Long-term Effects of Childhood Exposure to Persecution: Human Capital, Marriage Market, and Intergenerational Outcomes*

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Abstract

There were substantial class struggles in mid-20th Century China for more than two decades (1950-1976) in the form of persecution of certain groups of people, such as landlords, capitalists, and intellectuals. This paper investigates the impacts of early life exposure to persecutions during the class struggle period on human capital development and marriage market outcomes, and it analyses how such impacts depend on exposure happened in the life course. Using a difference-in-differences strategy, I show that individuals with longer exposure to persecutions in early childhood (0-6 years old) completed less formal schooling, have worse verbal and math skills, and earn lower incomes in the long-term. Furthermore, they are more likely to marry people from classes favored by the regime but with poorer human capital outcomes. While males are affected by the exposure in early childhood more through direct impact on human capital development, females are impacted more indirectly through marriage.

JEL Codes: J13, J12, J24, N45

Keywords: Childhood; Persecutions; Human Capital; Marriage Market

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1 Introduction

Throughout history, the persecution against one social group happened substantially, in the way of systematically mistreating people based on identities, including religion, race, ethnicity, socioeconomic class, and political background. Besides massive killing, such as in the Holocaust against Jews and the Rwandan genocide, common persecution methods also include property confiscation, personal harassment, forced labor, and forced resettlement, through which persecuted people without being killed became survivors after the persecution. While most studies focus on outcomes of local casualties (Akresh and De Walque, 2008; Acemoglu et al., 2011; Bai and Wu, 2018) and physical damage (Akbulut-Yuksel, 2014) of civil conflict, little attention was paid to the long-term outcomes of persecution survivors, especially of young children. Are individuals with early-life exposure to the mistreatment against their own social group affected permanently? Intragenerationally, is the relationship between persecuted and non-persecuted social groups also affected by persecution in the long run? And, intergenerationally, are there any dynamic effects of persecution across generations?

This study answers the above research questions by utilizing the class struggle period in China more than half a century ago (1950-1976), when massive persecution activities were carried out against "bourgeoisie". First, I examine the life-long impacts of early life exposure to persecutions on individual human capital development, which is highly associated with individual economic achievement (Mincer, 1958) and social economic development (Barro, 2001). Second, I study marriage market outcomes to see whether marriage sorting pattern changed after different socioeconomic classes were treated differently during the class struggle, since socioeconomic class is an acquired social identity and can be revised through marriage. Last, I investigate how parents' early life exposure to persecutions affect the outcomes of the next generation. Using a difference-in-difference strategy, my results suggest persistent associations between the length of early life exposure to persecutions in the class struggle and long-term outcomes, including human capital outcomes, marriage outcomes, and possibly intergenerational outcomes.

One further question asked by this study is whether the impacts of persecution vary over the survivors' life course. While comprehensive empirical evidence has shown that positive interventions during early childhood boots life-long development (Garces et al., 2002; Deming, 2009; Heckman et al., 2013), some studies also suggest adverse outcomes of negative interventions, such as famine (Neelsen and Stratmann, 2011) and civil war (León, 2012), in early childhood. Therefore, this paper supplements the literature by separating the impacts of early-life exposure to persecutions in class struggle into three main stages before turning to be an adult (age 18): early childhood (0-6), primary education years (7-12), and adolescence (13-18), and showing that early childhood is, again, the most

affected period when being exposed to persecutions.

Unlike genocides (Akresh and De Walque, 2008; Acemoglu et al., 2011) or civil war (Blattman and Miguel, 2010; Chamarbagwala and Morán, 2011), class struggle has not been utilized to understand socioeconomic consequences of civil conflict in literature. As an ideological view of socialism (Engels and Marx, 1848; Marx, 1875), the theory of class struggle is established based on classifying the whole society into two great classes: bourgeoisie and proletariat, between which the struggle is aimed to take over both economic and political control from the bourgeoisie. In the 20th Century, when class struggle was practiced in most communist regimes, including Soviet Union (Conquest, 1986 & 2008), Eastern Europe (Valentino, 2005), China (MacFarquhar et al., 1987; Walder and Su, 2003; Fairbank and Goldman, 2006; MacFarquhar and Schoenhals, 2006), Cambodia (Shaw, 2000), Vietnam (Margolin, 1999; Rosefielde, 2009), etc., people from families defined as "bourgeoisie" were harassed, publicly humiliated, imprisoned or even executed.

> *"It is altogether self-evident that, to be able to fight at all, the working class must organize itself at home as a class and that its own country is the immediate arena of its struggle — insofar as its class struggle is national, not in substance, but, as the Communist Manifesto says, 'in form'."*
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> *—Marx, Critique of the Gotha Program (1875)*

However, exploiting the class struggle period in China has its own advantages in estimating the long-term impacts of persecution. On one hand, the class struggle took place in China between 1950 and 1976 (MacFarquhar et al., 1987; MacFarquhar and Schoenhals, 2006), therefore, individual information of people born shortly before and during that historical period in China are still available to be collected in very recent surveys. On the other hand, happened about half a century ago, the class struggle in China also provides a long enough time window to allow the long-term outcomes to show up in those young survivors' late lives, which are hard to be observed if we use more contemporary persecution events, such as Rwandan genocide in 1994. Moreover, since killing is not the entire persecution method during the class struggle[1], people survived after the persecution in class struggle form a relatively larger and more representative treatment group than genocides, where the persecuted population was more likely to be eliminated.

Although some studies about China have looked at both instant and long-run effects of the Cultural Revolution (1966-1976) on outcomes, such as education attainment (Bai and Wu, 2018), post Cultural Revolution education decision (Meng and Gregory, 2002; Han et al., 2019), returns to schooling (Zhang et al., 2007; Fleisher and Wang, 2005),

[1]Detailed description about campaigns of class struggle in China is provided by Section 2.

employment (Bai and Wu, 2018), belief (Gong et al., 2014; Roland and Yang, 2017), trust (Wu, 2018), and intergenerational education correlation (Deng and Treiman, 1997), their estimates do not give the long-term impacts of persecutions in the class struggle. One important reason is that the Cultural Revolution is simply the last period of the whole class struggle history in China and follows right after previous campaigns, when landlords, capitalists, intellectuals, etc. have already been massively persecuted. The other reason is that few of these studies make good use of the variation in the treatment towards people based on their socioeconomic class, and this variation of persecution probability is the key identification source of this study.

One critical issue in estimating the life-long impacts of exposure to persecution is that, in most cases, people are persecuted because of their specific social characteristics, which is socioeconomic classification during the class struggle of China. Thus, the intent to be treated (persecuted) is strongly associated with unobserved characteristics between persecuted social groups and non-persecuted social groups, and these unobserved group characteristics are further associated with long-term outcomes. For example, during the class struggle, while the wealthier and better educated social classes are persecuted, they might also have higher inherited abilities, better family culture, etc., which are correlated with life-long human capital development, and possibly with later marriage market decisions. Therefore, OLS estimates of long-run impacts of persecution would be biased. Additionally, it is necessary to separate cohort effect from the effect of the exposure length, since the length of exposure to persecutions in the class struggle from 1950 to 1976 is fixed for any given cohort year.

In order to unbiasedly identify the impacts of early life exposure to persecutions during the class struggle, this paper employs a difference-in-difference strategy to control for all time-invariant group fixed effect and group-invariant cohort fixed effect at the same time. The treatment in this study is being exposed to persecution in each life stage, therefore, "treatment" and "control" groups are determined by the family socioeconomic class, which is classified and coded by the authority during the class struggle in China. The length of exposure to class struggle is captured by cohort variation, and is specified for each life stage before 18 years old. To visually show the pre-existing trends of "treatment" and "control" groups are very similar to each other, I plot the main outcome variables over all the available cohorts. In later analysis, more exogenous measurements about persecution intensity at birth province level are incorporated to examine the heterogeneity effect of persecution risk, and a non-linear measure of exposure and group specified linear time trend are each included in the main specifications to show the robustness of the results. Moreover, I address the concerns of confounding effects from other contemporary events and cohort order effect with the same length of exposure.

