an effect of old age. However, we control for age and its square, so this is unlikely. When including a full set of age fixed effects, the estimate on the ancestral non-religious share is very similar (0.171 vs. 0.185 in the baseline specification).

[29] Intergenerational transmission has been found to be stronger on the mother's side in previous studies, e.g., of social trust (Dohmen et al. 2012; Ljunge 2014b). We can only speculate why: maybe the bond is stronger between mother and child due to closer physical and social interaction.

We have investigated whether the point estimates differ for "young" and "old" second-generation immigrants – since the latter will have lived longer and are further from the parental influences during their formative years, this could result in a weaker effect of ancestral religiosity. Studying those above the mean age (43 years), by interacting the non-religious share with an indicator of age greater than 43, reveals no significant difference in the predictive power of religiosity among the older compared to the younger ($p=0.15$). Point estimates for the younger are higher than for the older, but the difference is not significant at conventional levels. However, interacting the non-religious share with a linear age variable produces a significant negative estimate on the interaction term. This supports the idea that the influence of the intergenerationally transmitted part of religiosity fades somewhat as individuals spend more time in a society with horizontal transmission and are further away from the vertical transmission from the parents. See table A3 in the Appendix for details.

One can imagine the effect of ancestral religion on individual health to be different depending on whether one parent or both parents are immigrants in the new country. For example, it may affect the degree of integration of children. In our sample, all individuals have an immigrant mother. Slightly more than half (55%) also have an immigrant father, while the rest have a native father. Interacting the non-religious fraction with an indicator for if both parents are immigrants do not indicate any significantly different estimates, however, compared to those with a native father and an immigrant mother. Hence, we do not consider this aspect of family background an important factor in this analysis.

B. Migrant Selection

As our subjects of study are children of migrants there may be concerns that their parents, the migrants, are selected on health and that this health is transmitted across generations without any relationship to religiosity. Such selection could introduce a spurious relationship between health and religiosity if the trait selected on is transmitted across generations. One approach to account for potential selection is to account for parental characteristics as was done in column 3 of table 2. Other approaches are to account for additional ancestral country characteristics, as is done in tables 5 through 7, or exclude parts of the sample which one might suspect more prone to selection, as is done in tables 8 and 9.

A more direct approach is to study the health of migrants compared to non-migrants from the same country and relate it to the non-religious fraction in that country. Using data on first-generation migrants in the 30 European countries in the ESS we compute the difference in health between first-generation migrants in Europe and non-migrants in the birth country of

the first-generation migrants, and we then average by birth country (where non-migrant health is measured in the EVS/WVS). A positive difference indicates that migrants have better health than non-migrants, on average. The concern is if the health difference is increasing with the non-religious fraction in the birth country, that is, if healthier people migrate from more secular countries. A flat relationship would not affect our estimates as the estimate is identified from differences between countries rather than levels. A negative relationship would indicate a bias toward zero.

Figure 3 plots the health difference between migrants and non-migrants against the non-religious share in 1970 in the birth country (for birth countries with at least 10 migrants in the ESS data). The relationship is flat; there is no significant relationship between the health difference and the non-religious share. The plot does not give reason for concern that there is a differential selection of migrants by the country's non-religious share.[30]

[Figure 3 about here]

C. Documenting the Intergenerational Transmission of Religiosity

Our hypothesized argument is that religiosity is transmitted across generations from the immigrant mother to the child, which in turn affects health. Given that ancestral religiosity is transmitted to the child, one can use ancestral religiosity as a measure of the persistent component of individual religiosity. Table 3 presents evidence that religiosity is indeed transmitted across generations. The non-religious share in 1970 in the ancestral country significantly predicts less religiosity among the children of immigrants. Four different measures of religiosity are considered in table 3: belonging to a religious denomination, degree of religiosity and frequency of attending religious service and frequency of prayer.

[Table 3 about here]

The results may be taken to support the casual chain we have hypothesized. Ancestral country religion predicts individual religiosity, which in turn influences health (although this need not be the only channel). Table 3 also shows that ancestral country religiosity is a

[30] Moreover, Ljunge (2016) finds no evidence of migrant selection on health in Europe, which provides additional evidence against migrant selection being important for the analysis.

measure of individual religiosity. Ancestral religiosity captures the part that is transmitted across generations.

D. Self-Reporting Health Based on Happiness or Life Satisfaction

The outcome variable we use is self-assessed health, and one potential problem is that people might report their health status based on how they experience life in general, making self-assessed health a measure of happiness or life satisfaction rather than an indicator of actual health. To check whether this is the case, we have controlled for the happiness and life satisfaction, respectively, of the individuals in our sample, as well as used happiness and life satisfaction as outcome variables. We report our findings in table 4. The previous results are robust to controlling for individual happiness. The point estimate of the share of non-religious in the ancestral country is very similar to the baseline (0.16 vs. 0.18). Results are similar when accounting for individual life satisfaction separately and jointly with happiness, as seen in columns 2 and 3 of table 4.

[Table 4 about here]

Happiness and life satisfaction are, unsurprisingly, strongly correlated with subjective health, but they are not significantly predicted by ancestral non-religiosity; see columns 4 and 5 of table 4. These results indicate that the baseline results are not due to religiosity changing the individual's mental state in a manner unrelated to health. Neither does accounting for optimism, which is one way of interpreting happiness and life satisfaction (as a cultural trait), affect the estimate of the non-religious fraction. Nor does the non-religious fraction significantly predict optimism.

E. Controlling for Additional Ancestral Influences

Ancestral countries vary in other dimensions than the non-religious share in 1970. If these factors correlate with the non-religious fraction and are transmitted across generations, the result could be driven by some other factor(s). There is no way to account for all factors, but by accounting for a range of plausible alternatives one may assess the robustness of our main findings. We report new results in three tables: adding variables capturing economic development and ancestral-country health in table 5; adding economic development, formal institutions and inequality in table 6; and adding variables capturing culture and cognitive ability in table 7. These regressions include the controls from column 1 of table 2, that is, the

most exogenous individual controls (age, its square and gender) as well as the country-by-year fixed effects. As the focus below is on additional ancestral health influences, the potentially endogenous individual controls are excluded in order not to bias the ancestral country estimates. Ancestral estimates hence capture all channels through which the factors may influence health, for example that some of the effect may work through marital status.

