Mother's Education and Child Health: Is There a Nurturing Effect?

Yuyu Chen* Hongbin Li†

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*Guanghua School of Management, Peking University, Beijing, China; Tel.: 8610-6275-7902; fax: 8610-6275-1460; e-mail: chenyuyu@gsm.pku.edu.cn

†Contact author. Department of Economics, the Chinese University of Hong Kong, Shatin, Hong Kong; Tel.: 852-2609-8185; fax: 852-2603-5805; e-mail: lhongbin@cuhk.edu.hk

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Abstract

In this paper, we examine the effect of maternal education on the health of young children by using a large sample of adopted children from China. As adopted children are genetically unrelated to the nurturing parents, the educational effect on them is most likely to be the nurturing effect. We find that the mother's education is an important determinant of the health of adopted children even after we control for income, the number of siblings, health environments, and other socioeconomic variables. Moreover, the effect of the mother's education on the adoptee sample is similar to that on the own birth sample, which suggests that the main effect of the mother's education on child health is in post-natal nurturing. Our work provides new evidence to the general literature that examines the determinants of health and that examines the intergenerational immobility of socioeconomic status.

JEL Classification: I12; I21; O15

1 Introduction

Child health has become a key indicator of economic development. Among the eight Millennium Development Goals (MDGs) that were adopted by the 189 members of the United Nations (UN) in 2000, at least four are directly related to child health or nutritional status (Todaro and Smith, 2005).[1] In addition to being a development indicator itself, child health is also closely associated with other development indicators, such as adult health, educational attainment, productivity, and income (Currie and Hyson, 1999; Currie and Brigitte, 1999; Persico et al., 2004; Case et al., 2002, 2005; Behrman and Rosenzweig, 2004). Despite its importance, little is known about the causes of good or poor child health.

Among the potential determinants of child health, the mother's education has been the focus of economists. More educated mothers may have healthier children because they have better knowledge about health care and nutrition, have healthier behavior, and provide more sanitary and safer environments for their children (Behrman and Deolalikar, 1988, 1990; Strauss, 1990; Thomas et al., 1990, 1991; Desai and Alva, 1998; Glewwe, 1999; Currie and Moretti, 2003). In addition to the nurturing effect, nature could also play an important role. More educated mothers are more likely to have better health, which genetically leads to better health for their children (Behrman and Wolfe, 1987; Wolfe and Behrman, 1987). In econometric terms, the nurturing effect is the causal effect of the mother's education on child health, but the nature effect is caused by selection or omitted variables. Unfortunately, to the best of our knowledge, almost no previous studies have separated the nature effect from the nurturing effect.[2]

An understanding of how the mother's education affects child health will help us to evaluate a very important development policy in the world today: the improvement of women's education. In fact, two additional goals of the MDGs are to directly target the education of

[1] These four goals are to reduce child mortality, improve the mother's health, combat diseases, such as AIDS and malaria, and eradicate hunger.

[2] In general, few previous papers have been able to show the causal effect of the mother's education on child health. One exception is a recent paper by Currie and Moretti (2003) that uses school openings as an instrumental variable to identify the causal effect of the mother's education on child health.

women.[3] Raising the education of girls is also the priority of the World Bank.[4] According to the World Bank, one primary reason for this priority is that raising the education of women can greatly improve the health of the next generation. However, to justify the policy priority, one needs to show that the mother's education has a nurturing effect on child health. If the mother's education matters mainly because of nature, then policy interventions that increase it will not have any intergenerational effect on child health.

Our goal in this paper is to empirically separate the nature effect from the nurturing effect. This is achieved by analyzing a sample of 2,140 adopted children aged between 0 and 4 years from China, which is the largest developing country in the world. As adopted children are genetically unrelated to the nurturing parents, the educational effect on them is most likely to be the true post-natal nurturing effect.

Our empirical work shows that the mother's education indeed has a nurturing effect. Following the literature (Thomas et al., 1991; Strauss and Thomas, 1998), we use the height-for-age z-score as our measure of child health. As argued by Thomas et al. (1991), Strauss and Thomas (1998) and Behrman and Rosenzweig (2002), height is a measure of both short run and long run health status. We find that the mother's education is an important determinant of the height-for-age z-score for adopted children even after we control for income, the number of siblings, health environment, and other socioeconomic variables. Moreover, the effect of the mother's education on the adoptee sample is only slightly smaller than that of the own birth sample, which suggests that the main effect of the mother's education on child health is through post-natal nurturing. We further find that the effect of the mother's education on adoptees mainly comes from that on adopted girls, who are more likely to be of normal health than adopted boys in China. Our finding suggests that the policies of the United Nations and of the World Bank, and of governments of both developed and developing nations that target the education of women will have a strong influence on economic development.

[3]They are universal primary education and the elimination of the gender gap in education.

[4]See the official statement of the World Bank at www.wordbank.org.

This paper not only adds to the literature on the contributing factors to child health but also sheds light on the growing literature that examines the intergenerational immobility of socioeconomic status. Research shows that people who grow up in wealthier and more educated families are healthier, more educated, and perform better in the job market (Behrman and Rosenzweig, 2002; Case et al., 2002; Plug, 2004; Black et al., 2005). This intergenerational transfer of economic status starts as early as childhood (Case et al., 2002; Currie and Moretti, 2003; Currie and Stabile, 2003) or even in the womb (Case et al., 2005). In this paper, we focus on a particular aspect of the intergenerational transfer: the effect of the mother's education on the health of young children. To the best of our knowledge, this is the first use of adoptees to examine the effect of parental education on child health. Generally, economic studies that use adoptees are rare,[5] and our sample is probably the largest for adoptees.[6]

Similar to other studies that use adoptees, our paper has two potential limitations. First, adoptees are different from own birth children, and thus the role of the mother's education may be different for adopted children and own birth children. Following Sacerdote (2000), Plug and Vijverberg (2003 and 2005) and Plug (2004), we conduct a series of sensitivity tests, and do not find evidence that the difference between adoptees (and adoptive families) and own birth children (and families) affect our estimations. Second, the mother's education may still pick up some of the selection effect if more educated mothers adopt children of better quality. Generally, there is no way to perfectly address this issue because our data and other adoptee data do not include any information on the birth parents or the health of the children at the time of adoption. However, selection may be less of an issue in the case of adoptions in China because most adopted girls have been abandoned, and thus adoptive parents cannot select children based on the information of birth parents. Moreover, there is no reason to believe that more educated mothers tend to select healthier children.

