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Suffer for the Faith? Parental Religiosity and Children's Health

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Contents

List of Tables

Abstract

This paper provides novel evidence on differences in health outcomes of children in religious and non-religious families in Russia. The health indicators analyzed include the subjective health status and anthropometric outcomes. The endogeneity of religiosity is accounted for. The empirical findings suggest that if both parents are religious, their religiosity does not affect children's height-for-age, but increases children's body mass index and subjective health. Father's religiosity has a stronger salutary effect than mother's religiosity. In fatherless families, children's health is more strongly affected by mother's education and employment status than in two-parent families. All findings are stronger for older children. These results underscore the importance of considering both maternal and paternal characteristics for family-oriented policies that target the protection of children's health. Also, policies protecting children's health should target single mothers as a particularly vulnerable social group.

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1 Introduction

Fundamental institutional reforms, political and economic changes in Central and Eastern Europe and the former Soviet Union countries brought a challenge to their health care systems, including the deterioration of the preventive medicine, sanitary and epidemiological system, health care services, and social and psychological stress. As a result, most countries in the region have experienced deteriorating health outcomes and increasing mortality. The most serious consequence of this situation is the deterioration of children's health due to its implications for the future labor force (UNICEF (1994)). At the same time, researchers in economics and social sciences document a revival of religiosity in transition economies that brings new challenges to economic policies (e.g., Iannaccone (1998)).[1] This paper analyzes possible consequences of this revival for the health outcomes of children. A better understanding of factors that do or do not affect the health status of children is a key to improving the human capital accumulation and children's well-being in the region.

Since the 1980s medical and psychological studies have started investigating the effects of religiosity on health outcomes of adults, including physical and mental health.[2] Recently this topic has also attracted the attention of economists and social scientists. The findings suggest that religiosity affects various socioeconomic and health outcomes of adults. For instance, it is underscored that religiosity reduces risky health behavior of adults, insures individuals against adverse idiosyncratic and countrywide events, and has a positive effect on education and income.[3]

Potential effects of religiosity on health of children and adolescents call for special attention, but these effects have not been widely explored in the literature. Among a few studies that have done so are Regnerus (2003), who suggests that the religiosity of adolescents improves their educational outcomes and reduces their asocial behavior, and Chiswick and Mirtcheva (2013), who argue that in the US the religiosity of children and adolescents from 6 to 19 years old improves their psychological and overall health condition. However, especially for younger children, it is reasonable to assume that it is the religiosity of their parents, not children's own religiosity that affects their own health outcomes.

Earlier studies suggest that parental, especially maternal, socioeconomic characteristics affect children's outcomes.[4] In particular, parents decide about necessary medical treatments of their children, their nutrition, sport and educational activity, and provide emotional and material support. In a recent paper Ha et al. (2014) argue that maternal religiosity in Zimbabwe is negatively correlated with the use of maternal health care services and with the child immunization. Also, Menon and McQueeney (2015) provide causal evidence that in India infants from Christian fam-

[1] As defined by Need and Evans (2001), a religiosity of an individual implies that he/she identifies himself/herself with a particular religious denomination, has religious beliefs, prays, and attends a religious organization.

[2] For reviews, see Koenig (1998), Levin (1994), and Levin and Schiller (1987).

[3] See Clark and Lelkes (2006), Clark and Lelkes (2009), Dehejia et al. (2007), Fletcher and Kumar (2014), Gruber (2005), Gruber and Hungerman (2008), Iannaccone (1998), and Popova (2014), among others.

[4] See Boone and Zhan (2006), Case et al. (2002), Case and Paxson (2001), Case and Paxson (2002), Chen and Li (2009), and Currie and Stabile (2003), among others.

ilies have better health status compared to infants from families with other traditional religions. A few other studies have addressed the causal effect of mother's fasting during pregnancy on future educational outcomes and mental health of children (see Almond and Mazumder (2011), Gruber and Hungerman (2008), and Majid (2013)). This paper contributes to this stream of literature by providing causal empirical evidence regarding the effects of maternal and paternal religiosity on the health of children in two-parent and one-parent households.

Using the individual longitudinal data from the Russian Longitudinal Monitoring Survey (RLMS), this paper examines the effects of maternal and paternal self-assessed religiosity on health outcomes of their children. The health indicators analyzed include the subjective health status and anthropometric outcomes such as a height-for-age and a body mass index. The effects of religiosity are assessed for different age groups of children and for children from two-parent and one-parent households. The endogeneity of religiosity is taken into account by employing the instrumental variable approach with exogenous instruments, and with generated instruments, as recently proposed by Lewbel (2012).

The findings suggest that after addressing the endogeneity problem, in two-parent families maternal religiosity has a positive effect on children's health only if both parents are religious, while the salutary effect of father's religiosity is statistically and economically stronger that the effect of mother's religiosity. The health status of children in one-parent (fatherless) households is more strongly affected by the socioeconomic characteristics of mother. The results also suggest that children's long-term health, which is proxied by a height-for-age, is not affected by parental religiosity. Even though the paper focuses on traditional religious denominations and beliefs, the findings can be generalized for various forms of spirituality and religiosity. These results underscore the importance of considering both maternal and paternal characteristics for a set of family-oriented policies that targets the protection of children's health. Also, policies protecting children's health should target single mothers as a particularly vulnerable social group.

The rest of the paper is organized as follows. The next section presents a sketch of the theoretical model and discusses the transmission mechanisms between parental religiosity and children's health. Then the empirical model, identification strategy, data, and results are presented and discussed. The final section concludes.