The analysis of this paper uses the longitudinal data from China Family Panel Studies

(CFPS, 2010-2016), which surveyed people born before, during and after the class struggle (1950-1976) and documents information about family class during class struggle for each individual in 2010 wave. Evidence shows that people attained less formal education, have lower cognitive skills and earn less income if they were exposed to longer class struggle persecutions in early life. Results about marriage market suggest that people from persecuted groups with longer early life exposure to class struggle married less educated and lower cognitively skilled spouses. Meanwhile, they are more likely to marry people in non-persecuted classes, and less likely to marry those from their own classes. No matter which outcome variable is studied, comparing across three life stages, the exposure in early childhood (0-6 years old) generates the largest disruptive impacts than any following life stage. Although intergenerational impacts of early childhood exposure to persecutions become noisier, the negative magnitudes are still detected on both parents' sides.

The findings of this paper suggest that early life exposure to persecutions does generate life-long impacts among survivors from persecuted families, especially when being exposed in early childhood (0-6 years old), even though persecuted groups were wealthier and more educated before the class struggle period. The further heterogeneous analysis also shows that the impacts of early childhood exposure to persecutions on human capital development are stronger to males, while females are affected more through spouse's human capital outcomes and class sorting. Moreover, such impacts can vary with the level of persecution risk in the birthplace. For further interpretations, I investigate health (nutrition), education, psychological trauma and personal perception change as potential mechanisms of the life-long impacts of early childhood exposure to persecution.

This rest of this paper is organized as follows. Section 2 provides the historical background of the class struggle in China. The empirical strategy is established in Section 3. Section 4 describes the China Family Panel Studies (CFPS). Section 5 presents the results and Section 6 concludes.

2 Historical background

> *"Class struggle, through which some classes have won, and some classes have been eliminated. This is history, and this is the history of civilization for thousands of years. To explain history with this point of view is called historical materialism. The opposite of this view is historical idealism."*[2]
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> *—Zedong Mao, founder of P.R.C., 1949*

After the establishment of the People's Republic of China in late 1949, the class struggle became a nationwide political phenomenon and socioeconomic movement in the country.

[2]Recorded in *Quotations from Chairman Mao Tse-Tung*, also known as the *Little Red Book*.

The whole class struggle period ended with the termination of the Cultural Revolution in 1976, before 1976 people from certain socioeconomic classes were persecuted and even executed in a series of campaigns, which adjoined or overlapped with each other.

Family class[3] is the basic identifier of individuals after 1949 (Deng and Treiman, 1997), and is also the root of implementing class struggle. It is classified by the authority based on economic occupations and political background. During the class struggle, people from classes, such as workers, poor peasants, and soldiers, were protected by the government and were known as the "red" group. Meanwhile, people from families classified as landlords, rich peasants, capitalists, etc., were intensively persecuted and were also called the "black" group. Classes between the "red" and "black" groups are commonly defined as "grey" group, whose risk of being persecuted is higher than "red" group but relatively lower than "black" group (MacFarquhar and Schoenhals, 2006). Since the family class is hereditary, children from persecuted families were discriminated in receiving formal education, finding a good job and getting other social welfare. In order to provide more detailed information about persecutions happened during the class struggle period in China, this paper lists several major campaigns as examples.

Land Reform (1950-1953) In order to take over land from landlords and redistribute it to peasants, a nationwide land reform was promoted. People classified in landlord class not only lost land and other properties but also faced massive harassment, torture and killing. According to Fairbank and Goldman (2006) and MacFarquhar et al. (1987), more than one million people were killed during the land reform.

Campaign to Suppress Counterrevolutionaries, "Three-anti" and "Five-anti" Campaigns (1950-1952) Almost at the same time of the land reform, a series of campaigns were aimed at former Kuomintang members, officials within the Communist Party of China and capitalists. Being Public humiliated, committing suicide, being sent to labor camps and being executed were associated with the classes targeted in these campaigns. Millions of death occurred (Short, 2001; Yang, 2008).

Collectivization Movements (1953-1966) Collectivization movements were launched in 1953 and aimed to take over private property rights in all sectors, including agriculture, manufacturing, and commerce (Lin, 1990; Kueh, 2008). In order to transfer the private business into state-owned, the government purchased business shares at the yearly interest rate of 0.5% until 1966, when the authority announced not to pay interests any more. In another word, business owners and capitalists lost ownership of their wealth after the collectivization. In addition, the collectivization in agriculture is associated with the later Great Famine (Lin, 1990).

Anti-Rightist Campaign (1957-1959) This campaign was designed to purge alleged "rightists"[4] including most intellectuals. The number of people being persecuted

[3]The latest official class standard is GB 4764-84 issued by Standardization Administration of China.

[4]Rightists, in this scenario, are people alleged to be in favor of capitalism and liberalism.

is estimated at 0.4 million to 0.7 million (MacFarquhar et al., 1987).

Cultural Revolution (1966-1976) The Cultural Revolution, also formally called the Great Proletarian Cultural Revolution, was officially launched in 1966. In order to completely purge society, people from all the suspect classes, including landlords, rich peasants, businessmen, capitalist, intellectuals, etc., were again persecuted through beating, imprisonment, torture, hard labor and execution. People, who could not stand the persecutions, committed suicide[5]. Children of persecuted classes were denied access to formal eduction. While the estimated death toll during the Cultural Revolution varies, Walder and Su (2003) suggest that, at least in rural areas, 750,000 to 1.5 million people were killed in that decade. In 1976, Chairman Zedong Mao died and the Gang of Four[6] was arrested, marking the end of Cultural Revolution, as well as of the whole class struggle period.

In summary, the timeline of these selected campaigns suggests that persecutions and suppression targeting certain socioeconomic classes happened continuously and repeatedly between 1950 to 1976. After that, persecution cases started to be redressed since 1977 and the economic reform of China officially was launched in 1978.

3 Data and Description

The data I used in this study comes from China Family Panel Studies (CFPS), which is a nationally representative, biennial longitudinal general social survey project designed to document changes in Chinese society, economy, population, education, and health. CFPS survey sampled from 29 out of 34 provinces in China, which is displayed in Figure A.1. Note that the CFPS does not include Tibet and Qinghai, but Figure A.2 shows that these two provinces have the least density in population. For political reasons, Hong Kong, Macau and Taiwan are also not covered in the survey. Initiated in 2010, families in CFPS have been followed in 2012, 2014 and 2016, therefore, all four waves data are pooled and utilized in the empirical analysis.

3.1 Individual Level

In this study, I focus on outcomes in two main areas: human capital and marriage market. Based on questions in CFPS, I use four different variables to measure individual human capital development. The first measure is the highest degree of formal education, while total education years[7] is not considered as a proper measure in the scenario of class

[5]One famous example is Pufang Deng, the son of Xiaoping Deng.

[6]The Gang of Four was a political faction, who controlled the power of the Communist Party of China in the Cultural Revolution. Its members include Qing Jiang (Mao's last wife), Chunqiao Zhang, Wenyuan Yao, and Hongwen Wang.

[7]Bai and Wu (2018) find no impact of Cultural Revolution on education years.

struggle. Here are two main reasons: first, the formal education system was disrupted during the class struggle, especially the Cultural Revolution. To compensate for the education interruption, no age and degree restrictions were set for the eligibility of taking National College Examination in and shortly after 1977. Second, education durations in each education level during the class struggle were not systematic and changed by the authority over time before 1977. As a result, people with the same level of education degree can have significantly different years of education history. The second and third human capital measures are about cognitive skills. All respondents were asked to do a math test and a verbal test each wave in 2010 and 2014, and the test scores show math skill and verbal skill respectively. Since math and verbal skills could also be developed outside the school but within the family, these two measures are particularly informative, especially when the persecuted group is more educated before the class struggle. If cognitive skills of the persecuted group are not significantly affected even when formal education was interrupted, it means household human capital transmission could compensate the impacts of class struggle on formal education. The last measure of human capital is annual income[8], which reflects the economic values of human capital. The question about annual income is asked in every wave of the CFPS. Given the formal education outcome during class struggle is noisy, examining the indirect effects on income makes the analysis about human capital development more complete, together with formal education level and cognitive skill test scores. In empirical analysis, I use annual individual income in log form and have adjusted all the monetary values to the price levels in 2010. The outcomes of marriage include both human capital outcomes and family class of the spouse, since marriage sorting could happen both by human capital level and social class. To be consistent, the human capital outcomes of the spouse are the same : highest education level, math test score, verbal test score, and income.

