Christian-Albrechts-Universität zu Kiel

# Unhealthy consumption behaviors and their intergenerational persistence: the role of education

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# Introduction

- Smoking and alcohol consumption are two crucial behaviors that can negatively affect health and longevity (Bazzano et al., 2007; Deng et al., 2006; Hao et al., 2004; Ruitenberg et al., 2002).

- With over 300 million smokers, Chinese people consume roughly one third of the world's cigarettes (World Health Organization, 2015).

- The 2007 national survey of alcohol consumption revealed that 55.6% of men and 15.0% of women were frequent alcohol consumers in China (Li et al., 2011).

# Introduction

- Several studies have investigated the correlation between parents and children's consumption behaviors (Charles, Danziger, Li, & Schoeni, 2014; Waldkirch, Ng, & Cox, 2004).

- Some studies find a positive correlation between parents and children's consumption behavior (Schmidt & Tauchmann, 2011; Waldkirch et al., 2004).

- Some others show that parental alcohol consumption does not seem to significantly affect children's alcohol consumption (Yu, 2003).

# Introduction

- Education as a form of human capital investment can improve cognitive skills and hence enhance positive health behavior (Berger & Leigh, 1989; Kenkel, 1991).
- Education discourages individuals from maintaining unhealthy habits such as smoking and drinking.
  - Previous work finds that education has a negative effect on the probability of smoking or on binge drinking (Cowell, 2006; Jensen & Lleras-Muney, 2012; Kemptner, Jurges, & Reinhold, 2011; Nayga, 1999).
- Other studies cannot provide evidence that education results in better health behavior (Reinhold & Jurges, 2010; Xie & Mo, 2014; Zhong, 2015).

# Research objectives

- Identify the correlation between individuals' unhealthy consumption behaviors (smoking and binge drinking) and their parents' unhealthy consumption behavior in China.

- Shed light on the impact of education on individuals' unhealthy consumption behaviors by using two institutional changes as instrumental variables for education in the estimations.

- Examine the impact of education on intergenerational persistence of smoking and binge drinking.

# Empirical approach

## Benchmark model for unhealthy consumption behavior

Following Yu (2003), we propose a Probit model for smoking and binge drinking as follows:

$$Prob_{(Y=1)} = \beta_0 + \boldsymbol{\beta_1 Parent} + \boldsymbol{\alpha X} + \varepsilon_i$$

- ***Y*** is a binary variable which gives the value of one if the individual is a current smoker or a binge drinker.
- ***Parent*** is a set of dummy variables for mother's and father's consumption behavior.
- ***X*** is a vector of control variables including individual demographic characteristics, socio-economic status, as well as year and regional dummies.

# Empirical approach

**The impact of education on unhealthy consumption of smoking and binge drinking**

$$Prob_{(Y=1)} = \beta_0 + \boldsymbol{\beta_1 Parent} + \boldsymbol{\beta_2 Education} + \boldsymbol{\alpha X} + \varepsilon_i$$

- Higher education leads to better health knowledge and might reduce the probability to choose unhealthy consumption of smoking and binge drinking. Thus, $\boldsymbol{\beta_2}$ is expected to be negative.
- To obtain a consistent estimation for education, the potential endogeneity of education in health equations has to be taken into consideration.

# Empirical approach

- ***Accounting for the endogeneity of education***

  The 9-year Compulsory Education Law

  - Normally a pupil would finish the nine years of compulsory schooling at the age of 15.
  - This implies that individuals who were born before 1971 were not affected by the law.
  - Law in different provinces are considered (Huang 2015).
    - The threshold birth year for those affected by the Law is 1971 for Beijing, Chongqing, Liaoning, and Heilongjiang;
    - 1972 for Shandong, Jiangsu, Shanghai, Hubei, and Henan;
    - 1973 for Guizhou, and 1976 for Hunan and Guangxi

- ***Accounting for the endogeneity of education***

The Provisions on the Prohibition of Using Child Labor

  - came officially into effect in April 1991 prohibits employment of children who are younger than 16 years of age

  - implies that individuals who were born before 1975 were not affected by the provisions (Xie and Mo 2014)

# Empirical approach

- **Two stage consistent estimation of Education**

$$\widehat{\boldsymbol{Education}} = \alpha_0 + \alpha_1 Law + \alpha_2 Provisions + \boldsymbol{\alpha X} + u_i$$

$$Prob_{(Y=1)} = \beta_0 + \boldsymbol{\beta_1 Parent} + \boldsymbol{\beta_2 \widehat{Education}} + \boldsymbol{\alpha X} + \varepsilon_i$$

# Empirical approach

**Impact of education on intergenerational persistence of unhealthy consumption**

$$\boldsymbol{Prob_{(Y=1)}} = \beta_0 + \boldsymbol{\beta_1' Parent} + \boldsymbol{\beta_2' \widehat{Education}} + \boldsymbol{\beta_3' Parent * \widehat{Education}} + \boldsymbol{\alpha X} + \delta_i$$

- The main concern is the coefficient of the interaction term $\boldsymbol{\beta_3'}$.
- The null hypothesis is that additional education can prevent individuals from persisting their parents' unhealthy behaviors, therefore, $\boldsymbol{\beta_3'}$ is assumed to be negative.

