The Schooling of Adult Children and the Smoking Cessations of Their Parents in China

Extended abstract for 2019 PAA Proposed Paper

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Abstract

The upward intergenerational transmission of health from children to parents is increasingly important because the elder parents today will live with their children for a period longer than ever before. Then, are parents of well-educated children have a healthier lifestyle? The answer is indefinite in theory. On one side, well-educated children can transfer more economic resources to parents and then their parents can afford more cigarettes and alcohol. On the other, well-educated children have more health knowledge, which can spill over to their parents. Using China's compulsory schooling reform in the mid-1980s as a quasi-experiment, this study examines the causal effects of children's schooling on parents' smoking behaviors. The instrumental variables estimations show that the likelihood of parents' smoking cessation increases with children's schooling. Such a spillover effect, which is mainly driven by daughters, is especially stronger among parents with less schooling.

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Introduction

The benefits of education on health can spill over from one family member to another, and such an externality contributes to the intergenerational transmission of health inequality (Kravdal, 2008; Aizer & Currie, 2014). However, most previous studies on intergenerational transmission focus only on the way from parents to children. The other way, from children to parents, is still understudied (De Neve & Kawachi, 2017). Until recently, a few researchers began to explore the association between children's schooling and parents' health empirically, and most of them found significant positive correlations.

However, these studies on the spillover effects of children's schooling have two weaknesses. First, they mainly perform analyses on health outcomes but rarely examine the mechanisms behind. Second, all of them only examine correlation but not the causality except for a recent Swedish study (Lundborg & Majlesi, 2018). In contrast, we use China's reform of compulsory schooling in the mid-1980s as a quasi-experiment to identify the causality of a specific channel.

Smoking, as well as other health-related behaviors, contributes to the downward intergenerational transmission of health inequality. In Sweden, smoking in young adults is negatively associated with parents' cultural capital through the academic track and positively associated with parents' healthy lifestyle through health orientation (Schori et al., 2014). The socio-economic position in early life is only correlated with smoking initiation, but cannot explain the difference in smoking cessation (Grimard & Parent, 2006). It's partially because most people begin to smoke in their young adulthood and choose to quit in their old ages (see Figure 1).

[Insert Figure 1 Here]

The schooling of adult children has two opposite effects on the smoking behaviors of their parents, because well-educated children bring more health knowledge as well as more economic resources to parents. First, the parents of high-income children can afford more consumption of cigarettes and then become less likely to quit smoking. Second, the spillover of knowledge from children can change parents' perception of the health consequences of smoking. Therefore, whether the schooling of children encourages or discourages parents to quit smoking depends on the relative magnitudes of these two effects. From Figure 2, we can see that that the parents of high-educated children are less likely to smoke and more likely to quit from smoking if they ever smoked.

[Insert Figure 2 Here]

The patterns shown in Figure 2 are only correlations but not causalities. We further examine the causal effects of children's schooling with the Instrument Variables (IV) design. In general, we find that the schooling of adult children has a positive impact on the likelihood of parents' smoking cessation. Such spillover effects, which are mainly driven by daughters, are especially stronger among parents with less schooling.

Background of China's Compulsory Schooling Reform

China's compulsory schooling laws (CSL) were first introduced in April 1986 and officially came into effect on July 1st, 1986. This law first time set nationwide-uniform compulsory schooling years to nine, which generally started at six years old. Some major features were introduced accordingly to guarantee children in their compulsory schooling years (from six years old to fifteen years old) enrolled for free and to encourage parents sending their children to school (Fang et al., 2012). Provinces were given some freedom for the implementation time considered on different capability. All provinces had implemented the law from 1986 to 1991. Table A1 describes the year of CSL implementation and first affected cohort by provinces (See Appendix).

The staggered implementation of CSL, therefore, created a series of natural experiments. We exploited temporal and geographic variation generated by China's compulsory schooling laws and used the eligibility of the law as our instrumental variable, which had been shown as a plausible instrument for education (Fang et al., 2012; Huang, 2015).

Data

This study uses the 2015 China Health and Retirement Longitudinal Survey (CHARLS) data. The CHARLS is an ongoing longitudinal survey which collects information from the noninstitutionalized elderly population (aged 45 and above) residing in China. The survey used a multistage probability proportional to size (PPS) sampling method that obtained a national representative sample with 150 urban and 450 rural communities among 28 provinces in China.