To identify the impacts of persecutions in the class struggle, one key determinant is family class, which predicts the probability of being persecuted during the class struggle. The detailed family class was self-reported by the respondents in CFPS and are mapped to the classifications in the government standard "Codes of Class Origin of Family (GB 4765-84)", which classified people into 45 detailed political classes. Adapted from literature (Deng and Treiman, 1997; MacFarquhar and Schoenhals, 2006), I classified the sample into three groups based on their reported family class: (a) The reference group, which is also called the "red" group, who were least likely to be persecuted in class struggle, (b) The most persecuted group is called the "black" group, and (c) All other classes in the middle were defined as the "grey" group. Table A.1 shows detailed classes in each group. In the main analysis, I pool "grey" and "black" groups together as "non-red" and then show heterogeneous effect between "grey " or "black" class as

[8]I only examine income for non-retired working sample in this study.

robustness check.

The other key determinant in this study is the length of exposure to the class struggle in each life stage: (0-6) early childhood, (7-12) primary education years, and (13-18) teenagerhood. Given class struggle happened between 1950 and 1976, exposure length for each individual is fixed for every individual conditional on his or her birth cohort. Figure 1 shows the variation in exposure length to the class struggle in each life stage. Furthermore, to show the relationship between exposure to the class struggle and long-term development outcomes of people across class groups: "red" and "non-red", I plot the average highest education level, math test score, verbal test score and log annual income by class group and by cohort. In Figure 2, the cohorts exposed to the class struggle from 13 to 18 years old are projected to the time trends of all the individual outcomes. Similarly, cohorts exposed to the class struggle between 7 to 12 years old and between 0 to 6 years old are also projected in Figure 3 and Figure 4. Three main findings are revealed in Figure 2 to Figure 4: (1) For the cohorts that are not affected before age 18, the trends of individual outcomes of both persecuted and non-persecuted groups are very similar with a significant gap showing persecuted group does better than the non-persecuted one. This is also consistent with that fact that persecuted people were wealthier and more educated. (2) The gap between "non-red" and "red" groups gradually shrinks once people got exposure to class struggle before 18 years old. Moreover, the comparison across Figure 2, Figure 3 and Figure 4 suggests that for cohorts mainly being exposed to the class struggle between 0-6, the advantages of the "non-red" group totally disappeared. (3) The information of the very early cohorts (before 1930) are noisy due to very small sample size of people, who are born in early 20th century but still are alive when CFPS was conducted in 2010s. Therefore, my empirical analysis focuses on cohorts between 1931 to 1978, as 1931 is the last cohort without any exposure before age 18 and 1978 is the last cohort reporting family class in the survey.

(Figure 1, Figure 2, Figure 3 and Figure 4 here)

Additionally in CFPS, age, gender, current residence status (urban V.S. rural), residential status at age 12 (urban V.S. rural), married status, etc. are all available to be controlled at individual level. Table 1 shows descriptive statistics of the main outcome variables and all other observed individual characteristics for both pooled sample and sub-samples by class group. From Table 1(a), the average highest education level of the pooled sample is 2.4 equalling to between primary and junior high school level, which is low on average. Between "non-red" and "red" groups, the average education level is slightly higher among the persecuted people. Such difference persists when we compare the average math test score, verbal test score and log income between the two groups. However, such descriptive difference is not informative in whether class struggle affects individual long-term development, since the treatment of being persecuted is endogenous

with group characteristics. Therefore, a more rigorous research design is required to answer the research questions and is illustrated in Section 4. Summary statistics of the control variables suggest that non-red people are more likely to be born and to live currently in urban areas. But in whichever social group, 89% of them are married at the time of the survey, meaning the probability of being married is not associated with family class or the probability of being persecuted. Overall, only 11% of people come from "non-red" families in our sample. As marriage market dynamics is also studied in this paper, the spouse's outcomes are summarized in Table 1(b). A special set of outcomes variables in the married sample is the family class of the spouse. 89% of people have a "red" class spouse, and the proportion is consistent with the population percentage of "red" class out of the full sample. However, the likelihood of having a "red" spouse reduces to 71% in "non-red" sample, while the probability of marrying a "grey" or "black" spouse is less then 5% for "red" class sample. The intention of marrying within class group is supported by the data. Empirical analysis shows more evidence about whether this within group sorting changes with exposure to persecutions in the class struggle.

(Table 1 here)

3.2 Province Level

To further test the heterogeneity of the impacts of exposure to persecutions in the class struggle, I generate two regional level measures about persecution risk at the birth province level.

The first birth province level measure is constructed using individual data from CFPS, which asks questions about specific individual experiences before 1976, including being sent to the rural/countryside, being sent to a labor camp, and being publicly humiliated. Thus, I calculate the average number of persecution experience types per person among the "non-red" sample at birth province level. The more types of persecution experiences one "non-red" person had on average in the same birth province, the higher intensity the persecution was in that place. The other birth provincial measure is constructed from Walder and Su (2003), who collected data from 1,520 county gazetteers and calculated the average abnormal death number per county during Cultural Revolution (1966-1976). Thus, I further calculate the estimated birth provincial level abnormal death number per 1,000 people during Cultural Revolution based on abnormal death number per county from 1966 to 1976, number of county in 1966, and provincial population in 1966. The basic assumption is that more severe persecutions would cause higher unusual death rate out of the whole population in one place. One concern of using this variable is it is only about the Cultural Revolution rather than the whole period from 1950 to 1976. However, the regional level statistics about unusual death number from 1950 to 1966 is not yet publicly and systematically documented, and it is reasonable to assume that the regional

variation of persecution severity against "non-red" people is consistent along the whole class struggle period. To visually compare two constructed birth province level measure, I show the geographical variations of them in Figure A.3 and Figure A.4. Overall, the constructed persecution intensity from CFPS and abnormal death rate (1966-1976) from Walder and Su (2003) are very close in geographical distributions.

4 Empirical strategy

There are two main challenges in identifying the long-term impacts of exposure to class struggle: (1) The treatment of class struggle: the class-based persecution, is highly correlated with the observed and unobserved characteristics across classes. Intuitively speaking, persecutions are implemented to wealthier and more-educated social groups on purpose. (2) The variation of exposure to class struggle is highly associated with cohort variation. It is important to separate the impacts of being born in a specific cohort and the impacts of experiencing a certain length of class struggle. Therefore, the identification strategy of this study is a difference-in-difference approach based on both class variation and cohort variation, in order to control both time-invariant group characteristics and group-invariant cohort characteristics. Particularly in this study, the baseline equation is as follows :

$$Outcome_{it} = \alpha + \sum_{j=1}^{3} \beta_{Pj} Class_{iP} \times Exposure_{ij} + X_{it}\Gamma + \lambda_g + \theta_c + \eta_C + \epsilon_{it} \quad (1)$$

where $Outcome_{it}$ is the interested outcome variable of individual i observed (surveyed) in year t. $Class_{iP}$ is the family class group indicator, which equals 1 if this individual comes from persecuted ("non-red") groups. $Exposure_{ij}$ is the length of exposure in life stage j for individual i: $j = 1$ meaning early childhood period (0-6 years old), $j = 2$ meaning primary education period (7-12 years old), and $j = 3$ meaning early adulthood (13-18 years old). To make the coefficients of all three life stages comparable, I normalize $Exposure_{ij}$ to a 0 to 1 scale by dividing the length of exposure by the total number of the years in each period j. X_{it} is a set of observed individual level control variables provided by CFPS. λ_g is the class group fixed effect, θ_c is the cohort fixed effect, η_C is county fixed effect, and standard errors are clustered at county level. The key coefficient of interest in this study is β_{Pj}, which shows how the differences between treatment (persecuted/"non-red") group and control (non-persecuted/"red") group change with length of exposure to class struggle in each life stage. In another word, β_{Pj} quantifies the impacts of exposure to persecutions on a set of outcomes.