2 Theoretical framework

2.1 Theoretical model

The theoretical foundation of this paper is developed following Grossman (1972)'s and Chiswick and Mirtcheva (2013)'s models of the demand for health. The intertemporal utility of a parent is defined below.

$$U = U(\phi_0 H_0, ..., \phi_t H_t, Z_0, ..., Z_t), \tag{1}$$

where H_0 is the stock of initial child health at birth, H_t is the stock of health in period t, ϕ_t is the flow of health services per unit of stock in period t, $h_t = \phi_t H_t$ is the total demand for health services, Z_t is the total demand for all other goods and services besides the child's health in period t.

Similarly to Chiswick and Mirtcheva (2013), no health depreciation with age is assumed for children.[5] Thus, I_t, the gross investment in the health stock in period t, equals net investment:

$$H_{t+1} - H_t = I_t \tag{2}$$

The health production function is presented as follows:

$$I_t = I_t(M_t, TH_t; ME_t, FE_t, MR_t, FR_t) \tag{3}$$

where M_t is the availability of medical care, TH_t is the time of parents available for investing a child's health, ME_t and FE_t are maternal and paternal education, respectively, and MR_t and FR_t stand for maternal and paternal religiosity, respectively. Differently from Chiswick and Mirtcheva (2013), I consider parental religiosity, not the child's own religiosity, as a determinant of the children's health production function.

2.2 Transmission channels

Earlier psychological, medical, sociological, and economic literature reveals several mechanisms that may explain a potential impact of religiosity on health. These mechanisms include the insurance effect, social network effect, regulating effect, and the internal psychological effect (Ellison (1994), Levin and Chatters (1998), Dehejia et al. (2007), and Popova (2014), among others). While these mechanisms are well discussed in relation to religiosity and socioeconomic outcomes of adults, their ability to explain the potential effects of religiosity on children is not yet studied extensively. Nevertheless, some transmission channels may be relevant for the health outcomes of children as well.

Seminal sociological studies (for instance, Ellison (1994) and Idler (1987)), argue that religiosity provides the sense of coherence and support that buffer potential impacts of stressful events. This provides a salutary effect on health. In economic literature this mechanism was defined as the insurance effect of religion (Clark and Lelkes (2006)). This effect implies that

[5] Chiswick and Mirtcheva (2013) argue that age of children reflects their physical and mental maturity, not depreciation of human body, as is assumed by Grossman (1972) for adults.

individual religiosity helps to smooth possible effects of adverse individual and countrywide events on socioeconomic outcomes of adults. It means that in case of adverse events, religious people are likely to be stressed less than the non-religious, since they have different systems of values. In economic literature this effect of religiosity has been studied in relation to consumption expenditures and life satisfaction (see Chen (2010), Clark and Lelkes (2006), Clark and Lelkes (2009), Dehejia et al. (2007), and Popova (2014), among others).

Another mechanism is related to social capital and networks. Religious communities and organizations may provide coping resources for an individual. This support may be material, e.g., providing consumptionassistance during hardship and illness, as well as psychological support via social inclusion and emotional support (Chen (2010), Dehejia et al. (2007), Ellison (1994), and Idler (1987), among others). The implication of this mechanism for health may be twofold. On the one hand, the support of a religious community during illness may give to an individual material and psychological resources to cope with difficulties. This may have a salutary effect on health. On the other hand, this mechanism also forces individuals to follow the ethical beliefs and interests of the religious community, which may not necessarily be in line with their own interests (Levin and Chatters (1998)). This may lead to a harmful impact on health, e.g., unintended pregnancies or prevented medical treatment (see Sulmasy (2009), Bartkowski et al. (2012)).

The regulating effect of religiosity is related to the internal locus of control (McIntosh and Spilka (1990)). In many religions, norms motivate health-related behavior, for instance, dieting, abstaining from smoking, excessive drinking, and drug use, thereby providing a perception that such behavior will be rewarded (Ellison (1994), Fletcher and Kumar (2014), Gruber and Hungerman (2008), and Regnerus (2003), among others). However, this regulating effect of religion on health is also equivocal. While most literature finds a positive regulating effect in both adults and adolescents, recent economic research also provides causal evidence of the negative effects of a mother's fasting on her child's health. Almond and Mazumder (2011) and Majid (2013) argue that fasting during Ramadan while pregnant results in a greater likelihood of a lower birth weight, child's physical and mental difficulties in adulthood, and poorer educational and labor market outcomes of children. In such cases early childhood health interventions may help to improve the child's mental, physical, and educational outcomes (Barham (2012)). Recently, Menon and McQueeney (2015) suggested that in India infants in Christian families have better anthropometric outcomes than infants in families with other traditional religions. This underscores that the literature on mothers' beliefs and children's health is inconclusive regarding the direction of a causal effect.

Finally, the effect of religiosity on health may be related to individual psychological resources. Gartner et al. (1991) review a number of psychological studies and concludes that there is no consensus in the literature regarding the direction of the effect of religiosity on mental health. Numerous psychological studies document that religiosity provides meaning in life and optimism that reduce uncertainty, reduce the risk of loneliness, and give self-esteem and hope (Ellison (1994), Levin and Chatters (1998), Rossi (1993), among others). These emotions improve mental health. On the other hand, negative effects of religiosity on psychological health

are also widely documented and include feelings of guilt and fear, and difficulties in communication with peers (Abbots et al. (2004), Azzi and Ehrenberg (1975), Chiswick and Mirtcheva (2013), Ellison et al. (2001), among others).

Summarizing the review of psychological, medical, sociological, and economic research, the direction of the impact of religiosity on health is equivocal. Also, causal studies are still scarce (Ellison and Levin (1998) and Levin (1994)).[6] This is especially true for the effects of religiosity on the health of children. This paper contributes to this topic.

[6] Recent economic papers by Almond and Mazumder (2011), Chiswick and Mirtcheva (2013), Gruber and Hungerman (2008), Majid (2013), and Menon and McQueeney (2015) are an exception.