[5]Recently, there have been a few papers that use samples of adoptees to study the intergenerational transfer of education, such as those of Sacerdote (2000), Sacerdote (2002), Plug and Vijverberg, (2003, 2005) and Plug (2004). Case et al. (2002) use adoptees to conduct a sensitivity test for their study of the effect of parental income on child health.

[6]All of these studies, except that of Sacerdote (2000), have samples of only a few hundred adoptees.

The structure of this paper is as follows. Section 2 describes infant abandonment and adoption in China. Section 3 lays out a simple empirical model. Section 4 describes the data and variables. Section 5 empirically tests the effect of the mother's education on child health, and Section 6 presents sensitivity tests. Section 7 concludes the paper.

2 Infant Abandonment and Adoption in China

China possibly has the most adoptees in the world. Although there are no formal statistics, some government agencies estimate that there are between 100,000 and 160,000 adoption cases every year (Liu, 1993; People's Daily, May 10, 1995).

Although child adoption is a universal phenomenon, it has many unique features in China because of the strong sex preference and the one-child policy. The preference for sons is deeply rooted both economically and culturally. A son is necessary for most Chinese parents, especially in rural areas, because few people have social security and it is customary for the son to support and care for aging parents. In addition, it is culturally important for the son to carry on the family name. In rural areas, households that do not have a son are discriminated against by friends and relatives because failure to carry on the family name is a serious sign of disrespect to one's ancestors.[7]

Since the one-child policy came into effect in 1979 the sex preference for boys has resulted in the widespread abandonment of girls. Under China's one-child policy, each household is allowed to have only one child. Later, the policy was relaxed in some rural areas to allow a second child if the first child is a girl. Households are given birth quotas, and births outside this quota, or "above-quota births," are heavily fined. Because of the one-child policy, parents who have a strong preference for boys may abandon their first or second girl and have another child without penalty. Thus, girl abandonment has resulted in a large number of girl adoptees. In addition to abandonment, children are put up for

[7]There is a succinct saying in Chinese that describes this vividly: "There are three ways to disrespect one's ancestors and not carrying on the family name is the biggest one" (*bu xiao you san, wu hou wei da*). Discrimination is also addressed in two other Chinese expressions: "no sons, no grandsons" (*duan zi jue sun*) and "extinction of descendants" (*jue hou*). All of these are extremely negative.

adoption if they are orphaned or their parents are unable to raise them. For these children, there is a balanced sex ratio.

Because of China's economic and cultural status, the adoption market also has unique features. First, most adoptees are girls. According to surveys by Johansson and Nygren (1991), Greenhalgh and Li (1995), Johnson et al. (1998), around 90 percent of abandoned infants are girls and around 80 percent of the adoptees are girls. Second, girl adoptees are on average of better quality than boy adoptees (Johnson, 1993; Johnson et al., 1998). Boys are generally abandoned because they are disabled or ill, whereas, most girls that are abandoned are normal. Johnson et al. (1998) find in their sample that only three percent of abandoned girls are disabled, ill or from disrupted families, in contrast to 76 percent of abandoned boys who are disabled, ill or from disrupted families. For their adoptee sample, less than one percent of the adopted girls are ill or disabled, but as much as 24 percent of adopted boys are ill or disabled. Third, because abandonment is illegal and above-quota births are heavily fined, parents usually travel a long distance to abandon their children. They normally put their children in a crowded public place, such as a train station, a hospital, or somewhere near an orphanage, with a thank you note and some basic information of the child, such as birth date, a bottle of milk, some clothes, and sometimes cash. Children that are picked up from these public places usually end up in a state-run orphanage. Finally, most children were abandoned and adopted at a very early age. To avoid complications, most adoptive parents prefer to adopt young infants. For this reason and also to avoid being caught for having above-quota births, most parents abandon their children at a very early age. According to Johnson et al. (1998), the majority of parents abandon their children in the first three months and the majority of these children are adopted in the first six months.

To supplement the one-child policy and to legally protect adoptees and adoptive parents, the government passed its first adoption law in April 1992. The law restricts the adoption of healthy foundlings to those who are childless and over 35 years of age. The age limit is to prevent adoptive parents from subsequently having their own birth children. However, in most areas, neither restriction applies because of the large number of abandoned

children that are waiting to be adopted. The law has little impact on our study as our data were collected in June 1992.

3 Empirical Model

We examine the relationship between child health and the mother's education by using the following child health equation:

$$HAZ_i = \beta_0 + \beta_1 medu_i + X_i\beta_2 + \epsilon_i \tag{1}$$

where HAZ, to be defined next, is a measure of child health, medu is the mother's education, X are other control variables, β_0, β_1 and β_2 are the corresponding vectors of coefficients, and ϵ is the residual. The subscript i denotes child i. We hypothesize that β_1 is greater than zero, or the mother's education has a positive effect on child health.

Following the literature (Thomas et al., 1991; Strauss and Thomas, 1998), we use the height-for-age z-score (HAZ) as a measurement of child health. The child anthropometric measurements, such as height-for-age, provide useful information for the child health status, are easy to administer, and are comparable across different ages and sexes. HAZ is a particularly good health indicator as it is a measure of both short and long-term health status (Thomas et al., 1991; Strauss and Thomas, 1998; Behrman and Rosenzweig, 2002).[8] The height-for-age z-score is defined as follows.

$$HAZ_i = \frac{h_{ij} - \overline{h}_j}{\sigma_j},$$

where h_{ij} is the observed height of child i in group j, where a group is defined according to child sex and the birth month. $\overline{h}_j$ and σ_j are the median and standard deviation of the height in group j, using American children as the reference population.[9]

[8]Using weight-for-age z-score and weight-for-height (BMI) yields similar results.

[9]Onis and Yip (1996) suggest that although there are some variations in the growth patterns of children from different races and/or ethnic backgrounds in developing countries, we use the American (or international) reference population, as the variations are relatively minor. The use of a common reference population has its advantages, as the population can be compared locally and with other countries. Onis and Yip also argue that it is not appropriate to develop a local reference or standard, as children who come from less developed areas may have poor health and nutrition. If we use these children as a reference, then the screening value for the investigation of health and nutritional status is lower.