The "parallel trends" assumption is the most critical assumption of using difference-in-difference strategy. In this study, the pre-trends of the persecuted/"non-red" group and the non-persecuted/"red" group are shown to be visually parallel in Figure 2,

meaning the gap between two groups in individual development only changes for cohorts with exposure to class struggle before age 18. Moreover, group specific linear time trends is also includes to test the main empirical results in robustness check part.

5 Empirical results

5.1 Main findings

The estimates of the empirical model in Section 4 are reported in Table 2, Table 3 and Table 4. Since the length of years exposed in early childhood (0-6 years old), primary school years (7-12 years old) and high school years (13-18 years old) are highly associated with each other for any given cohort, I show estimates of each life stage both individually and together. Furthermore, I compare the magnitudes of β_{Pj} across three life periods to show which early life stage is relatively more important.

5.1.1 Human capital development

Table 2 estimates long-term impacts of exposure to persecutions in the class struggle on individual human capital outcomes: including the highest education level ever obtained, the test score in math test, the test score in verbal test and the logged current individual annual income. In each panel of Table 2, the first column only estimates the impact of early childhood exposure, the second column only estimates the impact of exposure in primary education years, the third column only estimates the impact of teenagehood exposure, and the last column estimates the impacts of three stages together. For example, the outcome variable is the highest education level in Panel A. Comparing across Column (1) to (3), the estimated $\widehat{\beta}_{Pj}$ is biggest in absolute value when exposure is in early childhood. Also, when all three stages are included in the regression specification in Column (4), the negative impact of exposure to persecutions in the class struggle is only statistically significant and economically big in early childhood. Similar comparison can be replicated in Panel B to Panel D. Overall, the negative impacts of early life exposure to persecutions during the class struggle are the biggest and most significant in early childhood, no matter human capital development is measured by formal education attainment, cognitive skills or log income.

To interpret the estimates more clearly, Panel A shows a complete early childhood exposure to persecutions is associated with 0.209 lower level of formal education, in another words, is 20.9% less likely to achieve one higher education degree on average. Table A.2 repeats the same analysis for each level of education degree and shows that the impact of childhood exposure to persecution on highest education level is almost linear with education degrees. Panel B and Panel C are both about cognitive skills.

According to Panel B, a complete early childhood exposure to persecutions is associated with 4.9 lower percentage point math test score, while it is associated with 3.4 lower percentage point verbal test score in Panel C. Income can be interpreted as the economic values of human capital. Estimates in Panel D show that a full early childhood exposure to persecutions during class struggle reduces individual annual income by 15.9%. All these results in Table 2 suggest that children born in persecuted families got less formal education, developed poorer cognitive skills and earn less income, if they experienced longer class struggle, especially during early childhood.

(Table 2 here)

5.1.2 Marriage market

Estimates about marriage outcomes are documented in Table 3 and Table 4. Following the structure of Table 2, for each outcome variable, the first three columns show estimated impacts of exposure in each life stage separately, and the last column shows the estimates for the unconstrained specification. The same human capital measures: highest education level, math test score, verbal test score, and log income are employed to measure the spouse's human capital development in Table 3. Comparing the coefficients β_{Pj} of all three life stages, the magnitudes of early childhood exposure are the largest and most significant in general, except when the outcome is spouse's income. Although from Column (1) and Column (2) of Panel A, the magnitude of the impact of exposure to persecutions is slightly lower in early childhood than in primary education years, the difference between them is very small. And, the impact of early childhood exposure is still the largest in Column (4). To tease out possible marriage sorting within class group, family class group of both parties are controlled in all the specifications of Table 3. In Panel A, when an individual has a complete early childhood exposure to persecutions in the class struggle, his or her spouse is 19.2% less likely to achieve a higher education degree. Note that, it does not mean one spouse's exposure to persecution casually reduces the other spouse's education attainment, this association suggest that longer early childhood exposure to persecutions reduces the probability of marrying a more highly educated spouse. Panel B and Panel C show that an individual with a full early childhood exposure to persecutions is associated with his or her spouse getting about 5 lower percentage point scores in both verbal and math tests. Therefore, Table 3 indicates that people with longer early childhood exposure to persecutions in the class struggle are more likely to marry a less educated and lower cognitively skilled spouse, even when family class groups are already controlled.

(Table 3 here)

Table 4 presents evidence about the relationship between one spouse's exposure length to the class struggle and the other spouse's family class. The outcome variables are

the three main class group: "red" (non-persecuted) group, "grey" (lightly persecuted) group and "black" (heavily persecuted) group. The coefficients of the main respondent's family class dummies indicate marriage sorting within each class group: people in "grey" and "black" classes are less likely to marry people from "red' classes, while they are more likely to marry each other within their own class group. However, experiencing persecutions in class struggle breaks the within group marriage sorting, and the overall evidence in Panel A, Panel B, and Panel C suggest that early childhood exposure plays the largest role. From Panel A, a complete early childhood exposure to persecutions increases the probability of marrying a "red" class spouse by 11% but reduces the probability of marrying a "grey" class spouse by 3.9% and the probability of marrying a "black" class spouse by 7.1%. This means early childhood exposure to the persecutions makes people marry classes, that are protected by the regime instead of their own classes.

(Table 4 here)

5.2 Heterogeneity

The analysis so far has established that early childhood exposure to persecutions in the class struggle negatively affect human capital development, which is not only reflected by education attainment but also by cognitive skills and income level. Furthermore, such experience in early childhood also changes marriage outcomes, by increasing the likelihood of having a low human capital "red" spouse. Therefore, starting from here, I only focus on the impact of exposure in early childhood. In this section, I examine whether the impacts of early childhood exposure to persecutions in the class struggle vary across different sub-groups of people.

5.2.1 Persecution risk level

In the main empirical specification, the treatment of experiencing persecution is measured by a dummy variable, which equals 1 if the family is classified into a "non-red" class. However, the risk of being persecuted is supposed to be heterogeneous within the "non-red" group. On one hand, "non-red" people were further divided into "grey" and "black" groups, and "black" group is more likely to be persecuted during that historical period. On the other hand, the persecution severity varies across geographical regions (Walder and Su, 2003). Therefore, I incorporate birth provincial level variations to further test whether the impact of early childhood exposure changes with the level of persecution risk at the intensive margin using the two different measures introduced in Section 3.2.

(Table 5 here)

Table 5 estimates the heterogeneous impacts on human capital development with response to persecution risk. In Panel A, comparing at class group level, early childhood

exposure to persecutions are all negatively associated with individual's education attainment, cognitive test scores and income level in both "grey" and "black" classes, while the magnitude sizes on education attainment and verbal test score are higher in "black" sample than "grey" sample, which is consistent with the historical observation that the "black" group was persecuted more heavily than "grey" group. However, I also find that this pattern is reversed between "grey" and "black" groups when income is the outcome variable in Column (4), and my interpretation is some characteristics, that are correlated with individual income but not with education or cognitive skills, are not captured here. "Black" classes, including big capitalists, landlords, etc., might have advantages in social networks, inherited ability and family traditions against "grey" classes, which are mainly middle-class people, such as small businessmen, clerks, and craftsmen. In another word, even being hurt more in education and cognitive skills, "black" classes suffered less in later economic outcomes than "grey" classes. Panel C of Table 5 examines how the impact of early childhood exposure on human capital varies at birth province level, therefore, the interacted effect between family class group and early childhood exposure length is further interacted with persecution severity measures at birth province. The coefficients of the triple-difference terms are all negative and the magnitudes are economically meaningful when regional level persecution intensity are measured by CFPS persecution intensity and abnormal death rate from 1966 to 1976, indicating the impact of early childhood to persecutions in class struggle is relatively bigger in high persecution risk birth places, however, most of the estimates are not statistically significant due to big standard errors.