3 Econometric model

The econometric model of our interest is as follows:

$$H_{ij} = \beta_0 + \beta_1 MR^*_{pj} + \beta_2 FR^*_{pj} + \alpha \mathbf{M}_{pj} + \gamma \mathbf{F}_{pj} + \delta \mathbf{X}_{ij} + \theta \mathbf{HH}_{ijt} + \lambda_j + \mu_t + \varepsilon_{ij} \quad (4)$$

$$H_{ij} = \begin{cases} 1 \text{ if } H^*_{ij} > 0 \\ 0 \text{ otherwise} \end{cases} ; \; MR_{pj} = \begin{cases} 1 \text{ if } MR^*_{pj} > 0 \\ 0 \text{ otherwise} \end{cases} ; \; FR_{pj} = \begin{cases} 1 \text{ if } FR^*_{pj} > 0 \\ 0 \text{ otherwise} \end{cases}$$

where i stands for an individual (child), j stands for a region, p stands for a parent, and t stands for time. H represents a child's health. In three model specifications, three variables are used as H, including the height-for-age, the body mass index, and the subjective health status. MR^* and FR^* are the unobserved religiosity of a child's mother and of a child's father, respectively, while MR and FR are dummy variables and equal 1 if a mother/father assesses her/himself as being a believer.[7] $\mathbf{M}$ and $\mathbf{F}$ are the vectors of mother's and father's socioeconomic characteristics, respectively. These characteristics include age, education, and employment status. For one-parent (fatherless) households, only the characteristics of mother are included. $\mathbf{X}_{ij}$ is the vector of child characteristics, including gender, age, and dummies for the quarter of child's birth.[8] The quarter of birth serves as a proxy to the quality of nutrition. Earlier literature finds that the season of birth has a significant effect on future socioeconomic outcomes of individuals, including health and education (Buckles and Hungerman (2013), Plug (2001). $\mathbf{HH}_{ijt}$ is a vector of household characteristics, including household size, living in an urban area, marital status of parents, and an equalized household income. λ_j and μ_t represent dummies for the region of residence and survey's wave, respectively. ε_{ij} is a stochastic disturbance.

Mother's and father's religiosity, MR and FR, may be endogenous in Eq. 4. There are several reasons for the endogeneity of religiosity. First, unobserved variables related to religiosity can be omitted from Eq. 4. For instance, one of such omitted variables is a historical memory and a belief that religiosity has a salutary effect. Historically, religiosity was often linked with health care (Koenig (2012), Marchukova (2003), among others). First hospitals were often built within religious organizations. The salutary effect of religiosity on physical and mental health is also recognized in many medical and psychological studies (for reviews, see Koenig (1998) and Koenig (2012)). Even though with the development of public health care systems, religiosity starts to play a less pronounced role in health care, this unobserved historical memory may still affect the relationship between religiosity and health. This may also lead to another reason for endogeneity. There can be temporal endogeneity. When a child has health problems, parents are likely to seek psychological support and to become more religious. Also, a possible measurement error in children's health characteristics may be correlated with parental religiosity.

[7] Detailed questions on religiosity and on health characteristics are presented in the data section.

[8] Since children in the sample have not yet completed their education, education of the child and his/her age are collinear. Thus, the age of the child and his/her parents' education are included as explanatory variables.

Finally, due to selection on observable characteristics, children of religious parents may have different health outcomes than children of non-religious parents.

3.1 Identification strategy

Eq. 4 represents a model of a child's health with two endogenous binary regressors, mother's and father's religiosity. To account for endogeneity in this model several approaches are discussed in earlier literature. The first way to address the endogeneity problem is to use the linear two stage least squares (2SLS) with instruments Z_1 and Z_2 for mother's and father's religiosity, MR and FR. To have a consistent estimator, the instruments should satisfy two conditions. First, Z_1 and Z_2 should be correlated with mother's and father's religiosity. Second, Z_1 and Z_2 should be uncorrelated with unobservable characteristics that are likely to affect children's health outcomes.

$$\begin{aligned} corr(Z_1, MR_{pj}) &\neq 0;\ corr(Z_2, MR_{pj}) \neq 0 \\ corr(Z_1, FR_{pj}) &\neq 0;\ corr(Z_2, FR_{pj}) \neq 0 \\ corr(Z_1, \varepsilon_{ij}) &= 0;\ corr(Z_2, \varepsilon_{ij}) = 0 \end{aligned} \tag{5}$$

where Z_1 and Z_2 are instrumental variables, MR and FR are mother's and father's religiosity, respectively, and ε_{ij} is a stochastic disturbance from Eq. 4.

The first stage regressions are as follows.

$$MR^*_{pj} = \pi_0 + \pi_1 \text{churpc}_{jt} + \pi_2 \text{sharecold}_{jt} + \tau \mathbf{M}_{pj} + \kappa \mathbf{HH}_{ijt} + \eta_{pj} \tag{6}$$

$$FR^*_{pj} = \phi_0 + \phi_1 \text{churpc}_{jt} + \phi_2 \text{sharecold}_{jt} + \varphi \mathbf{F}_{pj} + \varkappa \mathbf{HH}_{ijt} + \mu_{pj} \tag{7}$$

$$MR_{pj} = \begin{cases} 1 \text{ if } MR^*_{pj} > 0 \\ 0 \text{ otherwise} \end{cases};\ FR_{pj} = \begin{cases} 1 \text{ if } FR^*_{pj} > 0 \\ 0 \text{ otherwise} \end{cases}$$

Two instruments $\mathbf{Z}$ are used, namely sharecold, a regional historical share of days colder than $-25°C$, and $churpc$, a number of churches per capita in a region j. Religiosity is related to cold weather (e.g., Pesta and Poznanski (2014)). Moreover, historically, people had superstitious beliefs that witches can influence the weather. Witchcraft trials were often coincided with the periods of cold weather, since witches were blamed for not providing a weather, which is favorable for agriculture (Oster (2004)). Thus, in regions with a higher share of extremely cold days, an individual religiosity is likely to be lower. A regional share of extremely cold days is taken from 1980 to a year of child's conception to exclude the influence of this instrument on child's health. The number of churches per capita is also likely to be related to religiosity. This intuition is consistent with earlier research. For instance, Gruber (2005) suggests that individual religiosity depends on religious and ancestral density, while Popova (2014) uses historical religious density as an instrument for individual religiosity.