4 Data

In this paper, we use the Chinese Children Survey that was conducted by the National Bureau of Statistics of China in June 1992. The survey was funded and supported by the United Nations Children's Fund, the Ministry of Education of China, the Ministry of Health of China, and the All Women's Federation of China. The purpose of the survey was to learn about the welfare of children aged 0 to 14 years. The survey randomly sampled 560,000 households and two million individuals (including children, their parents, and other family members) throughout China. This is probably the largest dataset for the study of child welfare in China. Most respondents (76 percent) of the survey were mothers of children, 14 percent were fathers, and the rest were other caregivers of the children.

In this paper, we focus on a sample of children aged 0 to 4 years, whose height and immunization history have been reported. The sample's total is 129,858 children. The heights (or lengths) of children of 24 months or younger were measured while they were lying down and those of older children were measured while they were standing up. Immunization history, including vaccination for BCG (bacillus calmette guerin), poliomyelitis, pertussis-diphtheria-tetanus, and measles was reported by the respondents.

The health status of Chinese children was poor when compared with international standards. Note that the average z-score was -1.376, which suggests that Chinese children were more than one-standard deviation shorter than American children in the same reference group. According to the standardized welfare indicators for children that are defined by the World Bank, children with a HAZ below two standard deviation points from the median of the reference population are considered stunt. In 1992, 32.5 percent of Chinese children were stunt. Moreover, many children had not been immunized. About 14 percent of the children had not received the BCG vaccine, 14 percent had not received the poliomyelitis vaccine, 18 percent had not received the pertussis-diphtheria-tetanus vaccine, and 25 percent had not received the measles vaccine. Only about half of the children had received all four vaccines in 1992.

In addition to health measures, the survey also provides detailed family and other socioeconomic variables. In particular, there is one question on the relationship between the child and his or her parents: 1=both birth parents, 2=one birth parent, 3=adopted from relatives, and 4=other adoptions. In the sample, 97.98 percent of the children have both birth parents, 0.37 percent has one birth parent, 0.13 percent is adopted from relatives, and 1.52 percent is adopted without bloodlines. In total, we have 2,140 adoptees aged between 0 and 4 in our sample and around 1,700 adoptees with complete information. This is probably the largest adoptee sample ever used in economics. The information on parents includes their education, family income, family size, and the family structure. Moreover, the survey also provides some environmental variables, such as whether the household has running water, their own water source, and a flushing toilet.

Similar to adoptee samples from other countries (see e.g. Plug and Vijverberg (2003) and Plug (2004)), the adoptee sample differs from the own birth sample in many characteristics. In particular, adoptees on average have poorer health than the own birth children. The average HAZ is -1.678 for the adoptee sample, but it is 0.307 higher for the own birth sample. Adoptive mothers are also less educated than other parents, with a difference of 1.412 years of schooling. There are also two particular characteristics of the Chinese adoptee sample that differ from adoptee samples from most other countries. First, the sex ratio of the adoptee sample is very low, with less than 20 percent being boys.[10] This reflects the one-child policy and the boy preference in China. Second, adoptive parents are about seven years older than other parents, which reflects the fact that most Chinese parents adopt children only after failure to have their own for many years.

5 Mother's Education and Child Health

In this section, we report the regression results. We first examine the effect of the mother's education on the health of adopted children and then examine the impact of the father's education. As a comparison, we also estimate the same child health equations by using

[10]The adoptee sample from Korea collected by Sacerdote (2000) also has an unbalanced sex ratio.

the own birth sample. Finally, we test whether the effect of the mother's education differs according to the sex of the child.

5.1 Health of Adopted Children

In this section, we examine the effect of the mother's education on child health by using the adoptee sample. The dependent variable for all regressions is the height-for-age Z-score (HAZ). The choice of independent variables follows that of Case et al. (2002), Plug and Vijverberg (2003) and Plug (2004). We employ ordinary least squares regressions and report standard errors that are robust to heteroscadesticity and clustering at the family level.

The first column in Table 2 reports a baseline specification with the mother's education, age, age squared, and sex as independent variables. This simple regression shows that the mother's education has a large positive effect on child health. The variable mother's education has a positive coefficient and it is significant at the one percent level. An additional year of education for the mother increases HAZ by 0.064: that is, 0.064 standard deviations of the height for children of the same age and sex. More intuitively, compared to an illiterate woman, a woman with primary school education (6 years) has children who are about 0.4 standard deviations taller, and a high school graduate (12) has children who are about 0.8 standard deviations taller.

Other variables have expected signs. Boys have a 0.176 standard deviations advantage in terms of height over that of girls, and there is a concave relationship between HAZ and age. The advantage of boys suggests that compared to international standards, Chinese boys have a smaller disadvantage in terms of height than girls. The negative coefficient of age and the positive coefficient of age squared are both significant at the one percent level. HAZ increases with age but with a decreasing slope, which suggests that although Chinese children have a great disadvantage at birth, they tend to catch up somewhat over time.

In addition to education, another important determinant of child health is parental income. Wealthier parents can afford medical care and more nutritious food, and can provide a better environment so that their children are healthier (Smith, 1999; Case et al., 2002).

When we add log per capita household income in the second column, the effect of the mother's education on child HAZ remains significant at the one percent level. The estimated coefficient decreases only marginally, which suggests that the main effect of the mother's education on child health is not through income. The newly added log income also has an expected positive sign, and is significant at the one percent level.

In column 3, we add another important variable, the number of siblings, as a control. The number of siblings can affect child health because with more children, the parents have less time and money for each child and as a result each of them may have poorer health (Becker and Lewis, 1973). Thus, we should expect the number of siblings to have a negative sign. The number of siblings has an expected negative coefficient and is significant at the one percent level. One more sibling reduces the HAZ by 0.238 standard deviations. When controlling for the number of siblings, the effect of the mother's education is reduced only marginally. This suggests that educated mothers tend to have a smaller family size, but most of the effect of the mother's education on child health is not through the effect of family size.