(Table 6 here)

Table 6 repeats the same exercises in Table 5 with respect to each human capital outcomes of the spouse. From Panel A, the impact sizes of both math test and verbal test scores are bigger for "black" group sample in Column (2) and Column (3). Although the magnitude size of the interacted term between the class group and early childhood exposure length is higher for "grey" group in Column (1), it is significant only at the margin of 10% level. Birth provincial level measures of persecution risk are interacted with the difference-in-difference term in Panel B, where the estimates under each persecution risk measure are all significantly negative, suggesting that given the same length of early childhood exposure to persecutions during the class struggle, people growing up in a province with more severe persecutions are more likely to marry less educated and lower cognitively skilled people.

(Table 7 here)

Early childhood exposure to class struggle breaks marriage sorting within class group, when different social groups of people are treated differently during the class struggle.

Table 7 presents further evidence across both social classes and geographical regions. Panel A of Table 7 shows that marriage behavior change mainly happens in the most persecuted group, "black" group, while early childhood exposure to persecutions affects "grey" classes less significantly and in smaller magnitudes. People from "black" families are 16.8% more likely to marry a spouse from "red" classes, but 4.7% less likely to find the spouse from "grey" group and 12% less likely to marry within "black" group. In Panel C, the estimates of the triple difference term are close to zero when persecution risk level at birth province is measured by the persecution intensity constructed from CFPS. This means associations between early childhood exposure to persecutions and spouse's family class group do not change significantly with the intensity measure constructed from CFPS. However, the coefficients are still economically meaningful when abnormal death rate during the Cultural Revolution measures persecution risk level, and the directions of the sign are consistent with the story that, impacts of early childhood exposure to persecutions in class struggle are amplified in high persecution risk areas.

Another way to show whether the impacts of early-childhood exposure to persecutions in class struggle vary with regional level persecution risk is to visually present the estimated impacts for both high and low risk level provinces. Therefore, I divide the whole sample into two sub-samples: high risk area and low risk area, based on whether the persecution intensity (abnormal deathrate) is higher than the average persecution intensity (abnormal deathrate) of the country, and then plot the all the estimated impacts of early childhood exposure to persecutions on each outcome for both high and low risk areas. Figure 5 presents when persecution risk level is measured by persecution intensity from CFPS, while Figure 6 shows results when using abnormal deathrate from 1966 to 1976. In each figure, (a)-(d) are about individual education development, (e)-(h) are about spouse's human capital outcomes and (i)-(k) are about family class of the spouse. Summarizing the patterns in both figures, the negative impacts on individual human capital development and the negative associations with spouse's human capital outcomes are consistently higher in provinces with higher persecution risk. However, the comparisons for the analysis on spouse's family class are noisy.

(Figure 5 and Figure 6 here)

5.2.2 Gender

Figure A.5 plots historical trends in education attainment for both males and females of the full CFPS sample, showing females are significantly disadvantaged in receiving education than male peers, which is consistent the historical tradition of neglecting education of females in China. Moreover, during marriage sorting process, males and females search with different expectations given unequal socioeconomics statuses (Schwartz, 2013). As I have found that early childhood exposure to persecutions in class

struggle significantly affect both human capital development and marriage outcomes, an exploration across gender is legitimate.

(Table 8 here)

Table 8 compares the impacts of early childhood exposure to class struggle persecutions on males and females separately. Panel A reports results of the male sample and Panel B reports results for the female sample. The P-values of the T-test show whether each estimated coefficient are significantly different between male and female samples holding coefficients of all other control variables the same. Shown in Column (1), (2) and (3), when the outcome variables are education attainment, math test skill and verbal test skill, the impact sizes of early childhood exposure to class struggle persecutions estimated using male sample are all bigger than those estimated with the female sample. The gender differences are extremely significant (at 5% level) when education attainment and math test score are the outcomes. The magnitude is higher for the female sample only in Column (4), where income is the outcome variable. While both two coefficients in Column (4) are not significantly different at all, labor market gender discrimination might relieve the impact of early childhood exposure on income more on males than on females. Overall, Table 8 suggests that males' human capital outcomes are affected more by early childhood exposure to persecutions in class struggle relatively than females'.

(Table 9 and Table 10 here)

Table 9 and Table 10 report the gender heterogeneity in the marriage market. From Table 9, the negative magnitudes are larger and only significant for female sample analysis, except when the outcome variable is income. However, even in the main analysis in Table 3, the impacts on spouse's incomes also is not informative. Table 9 mainly suggests that, compared with males experiencing the same length of class struggle persecutions in early childhood, females are more likely to marry a less educated and less cognitively skilled spouse. Table 10 reports results about the spouse's class group, where the pattern of the main analysis still exist for both male and female samples. This suggests, for both genders, people in the persecuted groups with early childhood exposure to class struggle are more likely to marry into the protected social group ("red" group) rather than the most persecuted group ("black" group). However, the coefficient differences are still statistically significant at 5% level when the outcomes are the indicators of "red" and "black" classes, where the impacts on females are bigger than those on males.

To sum up the findings of gender heterogeneity effect, the direct impacts of early childhood exposure to class struggle persecutions on human capital development are relatively bigger among males, however, females are affected more indirectly on the outcomes of their spouses, both human capital and class group, through marriage.

5.3 Intergenerational impacts

One natural question is whether the next generation is continuously affected as their parents have been affected by early childhood exposure to persecutions in both human capital development and marriage outcomes. Therefore, the intergenerational impacts of early childhood exposure to persecutions in the class struggle are examined in Table A.3. Five outcomes are being considered in this part of analysis, the child's birth weight (kg), highest education level, math test score, verbal test score, and log annual income. The child sample is restricted to those, whose both parents are born between 1931 to 1976, the cohorts analyzed in the main analysis. The first half of Table A.3 focuses on impacts of father's early childhood exposure, where all the coefficients are negative. In Column (1) and (5), the magnitudes on child's birth weight and income level are economically big, however, the standard errors are big as well. In Column (2), Column (3) and Column (4), the size of each coefficient is relatively small compared with the respective ones in Table 8, where the same set of outcome variables are examined for males. The second part of Table 11 shows the impacts from the mother's side, where only the coefficients in Column (1), Column (3) and Column (4) are negative now. When the outcome variable is birth weight, the impact is much bigger from mother than father, although the standard error is big. However, this is consistent with the fact that maternal health is more responsible for birth weight. Besides, the impacts from the mother's early childhood exposure on her child's cognitive skills are smaller than those on their own cognitive skills, which are also shown in Table 8. In a word, the intergenerational effects of parents' early childhood exposure to class struggle persecutions are not as strong as the within generation results and are relatively noisy.

