Early Life Conditions and Mortality Among Oldest Old Chinese

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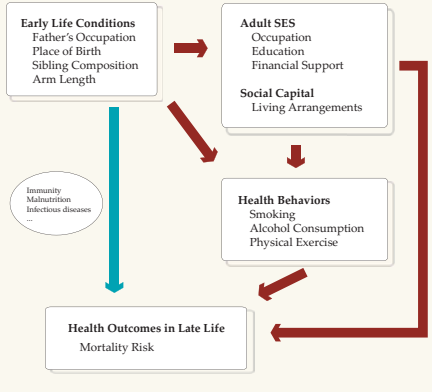
Purpose

The effects of early life conditions on health have been well documented in Western countries. I extend this research to China, with its distinct social, institutional, and cultural context. Specifically, I examine the following questions:
1) Are the oldest old, the "biological elite", highly homogeneous biologically such that there are few differences in mortality by SES?
2) If we find a social gradient in mortality, are these differences related to early life conditions?
3) If so, what might be the mechanisms through which early life conditions affect health outcomes in late life?

Flow Chart of Mechanisms



Data

The Chinese Longitudinal Survey on Healthy Longevity (CLSHL)
-Baseline Survey 1998
-Second Wave 2000

Of the 8,959 respondents aged 80 and above in the 1998 baseline survey, 4,744 were alive and re-interviewed in the second wave in 2000, and 3,355 were known to have died. The other 860 respondents could not be followed up in the second wave and thus were excluded from the sample. In addition, 1,083 cases were excluded because they have missing values for those variables included in the analysis (sensitivity analysis shows that estimations are robust using listwise deletion of missing data) .

The analysis sample consists of 7,016 individuals, 4,175 of whom are females and 2,841 are males.

Methodology

Nested Cox proportional hazard models (Cox, 1972) to evaluate how the effects of early life conditions on mortality between 1998 and 2000 change when adult characteristics are added.

Model 1:

$$\ln\left(\frac{h(t)}{h_0(t)}\right) = \beta_1 X_{age\_ethnicity} + \beta_2 X_{early\_life\_conditions}$$

Model 2:

$$\ln\left(\frac{h(t)}{h_0(t)}\right) = \beta_1 X_{age\_ethnicity} + \beta_2 X_{early\_life\_conditions} + \beta_3 X_{education}$$

Model 3:

$$\ln\left(\frac{h(t)}{h_0(t)}\right) = \beta_1 X_{age\_ethnicity} + \beta_2 X_{early\_life\_conditions} + \beta_3 X_{education} + \beta_4 X_{adult\_SES\&Social\_capital}$$

Model 4:

$$\ln\left(\frac{h(t)}{h_0(t)}\right) = \beta_1 X_{age\_ethnicity} + \beta_2 X_{early\_life\_conditions} + \beta_3 X_{education} + \beta_4 X_{adult\_SES\&Social\_capital} + \beta_5 X_{health\_behaviors}$$

Model 5:

$$\ln\left(\frac{h(t)}{h_0(t)}\right) = \beta_1 X_{age\_ethnicity} + \beta_2 X_{early\_life\_conditions} + \beta_3 X_{education} + \beta_4 X_{adult\_SES\&Social\_capital} + \beta_5 X_{health\_behaviors} + \beta_6 X_{interactions}$$

Results

Main Effects

Relative Risk Estimates Based on Multivariate Cox Proportional Hazards Regression Model (Model 4)

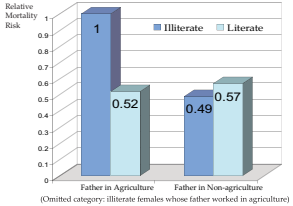
Independent variables	Males (N=2841)	Females (N=4175)
Early life conditions		
Siblings *(Both brothers and sisters)*		
No siblings	1.029	1.189
Only brothers	1.042	0.979
Only sisters	1.292*	0.589**
Place of birth *(Rural)*		
Urban	0.872	0.912
Father's occupation *(Agricultural)*		
Non-agricultural	1.230+	0.895
Housework & other	1.948**	1.367**
Arm length (cm)	0.997	0.916*
Square of arm length (cm^2)	1.000	1.001*
Adult SES and social capital		
Education *(Illiterate)*		
Literate	0.997	0.763*
Occupation of respondents before age 60 *(Agricultural)*		
Non-agricultural	0.890	1.561**
Housework &other	1.034	1.376**
Financial support *(Family only)*		
Family and others	0.856	1.059
Pension only	0.893	0.512*
Pension and other	0.932	0.655*
Government only	1.138	1.460*
Other	0.632	1.199
Living arrangements *(With son, no spouse present)*		
With spouse	0.633**	0.768*
With daughter, no spouse or son present	1.620**	0.948
With other family members	0.919	1.019
In a nursing home	0.648	1.020
Alone	0.912	0.935
Health behaviors		
Alcohol consumption *(Never)*		
Former	0.963	1.084
Current	0.845+	0.817*
Smoking *(Never)*		
Former	1.081	1.526**
Current	1.078	1.395**
Exercise *(Never)*		
Former	1.201	0.900
Current	0.564**	0.595**

(Controlling for: age and ethnicity)
Note: + p<0.1* p<0.05 ** p<0.01
Source: Chinese Longitudinal Healthy Longevity Survey in 1998 and 2000 waves.

Results

Interactions

Effect of Education Varies by Father's Occupation (Females)



(Omitted category: illiterate females whose father worked in agriculture)

Chinese Cultural Revolution 1966-1976

Why does effect of education on mortality vary by social origin?

We seek answer by referring to historical social context in China, especially the Chinese Cultural Revolution, during which education was seen as a privilege of bourgeois, and many educated people with upper social origin were forced to relocate to rural areas and participate in burdensome labor, which could have seriously damaged their health, both physically and mentally.

Conclusions

1) Social inequality in mortality persists throughout life, even among the oldest old.

2) Socal origin and adult SES affect mortality late in life interactively, rather than additively for women.

3) Effects of early life conditions vary between men and women.

4) Education, net adult SES and health behaviors, has a protective influence on health among oldest women, but not among men.

5) Explanations for these gender differences call for further analyses.