We next test whether the mother's education matters for child health, as highly educated mothers tend to live in a more hygienic environment. Improvements in domestic water supplies and excreta disposal facilities benefit the health of children, as they can reduce exposure to pathogens. Education may therefore affect child health by providing a household with more sanitation, such as running water or flushing toilets (Strauss, 1990; Horton, 1988; Case, 2001). We have three measures for health environment: a dummy for whether the household has running water, a dummy for whether the household has its own water source, and a dummy for whether the household has a flushing toilet. Although these are standard household facilities in developed countries, they were far less standard in a developing country like China in the 1990s. As shown in column 1 of Table 1, only about 30 percent of the children in our sample live in places with running water, and as little as 10 percent of the children use a flushing toilet. Interestingly, these measures for health environment have a big influence on the effect of the mother's education. The coefficient on the mother's education is reduced to 0.033 in column 4, but remains significant at the one percent level. Moreover,

the three health environment variables are jointly significant at the one percent level, which suggests that children are indeed healthier in better environments. These results together suggest that it is true that better educated mothers raise their children in more hygienic environments and thus have healthier children.

Finally, in columns 5 and 6, we include the rural and regional dummies. If we include these location dummies they can control for any unobserved difference between localities that matter for child health. For example, it can be that children in certain parts of China are genetically taller than children in other parts. Controlling for these dummies reduces the estimated coefficient on the mother's education, but it remains significant at the one percent level. After including all these controls, the remaining effect of the mother's education is 0.022 in column 5 and 0.032 in column 6. Note also that children in rural areas have a disadvantage as high as 0.528-0.874 standard deviations.

To summarize, we find that the mother's education has a positive effect on the health of adopted children. The effect is robust to different regression specifications that control for other variables that affect child health. The findings suggest that the mother's education has an important nurturing effect on child health. We also find that this nurturing effect of mother's education may also be attributed to more income, fewer children, and better environments.

In the interpretation of results associated with columns 2 to 5, we exercise some caution. All of the newly added variables, such as income, the number of siblings, and health environments can be endogenous. For example, the number of children and child quality (health) are simultaneously chosen as in the model of Becker and Lewis (1973). Income can also be endogenous as ill children may affect parents' labor supply and income negatively. However, resolving the endogeneity of these variables is not our current focus. We are mainly interested in the examination of whether the mother's education affects child health through genes, or through post-natal nurturing, such as more income, fewer children, and healthier environments. We find that income, the number of siblings, and environments are all important, but education may also affect child health through other non-gene mechanisms.

5.2 Parental Education

In addition to the mother's education, the father's education can also be important for child health. Although the literature has provided overwhelming evidence that the mother's education is more important, few studies have examined the relationship between the father's education and child health (Case et al., 2002). This may be due to the fact that fathers devote less time to childcare, and thus the relationship between the father's education and child health may not be immediate. However, in China, the father's education can be important because generally fathers have more education than mothers. In our sample, fathers have about two more years of education than mothers. If the maximum education in a family matters, then the father's education could be even more important than the mother's education in China.

To test whether the father's education, or more generally, parental education matters, we try a few alternative model specifications that use different measures of parental education in the last four columns in Table 2. Two features of these regressions are noteworthy. First, the mother's education is more important than the father's education for child health, though the difference is small. Second, the average of the two parents' education has the largest effect among all measures of the parental education that is followed by the maximum of the two parents' education.

5.3 Health of Own Birth Children

In this subsection, we repeat the same regressions by using the sample of own birth children. Comparing the results of the own birth sample with those of the adoptee sample is a way to check how important the nurturing effect is.

The regression results that are reported in Table 3 suggest that the main role of the mother's education is the post-natal nurturing effect. The estimated coefficients for the mother's education for all specifications are only slightly larger than those that are reported in Table 2. The difference in the estimated coefficients on the mother's education between the own birth and adoptee samples is not statistically significant for any of the specifications.

As the mother's education for the own birth sample picks up both the nature and nurturing effect, but for the adoptee sample picks up only the nurturing effect, the small difference in terms of the estimated coefficients between the two samples suggests that the nurturing effect is the major part of the education effect.

Other variables in regressions for the own birth sample behave similarly. The father's education has a positive effect but this effect is generally smaller than that of the mother's education. Moreover, the father or parents' education have a very similar effect on the health of own birth children to that of adoptees. These results confirm our early findings that the parents' education is mainly the nurturing effect. Age has a negative and concave effect on the HAZ of children, and boys also have an advantage for own birth children. Income has a large effect on health and it remains significant in all specifications. Health environment also has a large and significant effect on the health of Children. Finally, children in rural areas have a similar disadvantage to that of the adoptee sample.

5.4 Boys versus Girls

One important difference between the two samples is that the adoptee sample has too few boys (only 19.5 percent). There are at least two reasons why the effect of the mother's education may differ for boys and girls. First, it is observed that the mother's education matters more for the height of girls than boys, because more educated mothers may allocate more household resources to girls than boys (Thomas, 1994). As the adoptee sample is overrepresented by girls, the effect of the mother's education may be over-estimated. Second, in China, adopted boys may be of low quality for specific reasons. Because of the one-child policy and sex preference, Chinese parents are more likely to abandon girls. Hence, we observe that more than 80 percent of the adoptees are girls. Because of the sex preference, parents abandon boys only when the boys are disabled or ill. Thus, it is more likely that normal girls are abandoned and adopted, but ill boys are abandoned and adopted. If the mother's education has a larger effect on normal children than ill children, we should expect that the mother's education has a larger effect on adoptive girls than boys.

For this test and all of the sensitivity tests in the next section, we will use specification (6) from Tables 2 and 3. We use a specification that excludes income, the number of siblings and environmental variables because these variables are not our focus and they are likely to be endogenous.

Regression results for boys and girls are reported in Table 4. Interestingly, the mother's education has almost an identical effect on the health of boys and girls for the own birth sample. This suggests that there is no evidence to suggest that the mother's education affects girls' health more than boys' health in China. For the sample of adopted girls, the effect of the mother's education is almost the same as that of the sample of own birth girls, but for the sample of adopted boys it is much smaller and is not significantly different from zero. These results confirm prior findings (for example, Johnson et al. (1998)) that adopted boys are of poorer health, but adoptive girls are generally healthy or healthier.