5.4 Robustness check

5.4.1 Non-linear exposure

In the main analysis, the length of exposure to persecutions in class struggle is measured continuously and linearly, however, the linear impact of exposure is a strict assumption. In Table A.4, Table A.5 and Table A.6, I replace the linear measure with a dummy indicating whether the length of exposure exceeds half of that life stage and replicate all analysis in Table 2, Table 3 and Table 4. Table A.4 reports the estimates of the impacts of heavy exposure to persecutions in class struggle on human capital development. Consistent with Table 2, the impact size in early childhood (0-6 years old) is always larger than those in primary education years (7-12 years old) and in teenagerhood (13-18 years old), even though the coefficient is not statistically significant when the outcome variable is log income. Table A.4 reemphasizes the conclusion of Table 2, that being exposed to class struggle persecutions in early childhood is significantly and negatively associated with

less education attainment, lower cognitive skills and possibly lower income level in the long run. Table A.5 is parallel with Table 3, where the relationships between exposure to persecutions in class struggle and spouse's human capital outcomes are examined. Again, a non-linear measure of exposure length confirms the finding under the linear measure: early childhood exposure to class struggle persecutions significantly increase the probability of marrying a less educated and less cognitively skilled spouse, even when family class groups have already been controlled for both spouses. Table A.6 corresponds to Table 4 and studies the impact of heavy exposure to class struggle on marriage sorting. Besides restating that people tend to marry within their own class group, Table A.5 also confirms that a heavy early childhood exposure increases the probability of marrying a "red" class spouse but reduces that of marrying a "black" class spouse. And, the effect on marrying "grey" class turns to be also statistically significant in Table A.5. Moreover, Table A.4, Table A.5, and Table A.6 all agree that early childhood is the most critical period when being exposed to persecutions in the class struggle

5.4.2 Other nationwide events

The treatment effect of this paper is the persecutions against certain groups of people all along the whole class struggle period from 1950 to 1976. One concern is that this historical period is mingled with other national level socioeconomic events, which happened not based on socioeconomic class but might confound the impacts of early childhood exposure to persecutions. Therefore, I investigate whether the main findings are robust even when those major national level events are considered in this section.

Two main events are examined in this paper: the Great Famine and the nationwide school shutdown, both of them are directly correlated with human capital development. Although the official definition of the Great Famine is from 1959 to 1961, 1958 to 1962 is the more widely accepted duration in academia (Change and Wen, 1997; Becker, 1998; Ashton et al., 1992; Dikötter and Bauckham; 2012). The school shutdown happened right with the start of the Cultural Revolution and lasted to around 1970, when most normal schools were resumed but the admission was based on family classification rather than academic merit. For every birth cohort, the lengths of early-childhood exposure to both Great Famine and school shutdown can be calculated out and be interacted with the indicator of persecuted group to compete with the interacted effect between overall exposure to class struggle and "non-red" indicator.

The first part of Table A.7 shows the estimates of the impacts of early childhood exposure to class struggle when the effects of early childhood exposure to the Great Famine is also identified. The second part of Table A.7 replaces the early childhood exposure to the Great Famine with the exposure to the school shutdown. Comparing the coefficients of the interaction between early childhood exposure and "non-red" indicator

in Table A.7 with those in Table 2, the magnitudes fluctuate a bit but still suggest early childhood exposure to persecutions in the whole class struggle period is significantly associated with later education attainment, cognitive skills and income, controlling for the effects of exposure to either one of the other major events. Table A.8 reports the same "horse races" between impacts of early childhood exposure to the whole class struggle period and early childhood exposure to other national movements when the outcomes are human capital of spouses. Similar to Table A.7, there is no evidence that either the Great Famine or the school shutdown confounds the negative associations between exposure to class struggle in early childhood and spouse's human capital outcomes. Moreover, Table A.9 shows that early childhood exposure in any other national event does not break marriage sorting within class group at all.

5.4.3 Linear time trend

Another exercise to test the robustness of the main results regarding the long-term effects of early childhood exposure to persecutions in the class struggle is to introduce linear time trend into the main empirical strategy, in case of the concern about confounding effect of time trends. Table A.10 shows the estimates of the impacts of early childhood exposure to persecutions in the class struggle on human capital outcomes. All the magnitudes are still negative, but smaller than those estimated in Table 2, given there is collinearity between linear time trend and the linear length of exposure. However, coefficients in Column (1), Column (2) and Column (4) are close to estimates in Table 2, and still economically meaningful and statistically significant. Table A.11 estimates associations between early childhood exposure to class struggle persecutions and spouse's human capital outcomes. Similar with estimates in Table 3, people with longer early childhood exposure to persecutions end up with the marriage, where the spouse received less formal education and owns lower cognitive skills, even after controlling linear time trend. Table A.12 presents results about class sorting after the linear time trend is controlled. While marriage sorting within each class group still holds, early childhood exposure to persecutions in class struggle increases the probability of marrying "red" class spouse rather than one from "grey" and "black" classes. Overall, the impacts of early childhood exposure to persecutions during the class struggle on human capital development and marriage market are robust even when considering linear time trending.

5.4.4 Early V.S. old cohorts

Another way to address the concern that cohort effect is mixed with exposure effect is to examine, for people in different cohort groups but with same lengths of early childhood exposure, whether the impacts of early childhood exposure are significantly different or not. According to Figure 1, the latest cohorts with variation in early

childhood exposure to the class struggle is 1970 to 1976. Different from older cohorts, for people born between 1970 to 1976, the later the cohort is, the shorter early childhood exposure they have. Therefore, I define a dummy to indicate whether a cohort falls into 1970-1976 time window, and estimate a triple-difference model, where the coefficient of the triple-interacted term: "non-red" dummy, early childhood exposure length, and younger cohorts indicator shows significant deviation in the impacts of early childhood exposure if being youngest cohorts rather than being older cohorts. Table A.13 reports the coefficient gap between the younger and older cohorts with respective to human capital outcomes, and does not show that the impacts of early childhood exposure to persecutions in the class struggle are significantly different for the young cohorts. The results in Table A.14 tells that early childhood exposure to persecutions in class struggle is negatively associated with spouse's education attainment, math test score and verbal test score, of which only math test score is affected differently for those born late during class struggle. Moreover, Table A.15 also suggests that impacts of early childhood exposure to class struggle persecutions on marriage sorting in class are not significantly different if being born in the youngest cohort window overall.

5.5 Mechanisms

In the last section of empirical results, I propose several possible mechanisms to explain why early childhood exposure to persecutions in the class struggle hurts individual human capital development and changes marriage market outcomes for empirical investigations.

5.5.1 Health and nutrition

Maternal health and child undernutrition are associated with adult education attainment and economic productivity (Victora et al., 2008). If the nutrition and health care were neglected during fetus and early ages as parents are being persecuted, later human capital development would be harmed as well. therefore, I first examine whether early childhood exposure to persecutions in the class struggle affect health outcomes in Table 11. CFPS data offers two streams of measures about health. The first category is subject evaluations, including self-reported health status (scaled from 1 as "very healthy" to 5 as "very unhealthy") and health change from the previous year (scaled from 1 as "better" to 5 as "worse"). The other category is all objective health indexes, including height and weight, with which I generate body mass index (BMI). Shown in Table 11, Column (1) and Column (2) are about self-reported health status and change, Column (3) to Column (7) are all about objective measures. Therefore, there is no economically and statistically significant relationship between early childhood exposure to class struggle persecutions and self-reported health outcomes.

(Table 11 here)

However, estimates of effects on objective health measures are more informative. Although no significant effects are found on continuous measures of height and BMI in Column (3) and Column (5), significant impacts are found in Column (4) and Column (6). Column (4) shows the result on the indicator of being short, which is defined as two standard deviations from mean height in each age-gender group (Barstow and Rerucha, 2015), and suggests that early childhood exposure to persecutions is positively associated with the probability of being short at 10% significance level. Also, Column (6) shows that people with longer early childhood exposure to persecutions are more likely to be underweight (BMI 18.5 kg/m^2), which is usually associated with further medical and nutritional issues. Therefore, health and nutrition could be a possible driver connecting early childhood exposure in the class struggle persecutions with later human capital development, and could further affect marriage market outcomes through human capital sorting (Lewis and Oppenheimer, 2000).

5.5.2 Education

In the main analysis part, education attainment is one of the outcomes, which is significantly affected by early childhood exposure to persecutions in the class struggle. However, education can also play the role as a mechanism, through which early childhood experience indirectly affect other outcomes, such as cognitive skills, income, and marriage sorting. Furthermore, literature has provided evidence that adult education attainment is affected by both positive intervention (Garces et al., 2002; Heckman et al., 2013) and negative intervention (Neelsen and Stratmann, 2011; León, 2012) early childhood . Thus, the basic operation to examining the mechanism of education is to add the measure of education as a mediator and compare how the coefficient of interest changes before and after including education.