The 2SLS estimation when endogenous regressors are binary has challenges. In particular, one has to be careful with estimating a first stage. As underscored by Angrist and Pischke (2009), if a second stage includes fitted values received from a non-linear first stage, such an estimation constitutes a "forbidden" regression, since residuals in Eq. 4 are correlated with the predicted probabilities from Eqs. 6 and 7. Also, estimating the first and second stage separately gives incorrect standard errors. Following Angrist and Pischke (2009), I estimate Eqs. 6 and 7 by probit and receive predicted probabilities, $\widehat{MR_{pj}}$.and $\widehat{FR_{pj}}$. These predicted probabilities are used as instruments in the 2SLS estimation, so that the first stage is as follows.

$$MR^*_{pj} = \widetilde{\pi}_0 + \widetilde{\pi}_1 \widehat{MR_{pj}} + \widetilde{\tau}\mathbf{M}_{pj} + \widetilde{\kappa}\mathbf{HH}_{ijt} + \widetilde{\eta}_{pj} \tag{8}$$

$$FR^*_{pj} = \widetilde{\phi}_0 + \widetilde{\phi}_1 \widehat{FR_{pj}} + \widetilde{\varphi}\mathbf{F}_{pj} + \widetilde{\varkappa}\mathbf{HH}_{ijt} + \widetilde{\mu}_{pj} \tag{9}$$

The fitted values from Eqs. 8 and 9 are then used to estimate Eq. 4.

Recently, Lewbel (2012) proposed a modification to the 2SLS approach that helps to estimate the model with endogenous regressors in the absence of exogenous instruments or in case of weak exogenous instruments. The identification is based on instruments generated by the model. Instruments are constructed by multiplying the first stage residuals from Eq. 8 and 9 on demeaned exogenous variables from Eq. 4. These generated instruments can be used as sole instruments or in a combination with usual exogenous instruments $\mathbf{Z}$. This approach improves the statistical properties of the model, as compared to the traditional 2SLS approach.[9]

In this paper, first Eq. 4 is estimated using the ordinary least squares (OLS), which does not account for endogeneity and, thus, produces biased and inconsistent estimates. Then the 2SLS with exogenous instruments is estimated. Finally, the 2SLS with a combination of generated and exogenous instruments is used.

[9] This approach is implemented in Stata, using the procedure ivreg2h, as described by Baum and Schaffer (2012).

4 Data

The main data source is the Russian Longitudinal Monitoring Survey (RLMS). This is a nationally representative survey in Russia that contains data on individual socioeconomic characteristics, attitudes, and values. In each wave, the respondents with children are also asked in details about the health and outcomes of children. Since data on religiosity are available in selected rounds only, the analysis is limited to the years 2000–2003. To have a balanced 4-years panel, we need to trace each child each year. However, on average, each child is observed 1.2 times, and it is therefore not possible to use data as a panel.

The self-assessment of parental religious beliefs is based on the question *"What do you think about religion? I am a believer/ I am more a believer than a non-believer/ I am more a non-believer than a believer/ I am a non-believer/ I am an atheist"*. Based on this question a dummy variable for a parent being a believer/ a non-believer is constructed. The correlation between mother's and father's religiosity is about 0.3. This does not raise the issue of collinearity in the model.

A number of health characteristics of children are used for estimation. First indicator is the height-for-age. As in Duflo (2003) and Menon and McQueeney (2015), for each age in months the height-for-age scores are constructed. The scores are standardized, using the median and standard error for the corresponding age and gender group in the US. Another measure is a body mass index. Duflo (2003) argues that height-for-age is a commonly used measure of a general long-term health status of a child, while body mass index is short-term measure, which is responsive to illnesses. Finally, the third measure used in the paper is a subjective health status of a child. This variable is based on a main caregiver's response to the following question *"How would you evaluate your child's health (1=very bad, 5=very good)?"*

Regional shares of extremely cold days for the 1980–2003 period are computed based on the daily average temperature data from the regional meteorological ground stations. The temperature data from ground stations that are located within a 200km radius of each city's centroid in a region are weighted by an inverse distance square when there are several stations in a region. Thus, the closest meteorological station is given the largest weight.[10]

Data on the regional density of churches are collected using the web pages of regional religious organizations in Russia. Data descriptive statistics are presented in Table $A1$ in the appendix.

[10] For a detailed discussion of different methods to aggregate the weather data see Hanigan et al. (2006).

5 Results

In this section the effects of parental religiosity on health of children in two-parent and one-parent households are discussed. A household is defined as two-parent if both mother and father of a child reside in the household. In one-parent household, either father or mother does reside in the household. However, since motherless families are not common in Russia and the sample of such families is negligible, only fatherless families are considered for the estimation.

Tests for weak identification indicate that instruments are not weak in all model specifications, since the first stage the Cragg-Donald F statistic exceeds the corresponding Stock-Yogo critical value at 5% significance level (Stock and Yogo (2005)). These results are reported in each table.