6 Sensitivity Analysis

As in other studies that use adoptees, there are two potential problems that may prevent us from making a strong statistical inference. First, adoptees may be different from own birth children, adoptive mothers may be different from other mothers, and parents may treat adoptive children differently. Thus, it may be questionable to generalize findings from adoptees to all children. In other words, the results that use adoptees may not be directly comparable to those that use the own birth sample. Second, using adoptees cannot completely remove the nature effect. If more educated mothers choose healthier children, then the mother's education will still pick up some of the nature (or selection) effect.

In the following analysis, we conduct a series of sensitivity tests. Generally, there is no perfect way to deal with these problems unless adoptees and adoptive mothers are randomly selected from the population and they are also randomly matched. However, we can still follow some tests designed by Plug and Vijverberg (2003, 2005) and Plug (2004) to illustrate how serious these problems are for our study. In all the sensitivity tests, we use only the sample of girls, and focus on specification 6 in Tables 2 and 3. The results are very similar

if we use other specifications.

6.1 Non-Linear Effect of Education

First, we test whether the mother's education has a non-linear effect. As shown in Table 1, adoptees differ from own birth children in most of the variables we observe. In particular, adoptees have poorer health and their mothers have fewer years of education than own birth children. Can the effect of the mother's education also differ for the two samples? For example, if the effect of the mother's education is nonlinear, then the estimated effects of the two samples are not directly comparable because they measure the return to education at different levels.

To test whether the effect of the mother's education is non-linear, we use the mother's education levels - that is, primary school, junior high school, and high school or above dummies (the base group is the illiterate group) - rather than a continuous education variable in our specifications. Regression results are reported in the first two columns of Table 5. The coefficients of all three education level dummies are positive and significant for the own birth sample. The magnitude of the coefficient also increases with education level as expected. For the adoptee sample, all three education dummies have positive coefficients, and the ones on junior high school and high school dummies are significant at the one percent level. Moreover, none of the coefficients on the education dummies are statistically different for the two samples. These results suggest that nonlinearity may not be the reason to find similar effects of the mother's education for the two samples.

6.2 Are Adoptees Treated Differently?

We next test whether the way mothers treat their children affects our estimation. Adoptive parents may treat adopted children differently from other parents. Adoptive parents may treat adopted children poorly when they realize that the personality or intelligence of adoptees is different from their own. Many adoptive parents also have own birth children and it may be that adoptive parents treat their own birth children differently than adoptees.

Some adoptive parents have their own children after adoption and may favor their own children for genetic or emotional reasons (Case t al., 2000, 2001). Sometimes, people may adopt a girl to "lead in" their own birth boy. If they get their own boy, the adopted girl may become useless and thus be treated poorly. Adoptive parents may also treat adoptees better because they may worry about the negative psychological effect of being adoptees among peers. Adoptive parents may also want to compensate for adoptees' early misfortune (Johnson et al., 1998). Finally, it is likely that better educated mothers of own birth children spend less time on childcare and thus the return to their education is lower.

We have three tests of whether treatment matters. In our first test, we control for the way a child is cared for. If how well a child is cared for matters, then including a measure of the care given may change the effect of the mother's education in the two samples differently. We use a dummy variable for the mother being the main caregiver of the child as a measure of how well the child is treated. Adoptive mothers may care for adoptees more or less because of their preference for either own births or adoptees. Adoptive mothers may also spend more time taking care of children because they are less educated than other mothers and thus may have a lower opportunity cost. In columns 3 and 4 of Table 5, we report regressions controlling for a dummy variable for the mother as the main caregiver. When controlling for this variable, the coefficients on the mother's education variable do not change for both own birth and adoptee samples. These results suggest that the mother being the caregiver does not influence the estimated effect of the mother's education on child health.

In our second test, we directly examine whether adoptees are treated differently in a way that is related to the mother's education. In particular, we estimate the effect of the mother's education on the likelihood of a child receiving immunizations. Although immunization shots such as BCG, poliomyelitis, pertussis-diphtheria-tetanus, and measles are common in developed countries, it was less so in China in the 1990s. About half of the children in our sample had not received one out of four of the vaccines. Our regression results show that adoptive mothers do not differ from other mothers in health care. Columns 5 and 6 of Table 5 report regressions that use own and adoptee samples respectively. The

dependent variable is a dummy for having received all four vaccines (1 = having received all four vaccines, 0 = missing at least one of them). The effect of the mother's education is exactly the same (0.011) for both samples.

In our third test, we examine a sample of adoptees that live in families with own birth children. If adoptees are treated differently in these families, then the mother's education has a different effect on child health. The regression reported in column 7 shows that the mother's education has an almost identical effect on health for this sub-sample of adopted girls as for other adopted girls. Thus, there is no evidence to suggest that adoptees that are raised in families with own birth children are treated differently in a way that influences the estimated effect of the mother's education on child health.

6.3 Are Adoptive Parents Different?

It may also be that adoptive parents have better parenting skills and this is why they adopt children. If this is true, then the effect of the mother's education that is estimated using adoptees is over-stated when an inference is made for the rest of the population. To test whether adoptive parents are better parents, we follow Plug (2004) and use a sample of own birth children in adoptive families. If adoptive families are different, then we should be able to see that the effect of the mother's education for this sample is different from the sample of own birth children. The regression reported in column 8 of Table 5 shows that the effect of the mother's education is not significantly different from that of the sample of all own birth girls (column 1 of Table 4).

6.4 Selection Effect

There may still be some selection or nature effect with the adoptee sample. Some families may adopt children from relatives (called *guo ji* in Chinese). This may happen if the natural parents do not have the ability to raise all of their own children and it may also happen if natural parents want to have more children, especially boys, but do not want to pay the fertility fine. By excluding bloodline adoptions from the sample, we can examine whether

and by how much this kind of adoption has biased our estimations of the nurturing effect. Specifically, we estimate the child health equation by using only girl adoptees without bloodlines. The regression reported in column 9 of Table 5 continues to show that the mother's education has a positive and significant effect on the health of adopted girls with no bloodlines with the nurturing parents. Moreover, the magnitude of the effect is very similar to that of all adopted girls (column 3 of Table 4).