In 2015, nearly 12,400 households that included 23,000 respondents completed the interviews. We only included respondents who at least have a child aged 22 years old or above because most

people finish college in their 22 years old. We also exclude respondents aged 85 above because they were heavily selected by mortality.

Our key outcomes are smoking status and quit smoking status. Smoking status was defined as being a smoker in all three waves of the interview. Quit smoking status was defined as 'ever' quitting smoking in at least one wave. To investigate the effect of children's education, the highest educated child for each parent was used. We included socio-demographic variables: parent's gender, parent's hukou status, number of children, parent's years of schooling, age, and age square for both child and parent. We also added covariates lung disease indicator, money transfer, routine health checkup, and physical exam for different research needs. Table 1 reports the mean and standard deviation of the key variables used in this study.

Empirical Models: Logit and IV Probit

Besides running a simple logistic regression of children's education on parent's smoking and quit smoking status, we also conduct IV estimations.

We constructed our instrument as a discrete variable that = 1 if the child was below or equal six years old that hasn't started compulsory schooling years and = 0 if above fifteen years old that beyond the compulsory schooling years at the implementation year. Furthermore, we assumed a linear trend for the eligibility from six years to sixteen years so that eligibility ranges from 0 to 1 with a discrete decrease of 0.1 when age increased by one year. The equations of the two stages in IV estimations are as follow:

$$Edu_{ij} = \alpha_0 + \delta Eligib_{ij} + \alpha_1 X_i + u_j + e_{ij}$$

$$Smoke_{ij} = \beta_0 + \pi Edu_{ij} + \beta_1 X_i + u_j + e_{ij}$$

Where i denotes individual, j denotes province. The instrumental variable is $Eligib_{ij}$ which captures the cohort-province specific eligibility of children under CSL. Edu_{ij} is the children's years of schooling, $Smoke_{ij}$ is a dummy variable of parent's smoking status or quit smoking status, X_i is a set of parent's or child's characteristics, including parent's gender (male/female), type of hukou (urban/rural), number of children, years of schooling for parent, age and age square for both parent and child, lung disease (yes/no), routine checkup (year/no), amount of money transferred monthly from parent to child and from child to parent, self-treatment for illness (yes/no), and physical examination in past two years (yes/no). u_j is a vector of province fixed effects, and e_{ij} is the idiosyncratic error term. Given that our final outcomes (smoking and

quit smoking) are binary, we used a probit instrumental variable model (Wooldridge, 2002). We then further conducted subsample analyses investigating the effect by child's gender and parent's years of schooling. Literature suggested that female children are more likely to take care of their older parents and parents will lower SES lean on their children more. Therefore, we expected higher effects for those with female children and those lower educated parents.

Stata14.0 was used to conduct all analyses.

Results

Table 1 describes basic statistics for our dependent variables and all covariates for older adults aged 45 to 85 years old. There are 32% people are smokers and 34% people among smokers have reported ever quit smoking. Children's years of schooling are 10.7 on average. The people in our sample are aged 61.4 years on average and 40% live in an urban area. Gender is balanced in our sample. We find that 57% people in our sample have treated themselves when they get sick and 45% people have had a routine health checkup within 2 years. The money transfers are much higher from child to parent.

[Insert Table 1 Here]

Table 2 reports coefficients from logistic regression and IV Probit regression of the effect of children's education on parent's smoking and quit smoking status. From logistic regression, one year increase of children's schooling decreases the probability of parent's being a smoker by 0.7 and increases the probability of parent's quit smoking by 0.7 (Average marginal effects are reported). Using eligibility as an instrument, we find the effect of being a smoker is negative while no longer significant. The effect of one year increase in children's education increases the probability of parent's quit smoking. And the first stage is quite significant and has passed the F-test. The Wald test of exogeneity suggests that children's years of schooling may not endogenous which lead us to trust results from logistic regression.

[Insert Table 2 Here]

The subsample analysis for quit smoking status is reported in Table 3. The coefficients from Panel A suggest higher effects of quit smoking for the parent with a male child rather than the female child and for parents with less or equal to six years of schooling. The results from IV probit regression reported in Panel B are inconsistent across the gender of the child on the first stage and second stage results. We observe a significant positive effect of a child's education on

parent's quit smoking status for those parents who are educated for six years or less. The effects on smoking status are similar across the child's gender while significantly larger for those parents with higher education. The results of IV Probit are not significant (See the Appendix).