[Table 5 about here]

Let us begin with reporting our findings when controlling for economic development and ancestral health. One concern could be that countries that are more secular are also more developed. Barro and McCleary (2003) find such a correlation across countries. We account for the level of development with the (logarithm) of GDP per capita.[31] Table 5 presents the results, where it is seen that ancestral-country GDP does not significantly predict health in any of the specifications. The non-religious fraction meanwhile remains positive and significant.

Another concern may be that ancestral country health, either subjective or objective health outcomes, are transmitted across generations and explain the result. The level of development is kept in the specifications to capture general development. The second column of table 5 adds to the model the average self-assessed health in the ancestral country. Ancestral subjective health does predict the health of the immigrant child, but importantly, it does not rival the influence of the non-religious share. On the contrary, the estimate on the non-religious fraction is higher when also accounting for ancestral subjective health and development.[32] The third and fourth columns of table 5 account for objective health outcomes: life expectancy and child mortality, respectively. Neither of these variables are significant predictors of health when included individually, while the non-religious share remains similar to estimates without these controls. The last column displays the cumulative model, indicating the robustness of the non-religious share, while self-assessed health in the ancestral country is positively related to the self-assessed health of the second-generation

[31] GDP per capita is measured currently (year 2010). Since the rank of countries is quite stable over time, current GDP measures also capture past differences. The advantage of a current measure is that data are available for more countries.

[32] If subjective health is heavily influenced by cultural factors that differ among ancestral countries, controlling for ancestral country subjective health can be seen as a "cultural control"; and reassuringly, the subjective health of the second-generation immigrants is related to the non-religious fraction also when this control is included.

immigrants we study, and where infant mortality is negatively related to it (but with a small effect size). These results indicate that the non-religious fraction does not proxy for the level of development or health in the ancestral country. It strengthens the interpretation that religiosity affects health.

[Table 6 about here]

We next take into account that religiosity may correlate with formal institutions and inequality in the ancestral country – see the results in table 6. GDP correlates with well-functioning institutions, so we include it in all specifications and again find that it does not relate to health in a significant way. Political institutions are captured by whether the regime was communist and by the level of democracy in the polity2 index (higher values represent more democratic systems). The first variable is included because it is well known that non-religiosity was (made) high in communist regimes, and we want to see if the non-religiosity variable retains its relationship to health when controlling for communism. It turns out that it does; and communism itself does is not associated with health in a significant way. Adding the democracy measure yields similar results: democratic background neither predicts health nor affects the non-religiosity-health relationship very much. Another measure of institutions is the rule of law. Better rule of law predicts better health, when also accounting for development. Yet, it does not rival or dampen the influence of religiosity – if anything, the point estimate increases when including it. Lastly, Wilkinson and Pickett (2009) argued that income inequality leads to worse health, although this claim has been challenged; see for example Bergh, Nilsson, and Waldenström (2016). When including the Gini coefficient for income the estimate is negative and significant. It provides new evidence that ancestral inequality may predict worse health across locations, but importantly, non-religiosity still retains its influence. In the last two columns of table 6, we present cumulative models (with and without ancestral continent fixed effects). There, only non-religiosity and the rule of law are significantly associated with health.

[Table 7 about here]

In table 7, we include some indicators of culture and cognitive ability. We first control for social trust, one of the most influential cultural factors when it comes to a wide range of social and economic outcomes. For example, Berggren and Bjørnskov (2011) find a negative

relationship between religiosity and trust, and Ljunge (2014c) finds that generalized trust predicts health. In line with that finding, including ancestral country trust adds predictive power to the model: both trust and the non-religious fraction predict health. We then examine IQ, as Lynn et al. (2009) and Zuckerman et al. (2013) find a negative relation between religiosity and IQ. This raises the possibility that it is intelligence rather than religiosity that is associated with health. However, to begin with, we already control for GDP per capita in the mother's home country, which is related to IQ (Jones 2015), and the fraction of non-religious in the mother's home country still retains its influence, suggesting that there is an effect of religiosity over and above cognitive ability. The same reasoning applies when controlling for individual-level measures of education and income. When testing this thesis directly, by including national IQ scores from the mother's home country in our regressions, we find no support for a link between IQ in the mother's home country and individual health. As can be seen in table 7, the share of non-religious retains its statistical significance while IQ is insignificant. We also add a cultural indicator of authoritarianism, in the form of whether people think that children should be brought up to be obedient. This might relate to authoritarian streaks in certain religions. The estimate shows, however, that this variable is not related to health in a significant way, nor does it undermine the influence of non-religiosity on health. The last two columns show cumulative models (with and without ancestral continent fixed effects), and they reveal that only the share of non-religious and trust in the ancestral country are the significant predictors of health here.

F. Excluding the Most and Least Religious Ancestral Countries, Accounting for Integration and Excluding Ancestral Continents

There may be certain issues with studying second-generation immigrants whose parents come from very religious countries. One such issue could stem from persecution of religious minorities in such countries. Maybe the parents migrated because they had *different* religious beliefs and practices. Our usage, then, of aggregate measures of religiosity as indicative of the religiosity of the parents and, by inference, their children (the second-generation immigrants we study) may be mismeasured. Even though we do not know why parents migrated, we think there are four reasons for not regarding this potential problem as a reason for concern in our case. First, this would constitute a mismeasurement that would bias the estimated coefficient of the fraction of non-religious in the ancestral country towards zero. Still, we get significant estimates that are substantive. Second, we measure religiosity, not specific religious beliefs, which means that even though parents may have disagreed with dominant beliefs, they may

still be as religious, in terms of the strength of beliefs and in terms of religious practice, as the others of their home country. Third, in table 3 we show that ancestral non-religiosity *de facto* does predict individual religiosity among second-generation immigrants. Fourth, we have undertaken an exercise in which we exclude groups of ancestral countries based on how religious they are. As reported in table 8, the results stand when we exclude extremely religious countries (with a share of non-religious below 2%) and quite religious countries (with a share of non-religious below 5%). Maybe one can also argue that very non-religious ancestral countries are atypical and that these may affect the results. We therefore also test excluding quite non-religious countries (with a share of non-religious above 50%). The religiosity variable is still significant. When excluding both quite religious and quite non-religious countries, in the last column, the same conclusions turn out to apply.[33]

[Table 8 about here]

This exercise with sample cutoffs also addresses concerns that people do not reply honestly to surveys about religiosity in very religious countries: out of fear they could state that they are very religious although they may not be. Since our results hold when excluding the most religious countries, we consider it likely that the results are not driven by people replying dishonestly in extremely religious places. Even when using the full sample, this concern should not be a great problem, since it would imply that our estimates, if anything, are biased toward zero.[34] Moreover, since we use several different measures of religiosity, some of which are less subjective, and get similar results, this provides further reassurance.