Even for adoptees without bloodlines, there may still be selection effect. If more educated mothers tend to adopt healthier children, then the mother's education will still pick up some of the nature effect. For example, more educated mothers may live closer to an orphanage with high-quality abandoned girls. Or perhaps, more educated mothers care more about child height, or are more able to assess the health status of a child. Generally, there is no perfect way to evaluate selection of this sort due to the limitations of our data.[11]

Although we do not have a good econometric test for the selection effect, we provide a few reasons for why selection may not be an issue in China. First, most adoptees in China are illegally abandoned girls. Thus, birth parents cannot select the adoptive parents and adoptive parents cannot select children based on the information of the birth parents. Second, all parents want to adopt healthy children and it may not be true that well educated mothers tend to pick taller or healthier children. The opposite may be true. Less educated mothers may select taller children if the return to height increases for low-skilled jobs.[12]

7 Conclusions

In this paper, we have examined the effect of the mother's education on the health of young children by using a large sample of adopted children from China. As adopted children are genetically unrelated to the nurturing parents, the education effect for them is most likely the nurturing effect. We find that the mother's education is an important determinant

[11] Ideally, these problems could be solved if we observe the information about the children's birth parents and about the children themselves before they were adopted.

[12] The return to height may decrease with education if height is valued more for low-skilled jobs. See, for example, Thomas and Strauss (1997) and Strauss and Thomas (1998) for detailed arguments.

of the health of adopted children even after we control for income, the number of siblings, health environments, and other socioeconomic variables. Moreover, the effect of the mother's education for the adoptee sample is similar to that for the own birth sample, which suggests that the main effect of the mother's education on child health is in post-natal nurturing. Our further sensitivity tests do not show any evidence that the difference of adoptees from own birth children affects the estimated effect of the mother's education on child health. Although using a sample of adoptees cannot solve all econometric issues, such as selection, the empirical results are suggestive that the mother's education has a nurturing effect. Our work also provides new evidence for the general literature that examines the intergenerational immobility of capital, human capital, and health capital.

Our finding that the mother's education has a nurturing effect on child health may shed light on public policies in developing countries. First, our finding that an important part of the health capital is accumulated through nurturing suggests that the health of the poor can be improved and the inequality of health can be reduced by public policies, such as the improvement of women's education. Second, there are many policies that may improve the health status of a country, but few empirical studies have shown any of these policies have a causal effect on health. To this end, our finding that the education level of women has a causal effect on the health of the next generation provides strong support for the policies adopted by the United Nations and the World Bank.

References

Becker, Gary and Gregg Lewis, 1973. "On the interaction between the quantity and quality of children," *Journal of Political Economy* 81(2), S279-288.

Behrman, Jere and Anil Deolalikar, 1988. "Health and nutrition," in Hollis Chenery and T.N. Srinivasan eds. *Handbook of Development Economics, Volume 1*, Amsterdam: North-Holland.

Behrman, Jere and Anil Deolalikar, 1990. "The intrahousehold demand for nutrients in rural South India: Individual estimates, fixed effects and permanent income," *Journal of Human Resources* 25(4), 665-696.

Behrman, Jere and Mark Rosenzweig, 2002. "Does increasing women's schooling raise the schooling of the next generation?" *American Economic Review* 92(1), 323-334.

Behrman, Jere and Mark Rosenzweig, 2004. "Returns to birthweight," *Review of Economics and Statistics* 86(2), 586-601.

Behrman, Jere and Barbara Wolfe, 1987. "How does mother's schooling affect the family's health, nutrition, medical care usage, and household sanitation?" *Journal of Econometrics* 36, 185-204.

Black, Sandra, Paul Devereux and Kjell Salvanes, 2005. "Why the apple doesn't fall far: Understanding intergenerational transmission of human capital," *American Economic Review* 95(1), 437-449.

Case, Anne, 2001. "Does money protect health status? Evidence from South African pensions," *NBER Working paper* No. 8495.

Case, Anne, Angela Fertig, and Christina Paxson, 2005. "The lasting impact of childhood health and circumstance." *Journal of Health Economics* 24, 365-389.

Case, Anne, I-Fen Lin and Sara McLanahan, 2000. "How hungry is the selfish gene?" *Economic Journal* 110(466), 781-804.

Case, Anne, Darren Lubotsky and Christina Paxson, 2002. "Economic status and health in childhood: The origins of the gradient," *American Economic Review* 92(5), 1308-1334.

Case, Anne and Christina Paxon, 2001. "Mothers and others: Who invests in children's health?" *Journal of Health Economics* 20, 301-328.

Currie, Janet and Rosemary Hyson, 1999. "Is the impact of health shocks cushioned by socioeconomic status? The case of low birthweight," *American Economic Review Papers and Proceedings* 89(2), 245-250.

Currie, Janet and Brigitte Madrian, 1999. "Health, health insurance, and the labor market," in Orley Ashenfelter and David Card eds. *Handbook of Labor Economics, Volume 3A*, Amsterdam: North-Holland.

Currie, Janet and Enrico Moretti, 2003. “Mother’s education and the intergenerational transmission of human capital: Evidence from college openings,” *Quarterly Journal of Economics* 118, 1495-1532.

Currie, Janet and Mark Stabile, 2003. “Socioeconomic status and child health: Why is the relationship stronger for older children?” *American Economic Review* 93(5), 1813-1823.

Desai, Sonalde and Soumya Alva, 1998. “Maternal education and child health: Is there a strong causal relationship?” *Demography* 35(1), 71-81.

Glewwe, Paul, 1999. “Why does mother’s schooling raise child health in developing countries? Evidence from Morocco,” *Journal of Human Resources* 34(1), 124-159.

Greenhalgh, Susan and Jiali Li, 1995. “Engendering reproductive policy and practice in peasant China: For a feminist demography of reproduction,” *Signs* 20(3), 601-641.

Horton, Susan, 1998. “Birth order and child nutritional status: Evidence from the Philippines,” *Economic Development and Cultural Change* 36(2), 341-354.

Johansson, Sten and Ola Nygren, 1991. “The missing girls of China: A new demographic account,” *Population and Development Review* 17(1), 35-51.

Johnson, Kay, 1993. “Chinese orphanages: Saving China’s abandoned girls,” *Australian Journal of Chinese Affairs* 30, 61-87.

Johnson, Kay, Banghan Huang and Liyao Wang, 1998. “Infant abandonment and adoption in China,” *Population and Development Review* 24(3), 469-510.

Liu, Mingli, 1993. “Papa, Mama, don't throw me away.” *Social Work* 1, 39.

Onis, M.D. and Yip, R., 1996. The WHO growth chart: Historical considerations and current scientific issues. *Bibl Nutr Dieta, Karger* 53, 74-89.