(Table 12 here)

Table 12 shows how the impacts of early childhood exposure to persecutions in the class struggle on cognitive skills and income level change with and without the highest education degree in the empirical specification. While the coefficients of education level itself are considerably large and significant in all the exercises, the magnitude size of the impact of early childhood exposure on math and verbal test scores both reduced to nearly zero and decreases by about 2% when income is the outcome variable. Note that the coefficients on education here are not causal estimates, the results still suggest that education help to explain large proportion of the observed impacts of early childhood exposure on cognitive skills, and part of that on income.

(Table 13 and Table 14 here)

A similar operation is carried out in Table 13 and Table 14, where outcome variables are human capital development and class group of the spouse. Results in Column (1) to Column (6) of Table 13 show that highest education degree of the main respondent can partially explain the association between his or her own early childhood exposure length with the the spouse's education attainment and cognitive skills. Thus, I do find evidence of education sorting, however, education cannot completely explain all the impacts on the spouse's human capital outcomes. Moreover, when highest education level is added into the specifications in Column (1), Column (3) and Column (5) of Table 14, the coefficient of the interaction between early childhood exposure length and indicator of the persecuted group never changes. Meanwhile, education level of one spouse has no association with family class of the other one, which inquires for further investigation of other possible mechanisms to explain the impacts of early childhood exposure to class struggle persecutions on marriage market outcomes.

5.5.3 Mental trauma

Early life negative experiences generate life-long psychological trauma (Steel et al., 2002). During the period of class struggle, crucial experiences happened to the persecuted families, including being sent down to the countryside and rural areas, being sent to a labor camp or prison, being publicly humiliated and being executed, and, might cause life-long psychological trauma, which indirectly affect individual marriage choices. For example, a person with higher self-confidence makes better marriage choices and is more likely to be considered as a good candidate in marriage market (Clausen, 1991).

CFPS asks a series of questions about subjective well-being and depression, which allows the study about the impact of early childhood exposure to persecutions on later mental health. Table 15 presents all the estimates of the impacts of early childhood exposure on six different dimensions of subjective well-being, each of which is scored higher when the outcome is better, for the married sample. The overall pattern is that early childhood exposure to persecutions is negatively associated with mental health, and the coefficients are statistically significant when outcomes are self-confidence level, self-reported popularity, and self-reported easy-going level. Therefore, it is reasonable to consider mental shock as one possible mechanism.

(Table 15 here)

5.5.4 Personal perception

Personal perception is also affected by political experiences. Roland and Yang (2017) show that cohorts affected by the Cultural Revolution believe less in pay-off of effort than later cohorts, while González et al. (2019) find that population affected by military

dictatorship support democracy in the later election. From Table 1, education attainment, cognitive test scores, and annual income level are all higher in "non-red" group than in "red" group on average. However, if people from persecuted group choose to marry people in non-persecuted group due to the change of their perceptions about social hierarchy, they are also more likely to marry a spouse with lower level human capital. In another words, it is possible that children with early childhood exposure to persecutions in class struggle grew up to believe "red" classes is better than other social classes.

Table 16 tests this hypothesis by showing the impacts of early childhood exposure to persecutions on subjective perceived determinants of individual success. In CFPS, everyone is asked to rate how important a factor is for an individual to achieve success, and the factors come from two levels: individual and family. Column (1) to Column (4) are about factors at personal level, including efforts, education, talent, and luck, while Column (5), Column (6), and Column (7) are about family level factors: economic condition, social status, and connections. The estimated results suggest that people with longer early childhood exposure to persecutions in the class struggle are more likely to believe that family economic condition and social status are more important for individual success. Given the historical fact that the "red" group is favored by the regime both politically and economically during the class struggle, empirical evidence in Table 17 shed light on the mechanism of personal perception change.

(Table 16 here)

6 Conclusion

This paper contributes to the literature by understanding to which extent the early life exposure to the persecution have persistent impacts on individual development and social structure among the survived population. By exploiting the data from one of the largest countries with class struggle history, my evidence shows that people with longer early life exposure to class struggle persecutions obtained less formal education, show worse cognitive skills and earn less income, moreover, they are more likely to marry a spouse with similarly worse human capital development and from non-persecuted family classes. Particularly, this study emphasizes that early childhood is the most critical life stage, when exposure to persecutions produces life-long effects. Further results suggest the impacts of exposure to class struggle can vary with regional persecution risk and gender, and the main affecting patterns of class struggle still exist when the alternative measure of exposure, time trending, and other confounding events are considered.

This study has important historical and policy implications. Besides showing direct evidence that individual development and inter-class dynamics are strongly associated with early childhood exposure to persecution, this paper explores multiple mechanisms

to understand such long-term impacts. While health shock and education interruption contribute to human capital development, mental trauma and personal perception shaped by political upheaval help to explain changes in marriage decisions. Therefore, even though this study is accompanied with the caveat that persecution in the class struggle is a very broad treatment effect, the message from the main findings is still strong: the impacts of the temporary persecution exposure are persistent and sophisticated, even though such experience happened in a very early life stage. Therefore, it is necessary to support and compensate people, who have made it through the persecution, especially those young children.

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Figure 1: Variations of exposure length to class struggle in each life stage by cohort

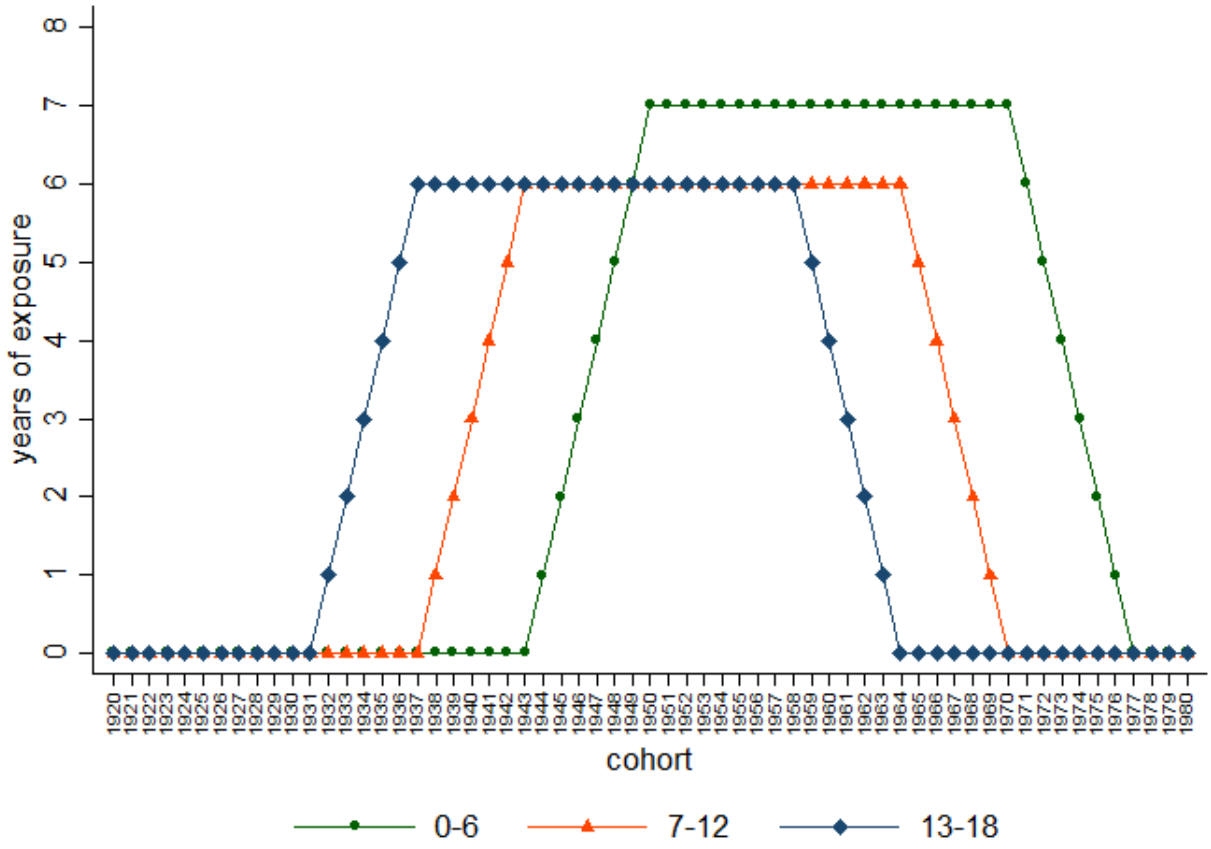


Figure 2: Time trends of human capital outcomes and cohort exposure to class struggle between 13 and 17 year old