[33] Although point estimates in some specifications are higher, so are the associated standard errors, making it hard to distinguish any significant differences across specifications.

[34] This logic applies also in relevant cases when the measurement error is not classical. Consider the case where migrants from very religious societies are not religious. Under our hypothesis, the children of these individuals would have better health than the children of the very religious compatriots who we as observers think they are. We hence observe what we think are very religious individuals who have relatively good health. This would push the relationship between religion and health toward being positive, hence against our finding of a robust negative relationship. Similar effects apply if migrants from less religious places, such as (former) communist countries, are more religious than the (measured) country average. Under our hypothesis, their children may have worse health than the children of the average individual of their ancestry. This would also work against us finding a negative relationship. As discussed, we find no strong indication that these issues have a significant impact on our analysis.

A related problem could stem from children from very religious backgrounds being atypical in the countries in which they are born, which in itself could affect their health (instead of religiosity doing so). In other words, it might be the lack of integration of children whose parents come from very religious countries that explain our findings. The sample cutoff test alleviates worries about this to some extent; but we have also included an indicator of non-integration – if a second language is spoken at home –in our baseline regressions (cf. Bleakley and Chin 2004). Reassuringly, this does not change the results in any qualitative sense. The second-language indicator is, in addition, itself insignificant – see table A4 in the Appendix for details.

[Table 9 about here]

Lastly, it could be that the results vary depending on geographical background. To see whether that is the case, we exclude ancestral continents in a systematic way in table 9, in order to see if the baseline findings (of table 2) change. They do not, qualitatively: when excluding ancestry from Africa, Asia, the Americas and Europe, one at a time, the non-religious fraction is still positively related to health; the same holds when only European ancestry is considered. The point estimate is a bit higher when European ancestry is excluded, but standard errors also double so there does not appear to be any significant differences in the non-religious estimate across specifications when ancestral continents are excluded. In addition, we include ancestral continent fixed effects in tables 6 and 7 and find that they do not affect the results much. These results are reassuring as they illustrate that the findings are not due to characteristics in one particular ancestral continent. Moreover, the results also hold using variation within ancestral continents.

G. Alternative Religiosity Measures

The religiosity measures we have focused on thus far, not least our main variable of interest, the non-religious fraction, have been used by Barro and McCleary (2003). Survey measures of religiosity from the ancestral country provide a complementary picture and robustness check on our results. We have looked at two sets of other indicators of religiosity. Table 10 includes five variables capturing religious beliefs in the ancestral country: the share of people who believe in God, in life after death, that people have a soul, that there is a heaven and that there is a hell. All these are related to health in a negative and significant way when included one at a time; however, the cumulative model shows that belief in God is the strongest

predictor among the five dimensions. This lends credibility to our general approach to relate religiosity or non-religiosity as such, rather than more specific instances of religious belief, to health.

[Table 10 about here]

Table 11 presents results with four other religiosity measures that can be seen as alternatives to our main measure (the non-religious fraction): the population share that consider themselves religious, the importance of religion in life (from little to very important), the population share that is member of a religious denomination and the frequency of religious attendance (from never to every day). All four of these measures, when replacing the non-religious fraction, one at a time, have negative and significant estimates. This is, again, consistent with our previous results that less religious ancestry predicts better health.

[Table 11 about here]

Hence, we think there are good grounds for not regarding our findings as specific to a specific measure of religiosity: The results hold up with other measures as well.

H. Estimates for Different Religions

The focus thus far has been on a summary measure of religiosity, the non-religious fraction (or similar indicators). Do the estimated effects differ by religious denomination? The fraction of adherents to a broad range of denominations in 1970 is examined in table 12, replacing the previous summary measure. The first column presents the baseline heterogeneity results, the second column adds the ancestral country's development level (GDP per capita), and the third column adds the health measure infant mortality to account for both economic and social development.

[Table 12 about here]

The significant negative estimates across specifications in table 12 refer to the shares of Catholics, Orthodox, Muslims and Hindus. We can reject that all the estimates on the

denominations are the same, so there is evidence of heterogeneity.[35] Point estimates are highest in magnitude for Muslims and Orthodox.

I. Evidence from the United States

The empirical analysis has so far been conducted using our European sample. As mentioned in Section III, our data cover 30 European countries in which second-generation immigrants were born and reside and 144 ancestral countries. We have also extended our analysis to the United States, using data from the General Social Survey (GSS), which is different in certain respects from our European data, but we have been able to construct a dataset that covers second- or higher-generation immigrants in the United States from 27 ancestral countries.

[Table 13 about here]

We find that our basic result, that a more religious background predicts worse self-assessed health, holds also in the US setting with much less variation in ancestral backgrounds (compared to the analysis in Europe), as seen in table 13. We consider this as an important validation of our findings, since the United States is an unusually religious country compared to most of Europe. The results indicate that the average religiosity of the country does not change the predictive power of religiosity over health. The results also hold when accounting for happiness as another measure of the individual's subjective state.[36]

VI. Concluding Remarks

Buddha said (in translation): "Without health life is not life; it is only a state of languor and suffering – an image of death." It expresses a common attitude throughout the world: Health is valued very highly, by individuals, by governments and by international organizations, as it is thought to contribute to better, happier lives and, perhaps less importantly, stronger

[35] The difference in estimates is mainly because the point estimate of Jewish is positive while it is large and negative for Muslims. The estimate of Catholics is not significantly different from Protestants, Buddhist, or other denominations with negative point estimates. We therefore do not draw strong conclusions from the findings for the different religions.

[36] Adding a wider set of individual controls, in particular education, tends to weaken the predictive power of ancestral religiosity. Education has a very strong predictive power over health in the United States, more so than in Europe, and one interpretation is that the influence of ancestral religiosity in the United States to a larger extent works through education.

economies and welfare systems. As a consequence of this attitude, it becomes important to clarify what the key determinants of health are. It has been proposed, in a large number of studies, that *religion* is one such determinant of health – and most of them indicate that the relationship is positive. This may make people in general and policymakers in particular more keen on stimulating the scope and scale of religion in their lives and in society; it has, in fact, led to some physicians advocating religious activities for their patients (Sloan et al. 2000).