Persico, Nicola, Andrew Postlewaite and Dan Silverman, 2004. “The effect of adolescent experience on labor market outcomes: The case of height,” *Journal of Political Economy* 112(5), 1019-1053.

Plug, Erik, 2004. “Estimating the effect of mother’s schooling on children’s schooling using a sample of adoptees,” *American Economic Review* 94(1), 358-368.

Plug, Erik and Wim Vijverberg, 2003. “Schooling, family background, and adoption: Is it nature or is it nurture?” *Journal of Political Economy* 111(3), 611-641.

Plug, Erik and Wim Vijverberg, 2005. “Does family income matter for schooling outcomes? Using adoptees as a natural experiment,” *Economic Journal* 115, 879-906.

Sacerdote, Bruce, 2000. “The nature and nurture of economic outcomes,” NBER Working Paper no. 7949.

Sacerdote, Bruce, 2002. "The nature and nurture of economic outcomes," *American Economic Review Papers and Proceedings* 92, 344-348.

Smith, James, 1999. "Healthy bodies and thick wallets: The dual relation between health and economic status," *Journal of Economic Perspectives* 13(2), 145-166.

Strauss, John, 1990. "Households, communities, and preschool child nutrition outcomes: Evidence from Cote d'Ivoire," *Economic Development and Cultural Change* 38(2), 231-261.

Strauss, John and Duncan Thomas, 1998. "Health, nutrition and economic development," *Journal of Economic Literature* 36(2), 766-817.

Todaro, Michael and Stephen Smith, 2005. Economic Development, ninth edition, Pearson-Addison Wesley: Boston.

Thomas, Duncan, 1994. "Like father, like son; like mother, like daughter: Parental resources and child height" *Journal of Human Resources* 29(4), 950-988.

Thomas, Duncan and John Strauss, 1997. "Health and wages: Evidence on men and women in urban Brazil," *Journal of Econometrics* 77, 159-185.

Thomas, Duncan, John Strauss and Maria-Helena Henriques, 1990. "Child survival, height for age and households characteristics in Brazil," *Journal of Development Economics* 33, 197-234.

Thomas, Duncan, John Strauss and Maria-Helena Henriques, 1991. "How does mother's education affect child height?" *Journal of Human Resources* 26(2), 183-211.

Wolfe, Barbara and Jere Behrman, 1987. "Women's schooling and children's health: Are the effects robust with adult sibling control for the women's childhood background?" *Journal of Health Economics* 6, 239-254.

Table 1: Summary Statistics of Variables for Children Under 4 Years

	Whole sample	Adoptees	Own birth children	Difference
	(1)	(2)	(3)	(4) = (2)-(3)
Number of observations	129,858	2,140	127,718	--
Height	82.675	82.838	82.672	0.167
	(11.841)	(11.082)	(11.853)	(0.258)
HAZ	-1.376	-1.678	-1.371	-0.307***
	(1.641)	(1.662)	(1.640)	(0.036)
Age (months)	27.563	29.171	27.537	1.634
	(13.795)	(13.049)	(13.806)	(0.301)
Gender	0.538	0.195	0.544	-0.349***
	(0.499)	(0.397)	(0.498)	(0.011)
Mother's age	27.616	34.222	27.522	6.700***
	(4.499)	(7.619)	(4.367)	(0.106)
Father's age	29.545	36.699	29.444	7.255***
	(5.408)	(8.961)	(5.272)	(0.130)
Mother's education	6.753	5.361	6.773	-1.412***
	(3.833)	(4.135)	(3.825)	(0.091)
Father's education	8.352	7.588	8.363	-0.775***
	(3.076)	(3.359)	(3.071)	(0.075)
Average parents' education	7.527	6.458	7.542	-1.084***
	(3.016)	(3.184)	(3.011)	(0.073)
Maximum parents' education	8.755	8.035	8.765	-0.729***
	(2.961)	(3.260)	(2.955)	(0.072)
Mother being the main caregiver	0.833	0.663	0.835	-0.172***
	(0.373)	(0.473)	(0.371)	(0.008)
Per capita income	839.725	794.099	840.489	-46.390***
	(715.224)	(505.890)	(718.188)	(15.589)
Log of per capita income	6.514	6.507	6.514	-0.007
	(0.672)	(6.031)	(0.673)	(0.015)
Number of siblings	0.784	0.726	0.785	-0.056***
	(0.902)	(0.897)	(0.902)	(0.020)
Have running water	0.304	0.262	0.305	-0.043***
	(0.460)	(0.440)	(0.460)	(0.010)
Have own water source	0.477	0.485	0.477	0.008
	(0.499)	(0.500)	(0.499)	(0.011)
Have a flushing toilet	0.102	0.061	0.103	-0.041***
	(0.302)	(0.240)	(0.303)	(0.007)
Rural household	0.819	0.877	0.819	0.058***
	(0.384)	(0.328)	(0.385)	(0.008)
Have BCG vaccine	0.857	0.809	0.858	-0.049***
	(0.350)	(0.393)	(0.349)	(0.010)
Have poliomyelitis vaccine	0.858	0.822	0.858	-0.036***
	(0.349)	(0.382)	(0.348)	(0.010)
Have pertussis-diphtheria-tetanus vaccine	0.818	0.778	0.819	-0.041***
	(0.386)	(0.416)	(0.385)	(0.011)
Have measles vaccine	0.745	0.727	0.746	-0.019
	(0.436)	(0.446)	(0.435)	(0.014)