[Insert Table 3 Here]

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Figure 1: The age distributions of smoking initiation and cessation

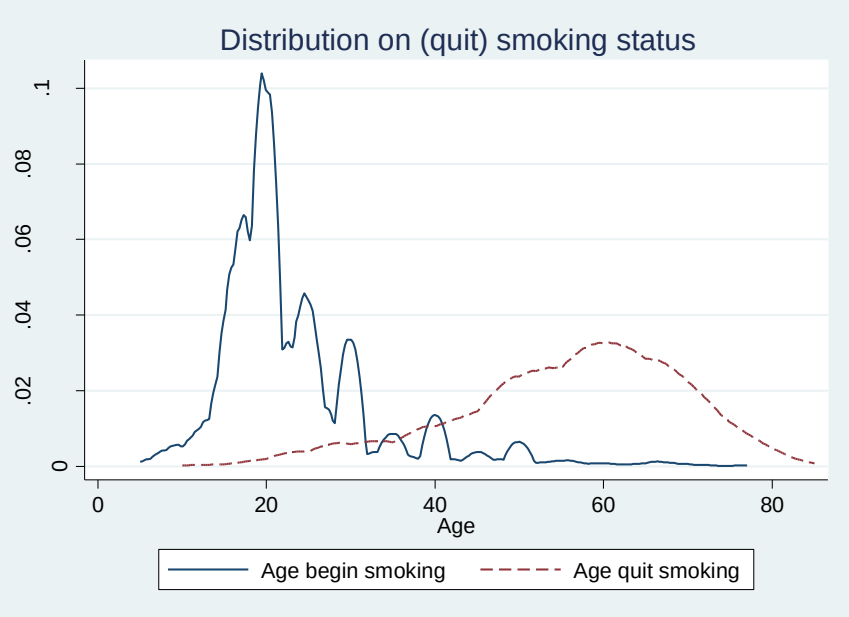

Figure 2: Smoking Behaviors by Children's and Parents' Education

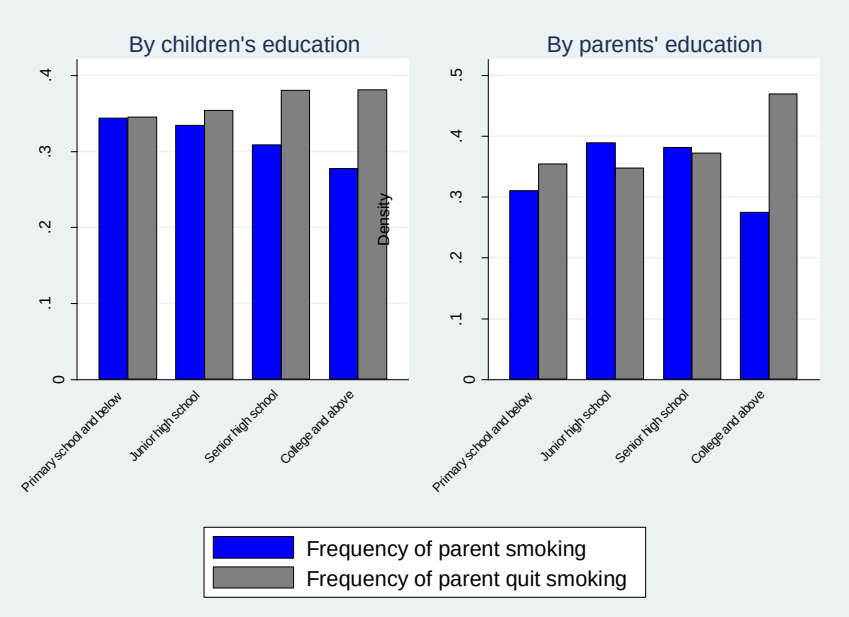

Table 1: Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Dependent Variable					
Currently smoking	10,308	0.321	0.467	0	1
Lung disease	10,308	0.108	0.310	0	1
Quit smoking	4,472	0.343	0.475	0	1
Covariates					
Children's years of schooling	10,308	10.722	3.919	0	22
Children's age	10,308	33.235	7.542	22	50
Parents' years of schooling	10,308	4.440	4.407	0	19
Parents' age	10,308	61.370	9.705	45	85
Parent is male	10,308	0.504	0.500	0	1
Parents' in urban	10,308	0.395	0.489	0	1
Number of children	10,308	2.959	1.605	1	12
Self-treatment for illness	10,308	0.570	0.495	0	1
Transfer money from parent to child	10,308	806.446	5824.503	0	240800
Transfer money from child to parent	10,308	4082.496	10918.800	0	500000
Take checkup within 2 years	10,308	0.450	0.497	0	1