However, in contrast to most of the previous literature, we document a *negative* relationship between religious background and health, and we do so by employing a relatively novel method for ruling out reverse causality. In our view, the previous literature is largely characterized by insufficient attention to problems of endogeneity, and the frequent claim of a causal positive effect does not appear to be substantiated.

We make use of data on second-generation immigrants in 30 European countries. The method consists of two steps. The first links the religiosity of these children of immigrants to the average religiosity in the mothers' home countries. The premise is that religiosity is transmitted vertically in the family, something which we also document empirically. Using "ancestral" religiosity addresses the risk of reverse causality in our findings, since the health of children of immigrants cannot affect the average religiosity in the mothers' home countries. The second step relates ancestral religiosity to the self-assessed health of the second-generation immigrants, controlling for various individual-level determinants and using fixed effects at the societal level (that encompass contextual factors that affect individuals' health). As mentioned, we find that more religious ancestry predicts worse self-assessed health, and we also find it to be robust to a wide range of individual and ancestral country control variables that may influence health. Moreover, the predictive power is robust to specifying separate religions instead of religiosity and to using alternative measures of religiosity; moreover, it holds for the United States in addition to the European countries in our main sample.

Our model allows ancestral religiosity to influence health through a range of channels, not only through individual religiosity. The negative result can, we suggest, be explained by relating religiosity to health through certain values, beliefs and behavior of the religious. Based on previous studies, the negative effect of religiosity on health could result from religious people being less concerned with life on earth (taking less care about their bodies), being more "fatalistic" (accepting even bad developments, feeling that they are part of the divine plan), having lower trust, having lower incomes or being more mentally strained by internal or external conflicts. The influence of ancestral religiosity may also manifest itself in

individual characteristics such as marital status and income, which account for part of the total relationship.

To conclude, the important insight from our research is that it is essential to use empirical methods that bring the literature forward in terms of identification. We not only show that religiosity and self-assessed health are negatively related but also that this is not because people who perceive themselves to be sick turn to religion. In line with Sloan et al. (2000), doctors and policymakers should, our findings suggest, be especially careful when deciding whether to proscribe religious activities as a way to improve people's health.

Appendix. Additional Tables

[Table A1]

[Table A2]

[Table A3]

[Table A4]

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Tables

Table 1. Summary statistics.

Variable	Mean	Std. Dev.
Individual variables:		
Health	3.84	0.94
Age	43.0	17.9
Female	0.540	0.498
Married	0.477	0.500
Never married	0.341	0.474
Upper secondary degree	0.504	0.500
College/university degree	0.271	0.445
Out of labor force	0.440	0.496
Unemployed	0.049	0.215
Low income	0.216	0.412
Middle income	0.301	0.459
Belong to religious denomination	3.24	1.87
Religious degree	4.76	3.10
Frequency of attending religious service	2.56	1.57
Frequency of prayer	3.35	2.42
Happiness	7.18	2.08
Life satisfaction	6.77	2.41
Second language spoken at home	0.55	0.50
Both parents immigrants	0.55	0.50
Mother's birth country variables:		
Non-religious fraction year 1970	0.147	0.184
Believe in: God	0.831	0.155
Believe in: Life after death	0.600	0.230
Believe in: People have a soul	0.742	0.158
Believe in: Hell	0.498	0.274
Believe in: Heaven	0.582	0.255
Share religious	0.719	0.152
Importance of religion	2.87	0.60
Share belonging to denomination	0.783	0.194
Religious service attendance	4.09	1.20
IQ	94.1	7.29
US data:		
Health	3.07	0.82
Age	47.0	17.8
Female	0.551	0.497
Happiness	2.23	0.618
Non-religious fraction year 1970 (ancestral)	0.075	0.093

Notes: Individual data from the European Social Survey, rounds 2 through 5. The sample is children of immigrants with an immigrant mother. Data for the mother's birth country variables are from Barro and McCleary (2003) and the combined European and World Values Survey. US data from the GSS, rounds from 1977 to 2014.

Table 2. Health and religiousness. Baseline results.

Dependent variable: Self-assessed health status				
Estimator:	OLS	OLS	OLS	Ordered Logit
	(1)	(2)	(3)	(4)
Non-religious fraction year 1970,	**0.253**	**0.180**	**0.157**	**0.408**
mother's country of birth	(0.070)***	(0.065)***	(0.060)***	(0.157)***
Age	-0.010	-0.034	-0.032	-0.079
	(0.003)***	(0.004)***	(0.004)***	(0.009)***
Age squared/100	-0.012	0.014	0.013	0.032
	(0.004)***	(0.004)***	(0.004)***	(0.010)***
Female	-0.102	-0.077	-0.078	-0.183
	(0.021)***	(0.020)***	(0.021)***	(0.053)***
Married		0.076	0.077	0.143
		(0.027)***	(0.027)***	(0.062)**
Never married		-0.027	-0.030	-0.076
		(0.038)	(0.038)	(0.087)
Upper secondary		0.058	0.049	0.124
		(0.022)***	(0.022)**	(0.055)**
College or university		0.205	0.176	0.416
		(0.026)***	(0.027)***	(0.062)***
Outside the labor force		-0.183	-0.182	-0.386
		(0.024)***	(0.024)***	(0.056)***
Unemployed		-0.152	-0.142	-0.353
		(0.048)***	(0.048)***	(0.115)***
Low income		-0.179	-0.175	-0.409
		(0.032)***	(0.032)***	(0.080)***
Middle income		-0.029	-0.027	-0.090
		(0.026)	(0.026)	(0.072)
Upper secondary education,			0.043	0.126
mother			(0.034)	(0.080)
Tertiary education, mother			0.053	0.119
			(0.037)	(0.095)
Upper secondary education,			0.043	0.091
father			(0.027)	(0.067)
Tertiary education, father			0.070	0.180
			(0.034)**	(0.089)**
Working mother (at age 14)			0.033	0.075
			(0.022)	(0.051)
Working father (at age 14)			0.015	0.024
			(0.030)	(0.067)
Country−by−year fixed effects	Yes	Yes	Yes	Yes
R−squared	0.268	0.293	0.295	
Observations	7545	7545	7545	7545

Notes: The dependent variable is self-assessed Health, which ranges from 1, 'very bad' to 5 'very good.' The sample is children of immigrants with an immigrant mother. Religiousness is measured as the share of the population that considers to be non-religious (agnostic or atheist) in 1970 in the mother's birth country. Individual data is from the second to fifth waves of the European Social Survey. Standard errors are 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. Intergenerational transmission of religiosity.