# The data

- ***Survey***

- China Health and Nutrition Survey (CHNS).

- 1989 to 2011 and was conducted in nine provinces for the years1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009, and three municipalities for the year 2011.

# The data

Measure of the dependent variables

- **Smoking**

  "*Do you still smoke cigarettes now?*

- **Binge Drinking**
  - pure alcohol consumed are taken as 4% for beer, 52% for liquor, and 10% for wine (Li et al., 2011)
  - one "standard" drink contains roughly 14 grams of pure alcohol
  - a male who consumes 14 drinks
  - a female who consumes 7 drinks

  (The Substance Abuse and Mental Health Services Administration).

# The data

- Descriptive statistics of main variables

| Variable | Definition | Mean | Std.Dev. |
|---|---|---|---|
| **Dependent variables** | | | |
| **Smoking** | Smoking = 1; otherwise = 0 | 0.250 | 0.433 |
| **Binge drinking** | Binge drinking =1; otherwise = 0 | 0.095 | 0.293 |
| **Parents unhealthy consumption behavior** | | | |
| **Smoker Mother** | Mother is smoker = 1; otherwise = 0 | 0.043 | 0.204 |
| **Smoker Father** | Father is smoker = 1; otherwise = 0 | 0.592 | 0.492 |
| **Drinker Mother** | Mother is a binge drinker = 1; otherwise = 0 | 0.021 | 0.144 |
| **Drinker Father** | Father is a binge drinker = 1; otherwise = 0 | 0.205 | 0.404 |
| **Education** | | | |
| **Education** | Years of education | 9.899 | 3.804 |
| **Instrumental variables for education** | | | |
| **Law** | Compulsory Education Law | 0.712 | 0.453 |
| **Provisions** | Provisions on the Prohibition of Child Labor | 0.477 | 0.500 |
| **Control variables** | | | |
| **Male** | Male=1; female=0 | 0.647 | 0.478 |
| **Age** | Age in year | 23.610 | 7.004 |
| **Age squared** | Age squared | 606.500 | 403.900 |
| **Married** | Married = 1; otherwise = 0 | 0.284 | 0.451 |
| **Lnm** | Logarithm of household income | 9.310 | 1.172 |
| **Working** | Working = 1; Not working = 0 | 0.731 | 0.444 |
| **Urban** | Urban = 1; rural = 0 | 0.272 | 0.445 |

Source: Authors' calculations based on CHNS samples

# Estimation results

## Estimations of intergenerational persistence of smoking and binge drinking

| | Smoking | | | Binge drinking | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Smoker /Drinker Mother** | 0.269*** | | **0.250*** ** | 0.681*** | | **0.514*** ** |
| | (0.07) | | **(0.07)** | (0.10) | | **(0.11)** |
| **Smoker /Drinker Father** | | 0.278*** | **0.274*** ** | | 0.625*** | **0.598*** ** |
| | | (0.03) | **(0.03)** | | (0.05) | **(0.05)** |
| **Control Variables** | Yes | Yes | Yes | Yes | Yes | Yes |
| **Constant** | -4.857*** | -5.133*** | -5.150*** | -6.290*** | -6.589*** | -6.567*** |
| | (0.24) | (0.24) | (0.24) | (0.38) | (0.40) | (0.40) |
| **N** | 13412 | 13412 | 13412 | 11264 | 13412 | 13412 |
| **Chi$^2$** | 2043.952 | 2033.617 | 2060.024 | 563.554 | 699.908 | 723.004 |
| **pseudo-R$^2$** | 0.292 | 0.296 | 0.297 | 0.194 | 0.226 | 0.231 |

* p<0.10, ** p<0.05, *** p<0.01

# Estimation results

## Estimation of the impact of institutional changes on individual's education

| | Years of Education | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Law** | 0.368*** | | **0.317*** ** |
| | (0.09) | | **(0.09)** |
| **Provisions** | | 0.948*** | **0.930*** ** |
| | | (0.09) | **(0.09)** |
| **Control Variables** | Yes | Yes | Yes |
| **Constant** | -4.778*** | -5.609*** | -6.111*** |
| | (0.49) | (0.49) | (0.51) |
| **N** | 12976 | 12976 | 12976 |
| **$R^2$** | 0.379 | 0.383 | 0.384 |