Table 2: Effects of Children's Education on Parents' Smoking Status

	Logit Model		IV Probit Model	
Dependent Variable	*Being a smoker*	*Quit smoking*	*Being a smoker*	*Quit smoking*
Children's years of schooling	-0.007***	0.007***	-0.101	0.180**
	(0.002)	(0.002)	(0.137)	(0.090)
First-Stage: Eligibility			0.888**	1.274***
			(0.425)	(0.386)
Wald test of exogeneity			0.25	1.84
p-value			0.6143	0.1751
Province Fixed Effect	Yes	Yes	Yes	Yes
Observations	10,379	4,499	10,379	4,499

Note. Both logistic and IV Probit control for the gender of parent, urban status, number of children, education, age, squared age, child's age, the child's squared age. Lung disease variable is controlled in quit smoking regressions.

Table 3: The results Subsample Analysis

	Quit smoking			
	Male child	Female child	Parent's years of schooling <=6	Parent's years of schooling >6
Panel A. Logit				
Children's years of schooling	0.034***	0.025**	0.033***	0.029
	(0.012)	(0.012)	(0.010)	(0.020)
Panel B. 2SLS				
Children's years of schooling	-0.017	0.271***	0.196***	0.090
	(0.148)	(0.025)	(0.066)	(0.848)
First-Stage: Eligibility	1.286***	1.127	1.570***	0.411
	(0.472)	(0.715)	(0.467)	(0.733)
Wald test of exogeneity	0.06	6.07	3.31	0.01
p-value	0.7997	0.0137	0.0689	0.9351
Province Fixed Effect	Yes	Yes	Yes	Yes
Observations	2681	1788	3068	1431

Note. Both logistic and IV Probit control for the gender of parent, urban status, number of children, education, age, squared age, child's age, the child's squared age. Lung disease variable is controlled in quit smoking regressions.

Appendix

Table A1: Compulsory Schooling Laws by Province

Province	The year when Laws Effect	First Affected Cohort
Beijing	1986	1971
Tianjin	1987	1972
Hebei	1986	1971
Shanxi	1986	1971
Liaoning	1986	1971
Jilin	1987	1972
Heilongjiang	1986	1971
Shanghai	1987	1972
Jiangsu	1987	1972
Zhejiang	1986	1971
Anhui	1987	1972
Fujian	1989	1974
Jiangxi	1986	1971
Shandong	1987	1972
Henan	1987	1972
Hubei	1987	1972
Hunan	1991	1976
Guangdong	1987	1972
Guangxi	1991	1976
Chongqing	1986	1971
Sichuan	1986	1971
Guizhou	1988	1973
Yunnan	1987	1972
Shaanxi	1988	1973
Gansu	1991	1976
Xinjiang	1988	1973

Note. From Huang (2015)

Table A2. Subsample Analysis

	Being a smoker			
	Male child	Female child	Parent's years of schooling <=6	Parent's years of schooling >6
Panel A. Logit				
Children's years of schooling	-0.049***	-0.048***	-0.039**	-0.078***
	(0.013)	(0.013)	(0.015)	(0.010)
Panel B. 2SLS				
Children's years of schooling	0.053	0.284***	-0.174	0.221
	(0.099)	(0.031)	(0.115)	(0.285)
First-Stage: Eligibility	1.402***	-0.138	0.962*	0.542
	(0.438)	(0.665)	(0.522)	(0.638)
Wald test of exogeneity	0.65	0.34	1.04	0.29
p-value	0.42	0.5576	0.3086	0.5926
Province Fixed Effect	Yes	Yes	Yes	Yes
Observations	6,136	4,166	7471	2902

Note. Both logistic and IV Probit control for the gender of parent, urban status, number of children, education, age, squared age, child's age, the child's squared age. Lung disease variable is controlled in quit smoking regressions.