In each section the results are presented for three measures of child's health, including the height-for-age, body mass index, and subjective health status of children 0–14 years old. Tables 1 and 2 present the results for two-parent households, while in Table 3 the results for one-parent households are presented. Additionally, in Tables $A2$-$A4$ in the appendix the results are presented separately for the subsamples of children aged 0–3 years, 4–7 years, and 8–14 years. The motivation for this distinction derives from differences in social environment and education at different ages.

In each table the results of several estimation methods are presented, including OLS, 2SLS with exogenous instruments, and 2SLS with a combination of generated and exogenous instruments. In all model specifications, the Hausman endogeneity test indicates that mother's and father's religiosity in Eq. 4 are endogenous. Since OLS estimates do not account for endogeneity, mainly the 2SLS estimates are discussed below.

5.1 Religiosity in two-parent families

In traditional societies men are often seen as breadwinners and women as housekeepers. Sociological research suggests that Russian society supports these traditional roles (Ashwin and Yakubovich (2005), Motiejunaite and Kravchenko (2008), among others). Although a number of Russian families are dual-earner households, men are often seen as principal breadwinners (Ashwin and Yakubovich (2005)). Thus, father as a principal breadwinner may primarily decide regarding the amount and quality of children's health care. This motivates us to consider both mother's and father's characteristics when studying children's health in Russia.

As shown in Table 1, mother's religiosity has no effect on the child's health, while father's religiosity has a strong positive effect. This is true for a body mass index and for the subjective health of children, but only in case of older children (8–14 years old) (see Tables 1 and A2). If both parents are religious, this results in a strong salutary effect on children's body mass index and children's subjective health (see Table 2). This is true for a body mass index of older children and the subjective health of all age groups of children (see Table A3). The findings also suggest no effect of parental religiosity on children's height in all model specifications.

Regarding other characteristics, boys have lower height and higher body mass index. Older children are generally less healthy. Mother's age has either negative, but marginally significant effect, or no effect on the child's health. Father's age has a negative effect on the height of children, and a positive effect on a body mass index and the subjective health of older children. Mother's education has a strong positive effect on children's height, while father's education does not affect children's health outcomes. Also, both mother's and father's employment affect children's subjective health status negatively.

Regarding household characteristics, the findings suggest that in larger families children have lower height, but are healthier subjectively than in smaller families. Household income has a positive effect on height and subjective health, while the marital status of parents does not affect children's health. Children living in an urban area are taller, but have lower weight and are less healthy subjectively. These effects may be related to a better availability of health care and to a higher level of pollution in urban areas, respectively.

Summarizing the section, when the issue of endogeneity is addressed, there is no effect of parental religiosity on children's height and therefore on a general long-term health status of children. Father's religiosity has a positive effect on children's weight and subjective health, but only for older children, while mother's religiosity has a positive effect on children's health only if both mother and father are religious. Thus, it is important to control for both mother's and father's characteristics. These findings also underscore the importance of maintaining the family values.

5.2 Religiosity in one-parent families

The results suggest that in fatherless families mother's characteristics play a greater role than in two-parent families (see Tables 3 and A4), although mother's religiosity does not affect children's anthropometric outcomes and subjective health.

A greater role of mother's socioeconomic characteristics can be explained by psychological and economic factors. On the one hand, a single mother is more likely to seek psychological support from others. Since religious networks may provide such support, she is likely to become more religious. Mother's education has a strong positive effect, while religiosity has no effect. This finding is consistent with the secularization theory, which implies a decreasing role of religion and an increasing role of education and urbanization throughout the process of economic development and modernization. Also, in a one-parent family, a mother becomes a principal breadwinner and her socioeconomic characteristics, especially education, affect children more strongly than in two-parent families, in which the effects of parental characteristics are balanced. Living in an urban area implies fewer health problems objectively, but poorer subjective health, while household income has a positive effect only for older children.

Concluding the section, it can be noted that the findings of earlier literature regarding the strong impact of mother's characteristics on the health of children (see Case and Paxson (2001), Chen and Li (2009), and Ha et al. (2014), among others) are especially important for one-parent

families. This paper underscores that mother's socioeconomic characteristics play considerable roles in such families. Thus, policies protecting children's health should target single mothers as a particularly vulnerable social group.

6 Conclusion

The empirical findings of this paper suggest that after accounting for the endogeneity, parental religiosity does not affect children's height and long-term health, but does affect children's weight and subjective health. Father's religiosity has a stronger salutary effect on children's health outcomes in two-parent families than mother's religiosity. Also, if both parents are religious, this results in a better subjective health of their children. In one parent (fatherless) families, children's health is more strongly affected by mother's education and employment status than in two-parent households, but is not affected by mother's religiosity. All findings are stronger for older children.

The contribution of the paper is twofold. First, parental religiosity and socioeconomic characteristics are introduced into the analysis of children's health and the transmission mechanism is discussed. Second, the endogeneity of mother's and father's religiosity is addressed. The results underscore the importance of considering both maternal and paternal characteristics for family-oriented policies that target the protection of children's health. Also, policies protecting children's health should target single mothers as a particularly vulnerable social group. This empirical research also motivates further theoretical and empirical investigations toward the effects of religiosity on the demand for children's health.