Dependent variable:	Belong to a religious denomination? (1=Yes, 0=No)	Degree of religiousness (0=not at all 10=very religious)	Attend religious service, how often? (1=never, 7=every day)	Pray, how often? (1=never, 7=every day)
	(1)	(2)	(3)	(4)
Non-religious fraction year 1970, mother's country of birth	**-0.165**	**-2.406**	**-0.970**	**-1.462**
	(0.073)**	(0.604)***	(0.325)***	(0.461)***
Individual controls	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes
R-squared	0.240	0.112	0.106	0.159
Observations	7500	7475	7519	7449

Notes: The dependent variable is as indicated in the column head. All specifications study second generation immigrants and estimates the effect of religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population that considers themselves a religious person in the mother's birth country. Individual controls include age, age squared, gender, education, labor force attachment, marital status, and income. 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. Health, happiness, and religiosity.

Dependent variable:	Self-assessed health status	Self-assessed health status	Self-assessed health status	Happiness	Life satisfaction
	(1)	(2)	(3)	(4)	(5)
Non-religious fraction year 1970, mother's country of birth	0.157	0.148	0.146	0.183	0.313
	(0.062)**	(0.067)**	(0.067)**	(0.217)	(0.312)
Happiness	0.107		0.063		
	(0.007)***		(0.007)***		
Life satisfaction		0.097	0.061		
		(0.006)***	(0.006)***		
Individual controls	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.338	0.341	0.349	0.177	0.228
Observations	7492	7502	7453	7508	7519

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 religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population considered to be non-religious (agnostic or atheist) in 1970 in the mother's birth country. Individual controls include age, age squared, and gender. 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 health influences.

Dependent variable: Self-assessed health status Alternative specification:	Level of development	Health assessments	Life expectancy	Infant mortality	Cumulative model
	(1)	(2)	(3)	(4)	(5)
Non-religious fraction year 1970,	**0.257**	**0.383**	**0.265**	**0.241**	**0.259**
mother's country of birth	(0.072)***	(0.108)***	(0.079)***	(0.064)***	(0.099)**
log of GDP per capita,	0.013	0.012	0.006	0.000	-0.038
mother's country of birth	(0.013)	(0.016)	(0.020)	(0.023)	(0.034)
Average self-reported health,		0.145			0.227
mother's country of birth		(0.055)**			(0.069)***
Life expectancy at birth,			0.001		-0.011
mother's country of birth			(0.003)		(0.007)
Infant mortality (per 1000 live births)				-0.001	-0.006
mother's country of birth				(0.001)	(0.003)*
Individual controls (exogenous)	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.270	0.276	0.270	0.270	0.277
Observations	7465	6765	7465	7465	6765

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 religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population that considers to be non-religious (agnostic or atheist) in 1970 in the mother's birth country. Individual controls include age, age squared, and gender. 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 formal institutions, inequality, religion, and health.

Dependent variable: Self-assessed health status Alternative specification:	Communism	Democracy	Rule of law	Gini	Cumulative model	Cumulative model
	(1)	(2)	(3)	(4)	(5)	(6)
Non-religious fraction year 1970,	**0.224**	**0.234**	**0.373**	**0.204**	**0.311**	**0.358**
mother's country of birth	(0.075)***	(0.074)***	(0.087)***	(0.065)***	(0.099)***	(0.097)***
log of GDP per capita,	0.014	0.010	-0.043	0.002	-0.038	0.004
mother's country of birth	(0.013)	(0.017)	(0.022)*	(0.015)	(0.023)	(0.031)
Communist regime (in 1970),	0.019				0.009	0.047
mother's country of birth	(0.031)				(0.036)	(0.038)
Democracy (polity2),		0.001			-0.002	0.000
mother's country of birth		(0.003)			(0.003)	(0.004)
Rule of law,			0.072		0.068	0.072
mother's country of birth			(0.023)***		(0.028)**	(0.028)**
Gini coefficient,				-0.005	-0.002	-0.003
mother's country of birth				(0.002)**	(0.002)	(0.003)
Individual controls (exogenous)	Yes	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ancestral continent fixed effects						Yes
R-squared	0.270	0.270	0.271	0.272	0.272	0.272
Observations	7465	7248	7465	7284	7099	7099

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 religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population that considers to be non-religious (agnostic or atheist) in 1970 in the mother's birth country. Individual controls include age, age squared, and gender. Country of residence-by-year fixed effects are included in all specifications. Ancestral continent fixed effects are dummies for the mother's birth continent being Africa, Asia, Europe, North America, or South/Latin America. 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 7. Cultural and cognitive factors.

Dependent variable: Self-assessed health status					
Alternative specification:	Trust	IQ	Obedience	Cumulative model	Cumulative model
	(1)	(2)	(3)	(4)	(5)
Non-religious fraction year 1970,	**0.224**	**0.156**	**0.234**	**0.196**	**0.192**
mother's country of birth	(0.069)***	(0.055)***	(0.071)***	(0.061)***	(0.059)***
Trust,	0.395			0.299	0.326
mother's country of birth	(0.142)***			(0.152)*	(0.170)*
IQ,		0.001		-0.001	-0.002
mother's country of birth		(0.002)		(0.003)	(0.005)
Obedience important child quality,			-0.023	-0.003	0.003
mother's country of birth			(0.123)	(0.136)	(0.140)
Individual controls (exogenous)	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes
Ancestral continent fixed effects					Yes
R-squared	0.278	0.279	0.275	0.285	0.285
Observations	7223	7118	7533	6600	6600

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 religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population that considers to be non religious (agnostic or atheist) in 1970 in the mother's birth country. Individual controls include age, age squared, and gender. Country of residence-by-year fixed effects are included in all specifications. Ancestral continent fixed effects are dummies for the mother's birth continent being Africa, Asia, Europe, North America, or South/Latin America. 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 8. Restricting the sample based on the ancestral non-religious fraction.

Dependent variable: Self-assessed health status					
Restriction on non-religous fraction in the mother's country of birth	>0	>0.02	>0.05	<0.5	<0.5 >0.05
	(1)	(2)	(3)	(4)	(5)
Non-religious fraction year 1970,	**0.271**	**0.183**	**0.213**	**0.465**	**0.712**
mother's country of birth	(0.075)***	(0.067)***	(0.075)***	(0.156)***	(0.222)***
Individual controls (exogenous)	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes
Number of ancestral countries	121	55	42	132	30
R-squared	0.266	0.285	0.302	0.235	0.265
Observations	7172	5410	4419	6533	3115

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 religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population considered to be non-religious (agnostic or atheist) in 1970 in the mother's birth country. Individual controls include age, age squared, and gender. Country of residence-by-year fixed effects are included in all specifications. The full sample includes 144 ancestral countries. 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 9. Ancestral continent sample restrictions.