* p<0.10, ** p<0.05, *** p<0.01

# Estimation results

## Instrumental Probit estimation of impact of education on smoking

| | Smoking | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | Marginal effect |
| **Smoker Mother** | 0.209*** | | 0.199*** | **0.040**** |
| | (0.07) | | (0.07) | **(0.02)** |
| **Smoker Father** | | 0.238*** | 0.237*** | **0.047***** |
| | | (0.03) | (0.03) | **(0.01)** |
| **Years of Education** | -0.186*** | -0.175*** | -0.173*** | **-0.035***** |
| | (0.05) | (0.05) | (0.05) | **(0.01)** |
| **Control Variables** | Yes | Yes | Yes | |
| **Constant** | -5.622*** | -5.811*** | -5.817*** | |
| | (0.33) | (0.32) | (0.32) | |
| **N** | 12976 | 12976 | 12976 | 12976 |
| **Chi²** | 2033.069 | 2022.481 | 2049.454 | 542.597 |
| **Wald test of exogeneity** | 0.002 | 0.004 | 0.004 | |
| **Test for over-identifying restriction (P-values)** | 0.278 | 0.264 | 0.244 | |

# Estimation results

## Instrumental Probit estimation of impact of education on binge drinking

| | Binge drinking | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | Marginal effect |
| **Drinker Mother** | 0.616*** | | 0.592*** | **0.055*** ** |
| | (0.05) | | (0.05) | **(0.01)** |
| **Drinker Father** | | 0.647*** | 0.489*** | **0.045*** ** |
| | | (0.11) | (0.11) | **(0.01)** |
| **Years of Education** | -0.114 | -0.145** | -0.149** | **-0.013*** |
| | (0.07) | (0.07) | (0.07) | **(0.01)** |
| **Control Variables** | Yes | Yes | Yes | |
| **Constant** | -6.764*** | -7.180*** | -7.168*** | |
| | (0.48) | (0.49) | (0.50) | |
| **N** | 12976 | 12976 | 12976 | 12976 |
| **Chi²** | 1973.145 | 1973.127 | 1994.816 | 566.826 |
| **Wald test of exogeneity** | 0.135 | 0.055 | 0.050 | |
| **Test for over-identifying restriction (P-values)** | 0.8538 | 0.9842 | 0.9907 | |

# Estimation results

## IV estimation of the impact of education on intergenerational persistence

| | Smoking | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Years of Education** | -0.175*** | -0.139*** | -0.127** |
| | (0.05) | (0.05) | (0.05) |
| **Smoker Mother*Years of Education** | 0.041 | | **0.020** |
| | (0.15) | | **(0.15)** |
| **Smoker Father*Years of Education** | | -0.064* | **-0.061*** |
| | | (0.04) | **(0.04)** |
| **Control Variables** | Yes | Yes | Yes |
| **Constant** | -5.554*** | -6.137*** | -6.072*** |
| | (0.33) | (0.38) | (0.38) |
| **N** | 12974 | 12974 | 12974 |
| **Chi2** | 1864.890 | 1904.807 | 1918.747 |
| **Wald test of exogeneity** | 0.015 | 0.003 | 0.017 |
| **Test for over-identifying restriction (P-values)** | 0.254 | 0.361 | 0.333 |

# Estimation results

## IV estimation of the impact of education on intergenerational persistence

| | Binge drinking | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Years of Education** | -0.109 | -0.066 | -0.071 |
| | (0.07) | (0.08) | (0.08) |
| **Drinker Mother*Years of Education** | -0.112 | | **-0.086** |
| | (0.14) | | **(0.15)** |
| **Drinker Father*Years of Education** | | -0.184*** | **-0.182*** ** |
| | | (0.06) | **(0.06)** |
| **Control Variables** | Yes | Yes | Yes |
| **Constant** | -5.554*** | -6.137*** | -6.072*** |
| | (0.33) | (0.38) | (0.38) |
| **N** | 12974 | 12974 | 12974 |
| **Chi2** | 1864.890 | 1904.807 | 1918.747 |
| **Wald test of exogeneity** | 0.015 | 0.003 | 0.017 |
| **Test for over-identifying restriction (P-values)** | 0.254 | 0.361 | 0.333 |

# Conclusions

- Significantly positive correlations between individuals' and their parental unhealthy consumption behaviors.
- Higher education decreases the probability of individuals' unhealthy consumption.
  - An additional year of education decreases the probability of smoking by proximately 3.5% and the probability of binge drinking by 1.3%.
- Additional year of education could prevent individuals from intergenerational persistence of unhealthy behavior from father, but it has no impact on intergenerational persistence of unhealthy behaviors from mother.

# Thank you for your attention!