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Table 1: Religiosity and children's health in a two-parent household

	Height-for-age			Body mass index			Subjective health		
	OLS	2SLS (exog. IVs)	2SLS (exog. and generic IVs)	OLS	2SLS (exog. IVs)	2SLS (exog. and generic IVs)	OLS	2SLS (exog. IVs)	2SLS (exog. and generic IVs)
	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.
Mother is a believer	0.126	-1.335	0.477	-0.098	-0.198	-0.142	0.049	0.042	0.127
Father is a believer	-0.006	-0.522	-0.465	0.169	-0.736	0.954 **	-0.003	-0.134	0.373 ***
Child's gender	-0.191 **	-0.182	-0.211 **	0.326 ***	0.325 ***	0.328 ***	0.033	0.031	0.036
Child's age	0.016	0.009	0.019	-0.148 ***	-0.155 ***	-0.142 ***	-0.012 ***	-0.013 ***	-0.009 **
Live in an urban area	0.458 ***	0.460 ***	0.451 ***	-0.724 ***	-0.730 ***	-0.718 ***	-0.164 ***	-0.167 ***	-0.156 ***
Household size	-0.122 ***	-0.078	-0.118 ***	0.159 *	0.179 **	0.144 *	0.053 ***	0.056 ***	0.043 ***
Mother's age	0.020 *	0.016	0.016	-0.012	-0.014	-0.009	-0.006 *	-0.007 **	-0.005
Father's age	-0.023 **	-0.024 *	-0.023 **	0.023	0.025	0.022	0.005	0.005	0.004
Parents married/cohabitating	0.072	0.258	0.073	-0.392	-0.327	-0.434	0.168	0.183	0.119
Mother with higher education	0.309 ***	0.333 **	0.341 ***	0.092	0.107	0.077	-0.025	-0.023	-0.031
Father with higher education	0.135	0.187	0.135	-0.168	-0.165	-0.167	0.054	0.055	0.047
Mother employed	0.058	-0.037	0.031	-0.220 *	-0.290 **	-0.164	-0.063 **	-0.075 **	-0.028
Father employed	-0.057	-0.169	-0.093	-0.075	-0.180	0.012	-0.101 ***	-0.112 ***	-0.067 *
Ln(equalized household income)	0.126 **	0.158 ***	0.123 **	0.022	0.062	-0.009	0.052 ***	0.058 ***	0.031 **
Nr. of observations	2030	2030	2030	1980	1980	1980	2456	2456	2456
R-squared	0.071	0.040	0.059	0.111	0.081	0.091	0.081	0.070	0.015
Cragg-Donald F statistic		5.31**	42.30**		4.24**	41.72**		4.81**	45.40**
Stock-Yogo 5% critical value (20% max iv size)		3.95	30.59		3.95	30.59		3.95	30.59

Note: * p<0.10, ** p<0.05, *** p<0.01. Standard errors are clustered at the family level and are robust to heteroskedasticity
All regressions include wave, regional, and children's quarter of birth dummies

Table 2: Religiosity and children's health in a two-parent household (both parents are believers)

	Height-for-age			Body mass index			Subjective health		
	OLS	2SLS (exog. IVs)	2SLS (exog. and generic IVs)	OLS	2SLS (exog. IVs)	2SLS (exog. and generic IVs)	OLS	2SLS (exog. IVs)	2SLS (exog. and generic IVs)
	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.
Both parents are believers	0.035	-1.473 ***	-0.548 *	0.154	2.964 ***	1.157 ***	0.045 *	1.119 ***	0.604 ***
Child's gender	-0.189 **	-0.202 **	-0.202 **	0.324 ***	0.329 ***	0.326 ***	0.034	0.046	0.040
Child's age	0.016	0.008	0.015	-0.148 ***	-0.127 ***	-0.140 ***	-0.012 ***	-0.004	-0.008 *
Live in an urban area	0.459 ***	0.441 ***	0.450 ***	-0.724 ***	-0.693 ***	-0.713 ***	-0.163 ***	-0.141 ***	-0.152 ***
Household size	-0.120 ***	-0.074 *	-0.102 **	0.156 *	0.078	0.128	0.052 ***	0.022	0.037 ***
Mother's age	0.020 *	0.014	0.016	-0.012	-0.006	-0.010	-0.006 *	-0.003	-0.005
Father's age	-0.024 **	-0.022 **	-0.023 **	0.024	0.022	0.023	0.005	0.004	0.004
Parents married/cohabitating	0.082	0.186	0.127	-0.401	-0.577	-0.464	0.170	0.067	0.117
Mother with higher education	0.307 ***	0.373 ***	0.344 ***	0.092	0.022	0.067	-0.027	-0.055	-0.041
Father with higher education	0.138	0.171	0.155	-0.173	-0.210	-0.186	0.054	0.030	0.042
Mother employed	0.057	-0.091	-0.003	-0.215 *	0.048	-0.121	-0.060 **	0.047	-0.004
Father employed	-0.058	-0.208	-0.117	-0.074	0.219	0.031	-0.099 ***	-0.007	-0.051
Ln(equalized household income)	0.126 **	0.184 ***	0.140 **	0.019	-0.123	-0.031	0.050 ***	-0.010	0.019
Nr. of observations	2030	2030	2030	1980	1980	1980	2456	2456	2456
R-squared	0.070	0.069	0.051	0.111	0.103	0.077	0.081	0.064	0.112
Cragg-Donald F statistic		102.72**	29.9**		100.51**	24.9**		137.26**	25.9**
Stock-Yogo 5% critical value (20% max iv size)		6.66	23.50		6.66	23.50		6.66	23.50

Note: * p<0.10, ** p<0.05, *** p<0.01. Standard errors are clustered at the family level and are robust to heteroskedasticity
All regressions include wave, regional, and children's quarter of birth dummies