Dependent variable: Self-assessed health status					
Sample restriction based on the mother's continent of birth	Exclude Africa	Exclude Asia	Exclude Americas	Exclude Europe	Only Europe
	(1)	(2)	(3)	(4)	(5)
Non-religious fraction year 1970,	**0.258**	**0.220**	**0.261**	**0.384**	**0.275**
mother's country of birth	(0.076)***	(0.083)***	(0.070)***	(0.181)**	(0.109)**
Individual controls (exogenous)	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.275	0.274	0.271	0.173	0.273
Observations	6977	7081	7503	2028	5809

Notes: The dependent variable in column (1) is self-assessed health, which ranges from 1, 'very bad' to 5 'very good.' The dependent variable in column (4) is happiness, which ranges from 0, 'extremely unhappy', to 10 'Extremely happy.' The dependent variable in column (5) is life satisfaction, which ranges from 0, 'extremely dissatisfied', to 10 'Extremely satisfied.' All specifications study second generation immigrants and estimates the effect of religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population that considers to be non-religious (agnostic or atheist) in 1970 in the mother's birth country. Individual controls include age, age squared, gender, education, labor force attachment, and income. 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 10. Dimensions of religious belief.

Dependent variable: Self-assessed health status						
Religious dimension: Believe in	God	Life after death	People have a soul	Hell	Heaven	Cumulative model
	(1)	(2)	(3)	(4)	(5)	(6)
Believe in God (fraction),	-0.334					-0.330
mother's country of birth	(0.065)***					(0.124)***
Believe in life after death,		-0.188				0.327
mother's country of birth		(0.056)***				(0.209)
Believe that people have a soul,			-0.257			0.238
mother's country of birth			(0.074)***			(0.175)
Believe in hell,				-0.182		-0.090
mother's country of birth				(0.052)***		(0.108)
Believe in heaven,					-0.198	-0.334
mother's country of birth					(0.052)***	(0.255)
Individual controls (exogenous)	Yes	Yes	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.264	0.262	0.262	0.264	0.263	0.263
Observations	8012	7861	7770	8012	7861	7770

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 religiousness in the mother's country of birth on self-assessed health. Belief in God is measured as the share of the population in the mother's birth country that express that they believe in God, and correspondingly for the other beliefs (data is country averages over the first five waves of the combined European Values Study and World Values Survey). Individual controls include age, age squared, and gender. Country of residence-by-year fixed effects are included in all specifications. Individual data (health, age, and gender) 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.

Table 11. Alternative religiosity measures.

Dependent variable: Self-assessed health status				
Alternative measure:	Share who consider themselves religious	Importance of religion in life	Share who belongs to religious denomination	Attend religious service (frequency)
	(1)	(2)	(3)	(4)
Religiousness, mother's birth country	-0.237			
	(0.055)***			
Importance of religion in life, mother's country of birth		-0.084		
		(0.022)***		
Share belonging to denomination, mother's country of birth			-0.278	
			(0.061)***	
Religious service attendance, mother's country of birth				-0.027
				(0.009)***
Individual controls (exogenous)	Yes	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes	Yes
R-squared	0.266	0.266	0.267	0.265
Observations	7936	7938	7760	7931

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 religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population that considers themselves a religious person in the mother's birth country (data is country averages over the first five waves of the combined European Values Study and World Values Survey collected between 1981 and 2009). Individual controls include age, age squared, and gender. Country of residence - by-year fixed effects are included in all specifications. Individual data (health, age, and gender) 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 12. Hetereogeneity based on belief.

Dependent variable: Self-assessed health status

	(1)	(2)	(3)
Catholic fraction 1970,	-0.245	-0.220	-0.224
mother's birth country	(0.067)***	(0.074)***	(0.075)***
Protestant fraction 1970,	-0.137	-0.091	-0.091
mother's country of birth	(0.086)	(0.101)	(0.100)
Orthodox fraction 1970,	-0.316	-0.246	-0.258
mother's country of birth	(0.106)***	(0.110)**	(0.114)**
Other Christian fraction 1970,	-0.125	-0.153	-0.130
mother's country of birth	(0.141)	(0.145)	(0.149)
Jewish fraction 1970,	0.095	0.188	0.175
mother's country of birth	(0.237)	(0.231)	(0.231)
Muslim fraction 1970,	-0.298	-0.294	-0.287
mother's country of birth	(0.072)***	(0.072)***	(0.073)***
Hindu fraction 1970,	-0.197	-0.200	-0.193
mother's country of birth	(0.070)***	(0.074)***	(0.076)**
Buddist fraction 1970,	-0.171	-0.176	-0.186
mother's country of birth	(0.109)	(0.113)	(0.116)
log of GDP per capita,		-0.012	-0.020
mother's country of birth		(0.021)	(0.026)
Infant mortality (per 1000 live births)			-0.001
mother's country of birth			(0.001)
Individual controls (exogenous)	Yes	Yes	Yes
Country-by-year fixed effects	Yes	Yes	Yes
R-squared	0.262	0.260	0.260
Observations	8506	8134	8134

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 religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population that holds a given belief in 1970. Individual controls include age, age squared, and gender. 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 13. Health and religiosity in the US.

Dependent variable:	Self-assessed health status	Self-assessed health status
	(1)	(2)
Non-religious fraction year 1970,	0.185	0.194
ancestral country	(0.078)**	(0.071)**
Age	0.002	0.000
	(0.004)	(0.003)
Age squared/100	-0.013	-0.011
	(0.003)***	(0.003)***
Female	0.001	-0.015
	(0.012)	(0.012)
Happiness		0.355
		(0.011)***
Individual controls (exogenous)	Yes	Yes
Year and region fixed effects	Yes	Yes
R-squared	0.063	0.136
Observations	14469	13842

Notes: The dependent variable is self-assessed health, which ranges from 1, poor' to 4 'excellent.' All specifications study second and higher generation immigrants and estimates the effect of religiousness in the ancestral country on self-assessed health. Religiousness is measured as the share of the population that considers to be non-religious (agnostic or atheist) in 1970 in the ancestral country. Individual controls include age, age squared, and gender. Region of residence and year fixed effects are included in all specifications. There are 9 regions and 22 years/waves. Data is the waves from 1977 to 2014 of the General Social Survey. Standard errors in parenthesis, which allow for clustering on the ancestral country. Significance stars, * p<0.1, ** p<0.05, *** p<0.01.