Note: Columns 1-3 report mean and standard deviations (in parentheses); column 4 reports the t-test of the difference between columns 2 and 3 with standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 2: Ordinary Least Squares Estimates of the Effect of Mother's Education on the Health of Adopted Children (Dependent variable: HAZ)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mother's education	0.064***	0.057***	0.053***	0.033***	0.022**	0.032***		0.028***		
	(0.009)	(0.010)	(0.009)	(0.010)	(0.010)	(0.010)		(0.010)		
Father's education							0.023*	0.010		
							(0.013)	(0.013)		
Parental education (mean)									0.040***	
									(0.014)	
Parental education (max)										0.028**
										(0.013)
Age (months)	-0.055***	-0.057***	-0.054***	-0.053***	-0.057***	-0.057***	-0.061***	-0.061***	-0.061***	-0.061***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)	(0.014)
Age squared	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sex	0.176*	0.165	0.200*	0.176*	0.121	0.116	0.137	0.136	0.138	0.136
	(0.101)	(0.102)	(0.102)	(0.102)	(0.101)	(0.099)	(0.101)	(0.101)	(0.101)	(0.101)
Log per capita household income		0.221***	0.167**	0.055	0.118					
		(0.069)	(0.069)	(0.072)	(0.075)					
The number of siblings			-0.238***	-0.202***	-0.160***					
			(0.043)	(0.043)	(0.043)					
Have running water				0.502***	0.288**					
				(0.110)	(0.119)					
Have own water source				0.142	0.071					
				(0.090)	(0.090)					
Have a flushing toilet				0.252	0.108					
				(0.166)	(0.179)					
Rural					-0.528***	-0.874***	-1.002***	-0.915***	-0.925***	-0.982***
					(0.157)	(0.109)	(0.110)	(0.115)	(0.115)	(0.112)
Observations	1781	1775	1775	1775	1775	1781	1701	1697	1697	1701
R-squared	0.04	0.04	0.06	0.08	0.12	0.10	0.10	0.11	0.11	0.10

Note: Standard errors in parentheses are robust to heteroskedesticity and clustering at the family level; * significant at 10%; ** significant at 5%; *** significant at 1%; columns (5) and (6) control for regional dummies.

Table 3: Ordinary Least Squares Estimates of the Effect of Mother's Education on the Health of Own Birth Children (Dependent variable: HAZ)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mother's education	0.091***	0.066***	0.059***	0.038***	0.028***	0.044***		0.036***		
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)		(0.002)		
Father's education							0.039***	0.021***		
							(0.002)	(0.002)		
Parental education (mean)									0.059***	
									(0.002)	
Parental education (max)										0.046***
										(0.002)
Age (months)	-0.047***	-0.048***	-0.046***	-0.046***	-0.046***	-0.047***	-0.048***	-0.047***	-0.047***	-0.048***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sex	0.033***	0.032***	0.039***	0.045***	0.048***	0.044***	0.045***	0.045***	0.044***	0.045***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Log per capita household income		0.346***	0.293***	0.175***	0.145***					
		(0.013)	(0.013)	(0.013)	(0.013)					
The number of siblings			-0.153***	-0.116***	-0.102***					
			(0.008)	(0.008)	(0.007)					
Have running water				0.321***	0.111***					
				(0.021)	(0.022)					
Have own water source				0.237***	0.145***					
				(0.016)	(0.015)					
Have a flushing toilet				0.354***	0.154***					
				(0.025)	(0.025)					
Rural					-0.524***	-0.825***	-0.885***	-0.785***	-0.787***	-0.855***
					(0.027)	(0.012)	(0.012)	(0.013)	(0.013)	(0.012)
Observations	125749	125588	125588	125588	125588	125749	121848	121848	121848	121848
R-squared	0.06	0.08	0.08	0.11	0.13	0.12	0.11	0.12	0.12	0.11

Note: Standard errors in parentheses are robust to heteroskedesticity and clustering at the family level; * significant at 10%; ** significant at 5%; *** significant at 1%; columns (5) and (6) control for regional dummies.

Table 4: Ordinary Least Squares Estimates of the Effect of Mother's Education on the Health of Boys versus Girls (Dependent variable: HAZ)

	(1) Own birth girls	(2) Own birth boys	(3) Girl adoptees	(4) Boy adoptees
Mother's education	0.044***	0.043***	0.038***	0.004
	(0.002)	(0.002)	(0.011)	(0.022)
Age (months)	-0.054***	-0.040***	-0.075***	0.009
	(0.002)	(0.002)	(0.015)	(0.030)
Age squared	0.001***	0.001***	0.001***	-0.000
	(0.000)	(0.000)	(0.000)	(0.001)
Rural	-0.818***	-0.830***	-0.878***	-0.834***
	(0.018)	(0.016)	(0.121)	(0.240)
Observations	57319	68430	1447	334
R-squared	0.12	0.11	0.12	0.07

Note: Standard errors in parentheses are robust to heteroskedesticity and clustering at the family level; * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Ordinary Least Squares Estimates of the Effect of Mother's Education on the Health of Girls: Various Specifications

Sample and specification	(1) Own birth	(2) Adoptees	(3) Own birth controlling for mother's care	(4) Adoptees controlling for mother's care	(5) Own birth	(6) Adoptees	(7) Adoptees with own birth siblings	(8) Own birth with adopted siblings	(9) Adoptees with no bloodlines
Dependent variable	HAZ	HAZ	HAZ	HAZ	Vaccine	Vaccine	HAZ	HAZ	HAZ
Mother's education			0.044***	0.034***	0.011***	0.011***	0.033**	0.050**	0.041***
			(0.002)	(0.011)	(0.001)	(0.004)	(0.015)	(0.022)	(0.011)
Mother's education dummies									
Primary	0.131***	0.102							
	(0.020)	(0.108)							
Junior high	0.345***	0.352***							
	(0.021)	(0.117)							
High school	0.590***	0.497***							
	(0.027)	(0.149)							
Age (months)	-0.054***	-0.075***	-0.057***	-0.079***	0.057***	0.053***	-0.052**	-0.039	-0.078***
	(0.002)	(0.015)	(0.002)	(0.017)	(0.000)	(0.004)	(0.023)	(0.027)	(0.016)
Age squared	0.001***	0.001***	0.001***	0.001***	-0.001***	-0.001***	0.001**	0.001	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rural	-0.757***	-0.845***	-0.809***	-0.901***	-0.076***	-0.005	-0.728***	-0.430	0.000
	(0.019)	(0.124)	(0.019)	(0.128)	(0.005)	(0.043)	(0.219)	(0.294)	(0.000)
									-0.877***
Mother being the main caregiver			-0.031*	-0.005					(0.125)
			(0.018)	(0.098)					
Observations	57319	1451	55028	1375	44017	905	753	326	1377
R-squared	0.13	0.12	0.13	0.12	0.28	0.16	0.10	0.08	0.13

Note: Standard errors in parentheses are robust to heteroskedesticity and clustering at the family level; * significant at 10%; ** significant at 5%; *** significant at 1%.