Table 3: Religiosity and children's health in a one-parent household

	Height-for-age			Body mass index			Subjective health		
	OLS	2SLS (exog. IVs)	2SLS (exog. and generic IVs)	OLS	2SLS (exog. IVs)	2SLS (exog. and generic IVs)	OLS	2SLS (exog. IVs)	2SLS (exog. and generic IVs)
	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.
Mother is a believer	0.371 **	-0.008	0.074	-0.076	-0.268	-0.121	-0.024	0.161	0.200
Child's gender	0.008	-0.008	-0.005	0.026	0.016	0.023	0.007	0.016	0.018
Child's age	0.024	0.025	0.025	-0.119 ***	-0.119 ***	-0.119 ***	-0.007	-0.008	-0.008
Live in an urban area	0.783 ***	0.792 ***	0.790 ***	-0.720 ***	-0.717 ***	-0.719 ***	-0.186 ***	-0.187 ***	-0.187 ***
Household size	-0.045	-0.060	-0.057	0.103	0.095	0.102	0.004	0.011	0.012
Mother's age	0.014	0.017	0.016	0.004	0.006	0.005	-0.010 **	-0.011 ***	-0.011 ***
Mother with higher education	0.492 ***	0.475 ***	0.479 ***	-0.063	-0.070	-0.064	-0.074	-0.062	-0.059
Mother employed	0.019	0.014	0.015	-0.078	-0.080	-0.078	0.065	0.071	0.072
Ln(equalized household income)	0.101	0.098	0.099	0.194 *	0.193 *	0.194 *	0.065 ***	0.064 **	0.064 **
Nr. of observations	779	779	779	739	739	739	1014	1014	1014
R-squared	0.099	0.093	0.096	0.073	0.072	0.073	0.052	0.038	0.032
Cragg-Donald F statistic		6.96**	26.27**		6.81**	25.89**		10.35**	25.03**
Stock-Yogo 5% critical value (20% max iv size)		6.66	20.31		6.66	20.31		6.66	20.31

Note: * p<0.10, ** p<0.05, *** p<0.01. Standard errors are clustered at the family level and are robust to heteroskedasticity
All regressions include wave, regional, and children's quarter of birth dummies

Appendix

Table A1: Sample descriptive statistics

Variable	Two-parent households				One-parent households			
	Nr. of obs.	Mean	Min	Max	Nr. of obs.	Mean	Min	Max
Child's characteristics								
Standardized height-for-age	2193	-0.57	-13.15	11.36	828	-0.69	-11.86	7.58
Standardized body mass index	2136	0.71	-6.09	23.95	785	0.60	-4.35	28.63
Subjective health status (1=very bad, 5=very good)	2651	3.62	1	5	1078	3.583	1	5
Child's gender (1=male)	2657	0.51			1080	0.52		
Child's age (years)	2657	7.7	0	14	1080	8.2	0	14
Mother's characteristics								
Considering herself as a believer (1=yes)	2718	0.79			1080	0.77		
Age	2657	33.5	16	58	1080	33.3	17	54
High education (1=has)	2718	0.22			1080	0.23		
Employed (1=yes)	2657	0.69			1080	0.74		
Father's characteristics								
Considering herself as a believer (1=yes)	2718	0.62						
Age	2657	36.1	18	67				
High education (1=has)	2718	0.20						
Employed (1=yes)	2718	0.79						
Household characteristics								
Both parents are believers (1=yes)	2718	0.38						
Live in an urban area (1=yes)	2718	0.60			1080	0.71		
Household size	2657	4.2	3	13	1080	3.7	2	13
Parents are married or cohabitating (1=yes)	2718	0.96			1080	0.38		
Ln(equalized household monthly income)= Ln(household monthly income/sqrt(household size))	2462	7.78	3.51	10.84	1016	7.66	4.04	10.32
Ethnic minority (1=speak at home a language other than Russian)	2718	0.29			1080	0.21		
Regional characteristics								
No. of churches per capita	2718	0.16	0	0.58	1080	0.14	0	0.58
Share of extremely cold days (below -25°C) from 1980 to a child's conception	2718	0.02	0	0.48	1080	0.02	0	0.41

Table A2: Religiosity and children's healh in a two-parent household by age groups

	Height-for-age			Body Mass Index			Subjective health		
	0-3 y.o.	4-7 y.o.	8-14 y.o.	0-3 y.o.	4-7 y.o.	8-14 y.o.	0-3 y.o.	4-7 y.o.	8-14 y.o.
	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.
Mother is a believer	-0.110	0.045	0.250	0.599	0.346	-0.045	-0.018	0.139	0.033
Father is a believer	-0.397	-0.438	0.120	0.669	-0.017	0.849 ***	0.298 **	0.114	0.522 ***
Child's gender	-0.480 **	-0.146	-0.129	0.385	0.069	0.398 ***	-0.063	0.004	0.092 **
Child's age	-0.269 **	0.268 ***	-0.015	0.394 **	-0.561 ***	-0.120 ***	-0.065 **	0.001	0.007
Live in an urban area	0.538 *	0.656 ***	0.312 ***	-0.425	-1.614 ***	-0.489 ***	-0.115 *	-0.225 ***	-0.147 ***
Household size	-0.187	-0.087	-0.082 **	0.263	0.348 *	-0.050	0.052 **	0.067 ***	0.025
Mother's age	0.027	0.006	0.011	-0.025	-0.006	-0.017	0.002	-0.006	-0.011 **
Father's age	-0.039 *	-0.021	-0.007	0.020	-0.008	0.040 ***	0.000	0.002	0.011 **
Parents married/cohabitating	0.055	0.432	-0.097	-0.771	-0.612	-0.201	0.204	-0.020	0.104
Mother with higher education	0.526 *	0.539 **	0.103	0.037	0.417	0.026	-0.117	0.068	-0.057
Father with higher education	0.593 *	0.014	0.102	-0.697 *	-0.191	-0.167	0.066	0.015	0.053
Mother employed	0.064	0.071	0.065	-0.475	-0.301	-0.108	-0.007	0.017	-0.070
Father employed	-0.136	0.050	-0.071	-0.162	0.069	0.099	-0.091	-0.143 **	-0.021
Ln(equalized household income)	0.005	0.187	0.141 **	-0.067	-0.157	0.044	0.044	0.040	0.025
No. of observations	424	486	1120	420	475	1085	496	599	1361
R-squared	0.104	0.147	0.058	0.040	0.175	0.090	0.050	0.102	0.082
Cragg-Donald F statistic	46.53**	34.28**	36.04**	47.28**	35.99**	35.92**	40.16**	39.65**	38.85**
Stock-Yogo 5% critical value (20% max iv size)	30.59	30.59	30.59	30.59	30.59	30.59	30.59	30.59	30.59