Table A1. Countries of Ancestry and their Shares of Non-Religious People.

Country	Non-religious fraction 1970, ancestral country	Country	Non-religious fraction 1970, ancestral country	Country	Non-religious fraction 1970, ancestral country
Afghanistan	0.000	Grenada	0.001	Nigeria	0.002
Albania	0.644	Guinea	0.001	Norway	0.011
Algeria	0.001	Guinea-Bissau	0.001	Oman	0.002
Angola	0.001	Guyana	0.005	Pakistan	0.000
Argentina	0.015	Haiti	0.010	Papua New Guinea	0.001
Armenia	0.614	Hong Kong	0.127	Paraguay	0.005
Australia	0.061	Hungary	0.141	Peru	0.004
Austria	0.026	Iceland	0.014	Philippines	0.003
Azerbaijan	0.338	India	0.005	Poland	0.087
Bangladesh	0.001	Indonesia	0.010	Portugal	0.023
Barbados	0.010	Iran (Islamic Rep. of)	0.000	Qatar	0.001
Belarus	0.399	Iraq	0.004	Romania	0.151
Belgium	0.058	Ireland	0.002	Russian Federation	0.515
Bolivia	0.011	Israel	0.008	Saint Lucia	0.000
Bosnia and Herzegovina	0.144	Italy	0.090	Sao Tome and Principe	0.000
Brazil	0.010	Jamaica	0.009	Senegal	0.000
Bulgaria	0.223	Japan	0.106	Singapore	0.031
Burundi	0.000	Jordan	0.012	Slovakia	0.143
Cabo Verde	0.004	Kazakhstan	0.043	Slovenia	0.072
Cambodia	0.025	Kenya	0.000	South Africa	0.007
Cameroon	0.001	Korea (DPR)	0.610	Spain	0.022
Canada	0.035	Korea (Rep. of)	0.003	Sri Lanka	0.005
Cayman Islands	0.543	Kuwait	0.000	St. Vincent and the Grenadines	0.004
Chile	0.060	Kyrgyzstan	0.526	Sudan	0.008
China	0.642	Latvia	0.476	Suriname	0.010
Colombia	0.006	Lebanon	0.020	Swaziland	0.000
Congo	0.005	Liberia	0.000	Sweden	0.247
Costa Rica	0.008	Libya	0.001	Switzerland	0.010
Côte d'Ivoire	0.000	Liechtenstein	0.008	Syrian Arab Republic	0.010
Croatia	0.033	Lithuania	0.292	Taiwan, Province of China	0.002
Cuba	0.501	Luxembourg	0.041	Tajikistan	0.337
Cyprus	0.019	Macao	0.119	Tanzania, United Rep. of	0.001
Czech Republic	0.191	Macedonia (f. Yugoslav Rep.)	0.069	Thailand	0.003
Denmark	0.030	Madagascar	0.001	Togo	0.000
Djibouti	0.001	Malaysia	0.003	Tunisia	0.001
Dominica	0.000	Maldives	0.000	Turkey	0.001
Dominican Republic	0.004	Mali	0.000	Turkmenistan	0.349
Ecuador	0.004	Malta	0.005	Uganda	0.000
Egypt	0.004	Mauritius	0.002	Ukraine	0.382
Eritrea	0.000	Mexico	0.017	United Arab Emirates	0.007
Estonia	0.533	Moldova (Rep. of)	0.520	United Kingdom	0.082
Ethiopia	0.000	Mongolia	0.612	United States of America	0.049
Finland	0.035	Morocco	0.000	Uruguay	0.302
France	0.120	Mozambique	0.001	Uzbekistan	0.420
Gambia	0.000	Myanmar	0.003	Venezuela (Bolivarian Rep.)	0.006
Georgia	0.528	Namibia	0.000	Viet Nam	0.135
Ghana	0.001	Netherlands	0.097	Yemen	0.000
Greece	0.002	New Zealand	0.035	Zimbabwe	0.002

Note: The non-religious fraction is measured between 0 and 1. Country values of the non-religous fraction are as in Barro and McCleary (2003). The average across countries is 0.09, and the standard deviation is 0.17 (both unweighted).

Table A2. Countries Participating in the ESS by 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	
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	
Hungary	X	X	X	X	X
Ireland	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	
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	
United Kingdom	X	X	X	X	X

Note: The stacked second to fifth round of the ESS data is used in the analysis. The first round does not include information on parental birth country so we are unable to identify children of immigrants' ancestry in that round. The X:s in round 2 through 5 correspond to the country-by-year fixed effects used in the analysis.

Table A3. Age interactions with religiosity.

Dependent variable:	Self-assessed health status	Self-assessed health status
	(1)	(2)
Non-religious fraction year 1970,	0.259	0.194
mother's country of birth	(0.080)***	(0.067)***
Non-religious fraction * I(age>43)	-0.147	
	(0.103)	
I(age>43)	-0.087	
	(0.049)*	
Non religious fraction * Age		-0.008
		(0.003)***
Age	0.028	0.033
	(0.004)***	(0.004)***
Individual controls	Yes	Yes
Country-by-year fixed effects	Yes	Yes
R-squared	0.294	0.294
Observations	7545	7545

Notes: The dependent variable in column (1) 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 religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population that considers to be non-religious (agnostic or atheist) in 1970 in the mother's birth country. Individual controls include age, age squared, gender, education, labor force attachment, and income. 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 A4. Second language spoken at home.

Dependent variable:	Self-assessed health status
	(1)
Non-religious fraction year 1970,	0.178
mother's country of birth	(0.064)***
Second language spoken at home	0.033
(Yes=1, no=0)	(0.030)
Individual controls	Yes
Country-by-year fixed effects	Yes
R-squared	0.293
Observations	7545

Notes: The dependent variable in column (1) 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 religiousness in the mother's country of birth on self-assessed health. Religiousness is measured as the share of the population that considers to be non-religious (agnostic or atheist) in 1970 in the mother's birth country. Individual controls include age, age squared, gender, education, labor force attachment, and income. 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.