Note: * p<0.10, ** p<0.05, *** p<0.01. Standard errors are clustered at the family level and are robust to heteroskedasticity
The method of estimation is 2SLS with exogenous and generic instruments
All regressions include wave, regional, and children's quarter of birth dummies

Table A3: Religiosity and children's healh in a two-parent household by age groups (both parents are believers)

	Height-for-age			Body Mass Index			Subjective health		
	0-3 y.o. coef.	4-7 y.o. coef.	8-14 y.o. coef.	0-3 y.o. coef.	4-7 y.o. coef.	8-14 y.o. coef.	0-3 y.o. coef.	4-7 y.o. coef.	8-14 y.o. coef.
Both parents are believers	-0.599	-0.648	-0.457	1.249	0.685	1.061 ***	0.529 ***	0.306 **	0.846 ***
Child's gender	-0.487 **	-0.151	-0.131	0.411	0.080	0.392 ***	-0.068	0.013	0.093 **
Child's age	-0.269 **	0.275 ***	-0.020	0.391 **	-0.567 ***	-0.126 ***	-0.061 **	0.000	0.006
Live in an urban area	0.521 *	0.646 ***	0.328 ***	-0.401	-1.570 ***	-0.499 ***	-0.095	-0.220 ***	-0.146 ***
Household size	-0.182	-0.076	-0.061	0.249	0.329 *	-0.067 *	0.047 *	0.062 ***	0.012
Mother's age	0.030	0.006	0.010	-0.032	0.000	-0.014	-0.001	-0.004	-0.010 *
Father's age	-0.042 *	-0.020	-0.010	0.024	-0.013	0.039 ***	0.001	0.000	0.012 **
Parents married/cohabitating	0.077	0.453	-0.070	-0.800	-0.677	-0.218	0.205	-0.029	0.076
Mother with higher education	0.527 *	0.522 **	0.153	0.071	0.393	0.006	-0.110	0.063	-0.086
Father with higher education	0.619 *	0.027	0.095	-0.747 *	-0.193	-0.166	0.031	0.009	0.050
Mother employed	0.051	0.056	-0.015	-0.445	-0.253	-0.049	0.002	0.030	-0.016
Father employed	-0.137	0.013	-0.150	-0.117	0.139	0.127	-0.098	-0.123 *	0.014
Ln(equalized household income)	0.016	0.196 *	0.172 **	-0.079	-0.188	0.020	0.030	0.033	0.001
No. of observations	424	486	1120	420	475	1085	496	599	1381
R-squared	0.099	0.121	0.029	0.088	0.180	0.064	0.067	0.070	0.096
Cragg-Donald F statistic	42.03**	33.03**	36.79**	41.12**	31.68**	36.59**	39.99**	36.80**	49.71**
Stock-Yogo 5% critical value (20% max iv size)	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50

Note: * p<0.10, ** p<0.05, *** p<0.01. Standard errors are clustered at the family level and are robust to heteroskedasticity
The method of estimation is 2SLS with exogenous and generic instruments
All regressions include wave, regional, and children's quarter of birth dummies

Table A4: Religiosity and children's health in a one-parent household by age groups

	Height-for-age			Body massindex			Subjective health		
	0-3 y.o	4-7 y.o.	8-14 y.o.	0-3 y.o	4-7 y.o.	8-14 y.o.	0-3 y.o	4-7 y.o.	8-14 y.o.
	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.
Mother is a believer	1.679 **	-0.521	0.639	-1.547	-0.555	0.213	-0.012	-0.051	-0.008
Child's gender	-1.009 **	0.580	0.106	0.477	-0.903 *	0.116	-0.128	-0.145 *	0.054
Child's age	0.105	0.182	-0.099 **	0.227	0.137	-0.045	-0.108 ***	0.010	0.030 *
Live in an urban area	0.393	1.150 *	0.743 ***	-1.119	-0.651	-0.173	-0.276 **	-0.124	-0.202 ***
Household size	0.219 *	-0.228	-0.033	-0.347 *	0.410 **	0.070	-0.027	-0.019	0.048 *
Mother's age	-0.064	0.042	0.032 **	0.032	0.025	-0.009	-0.014	-0.016 **	-0.011 **
Mother with higher education	0.767	0.792 **	0.212	-1.557 **	-0.433	0.430 **	0.286 *	-0.071	-0.140 **
Mother employed	0.387	0.347	-0.217	-0.983	-0.091	0.157	0.129	-0.021	0.147 **
Ln(equalized household income)	0.133	0.001	0.142 *	0.582	0.092	0.051	0.004	0.060	0.073 **
Nr. of observations	129	167	483	123	160	456	162	234	618
R-squared	0.231	0.203	0.183	0.209	0.126	0.068	0.160	0.105	0.074
Cragg-Donald F statistic	22.88**	36.80**	29.42**	26.03**	29.71**	26.28**	23.33**	21.41**	24.70**
Stock-Yogo 5% critical value (20% max iv size)	20.31	20.31	20.31	20.31	20.31	20.31	20.31	20.31	20.31

Note: * p<0.10, ** p<0.05, *** p<0.01. Standard errors are clustered at the family level and are robust to heteroskedasticity
The method of estimation is 2SLS with exogenous and generic instruments
All regressions include wave, regional, and children's quarter of birth dummies