Figures

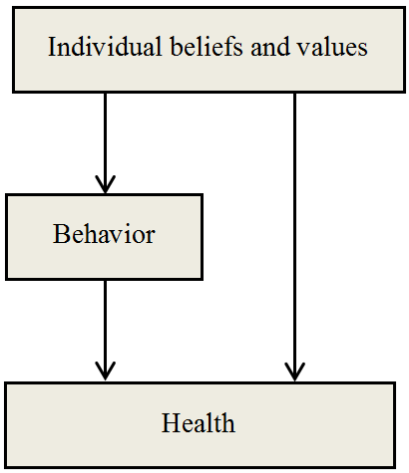

Figure 1. The mechanisms that link religiosity and health

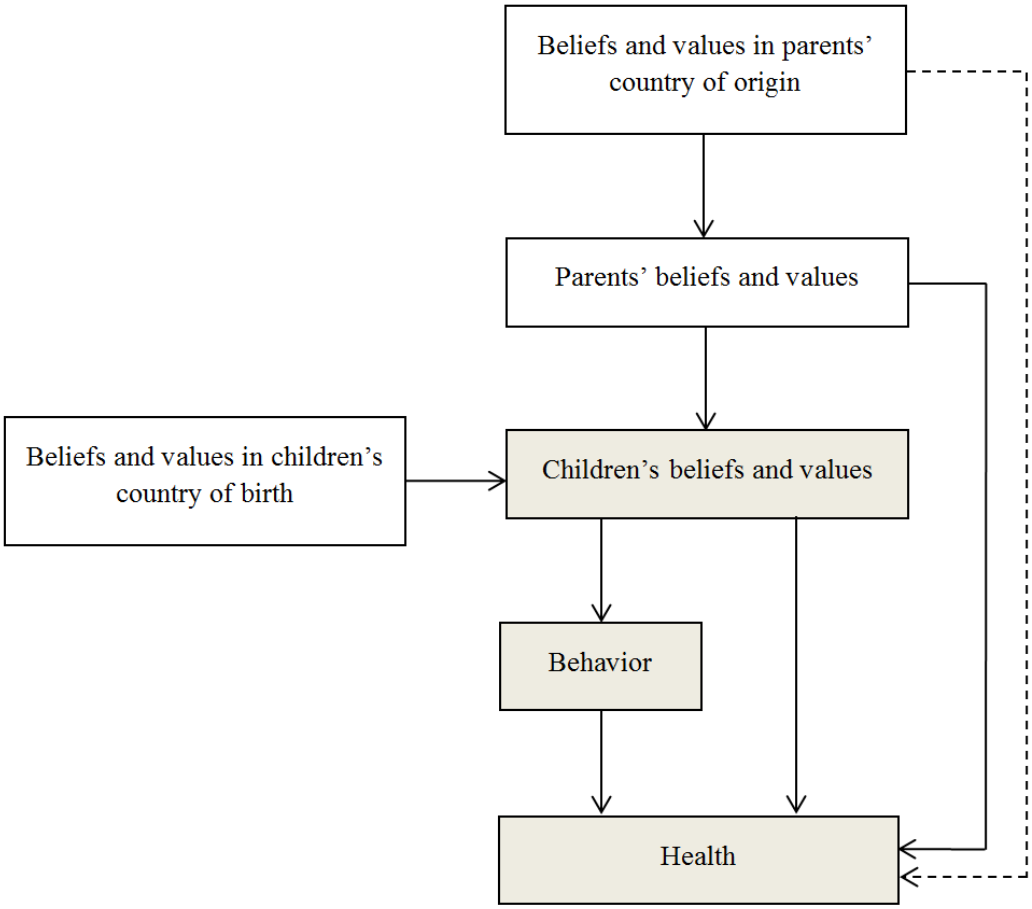

Figure 2. Health as a function of ancestral culture

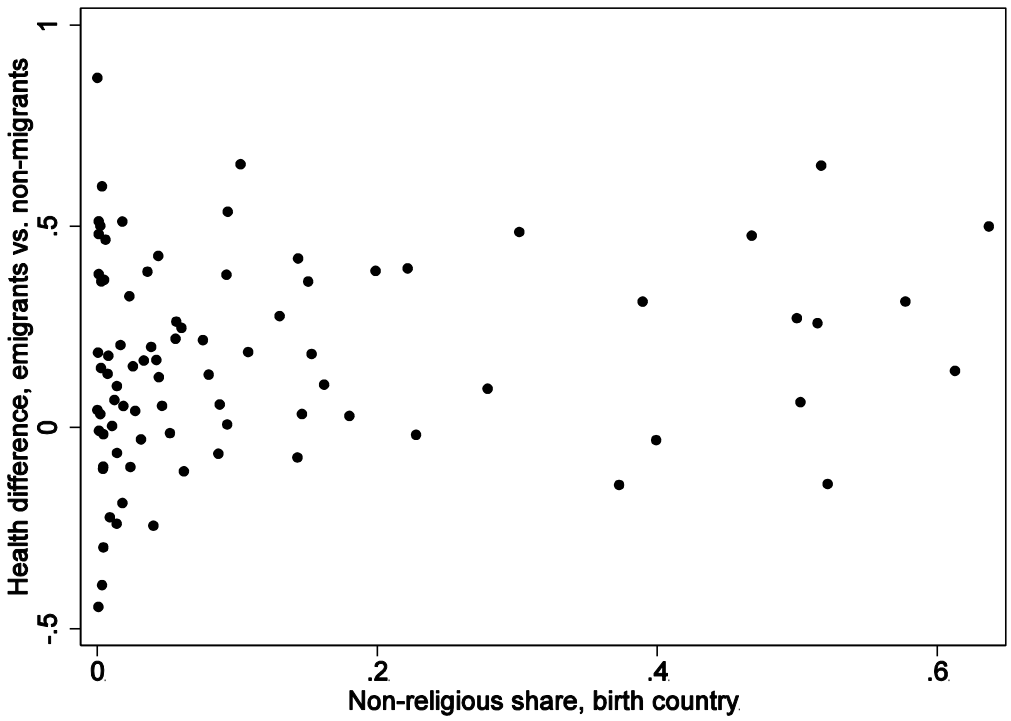

Figure 3. The health difference between first generation migrants and non-migrants, and the non-religious share in the birth country

Note. The vertical axis measures average differences in health between first-generation migrants in Europe and non-migrants across the world, by source country. The horizontal axis increases with the non-religious share (in 1970) in the source country.