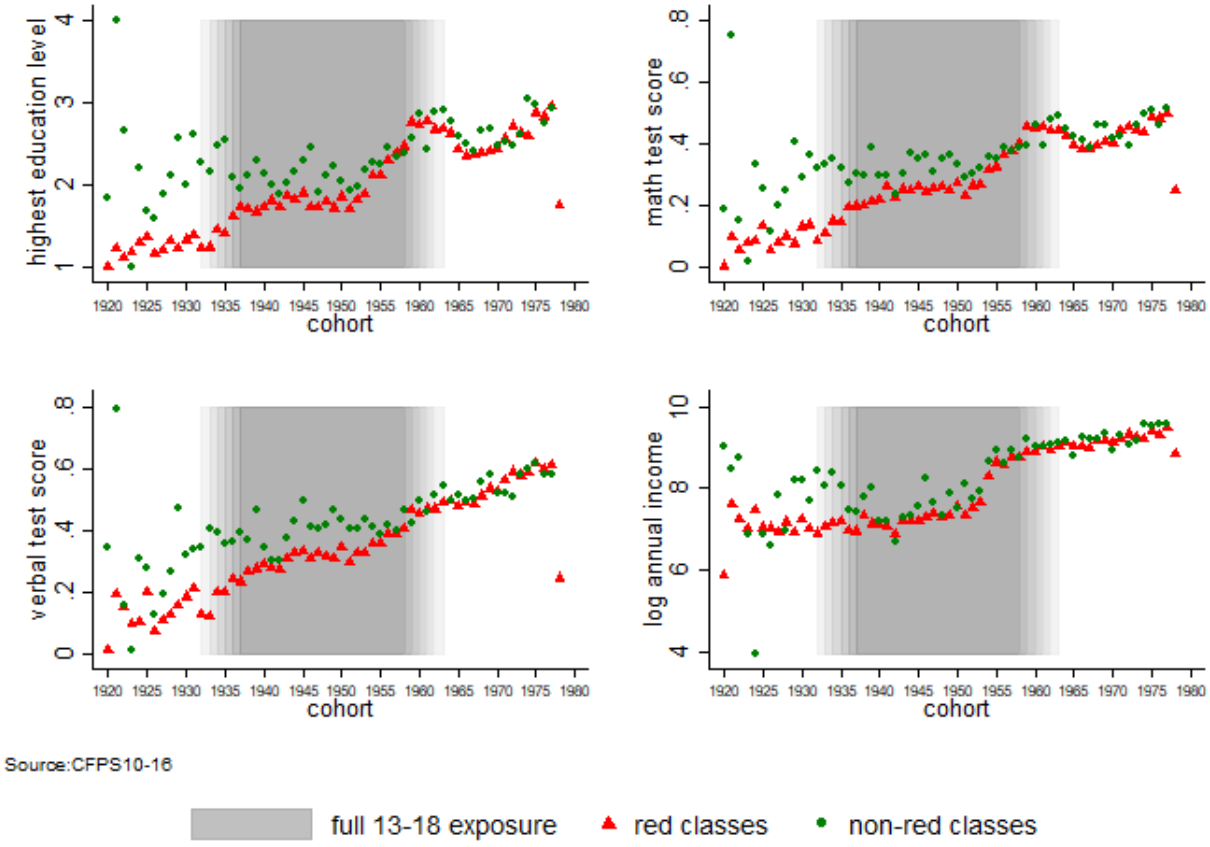


Figure 3: Time trends of human capital outcomes and cohort exposure to class struggle between 7 and 12 year old

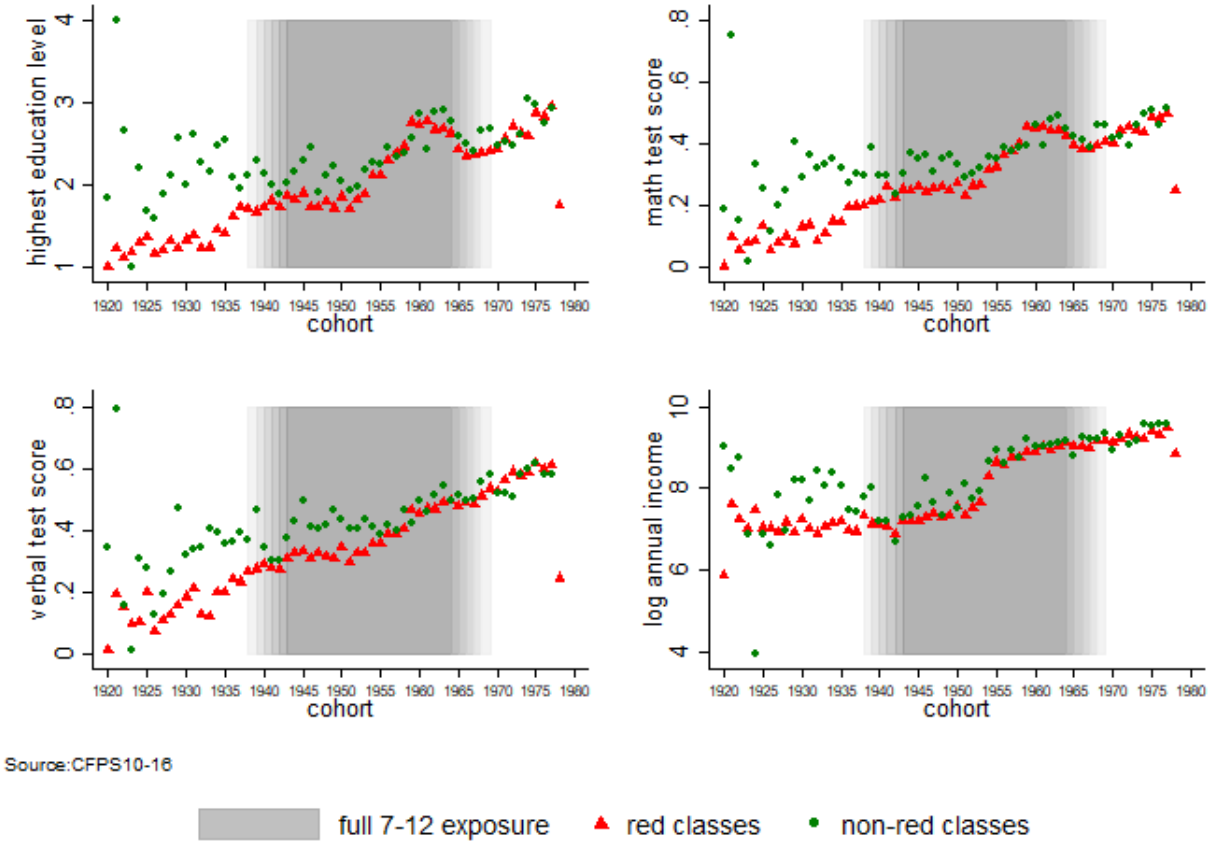


Figure 4: Time trends of human capital outcomes and cohort exposure to class struggle between 0 and 6 year old

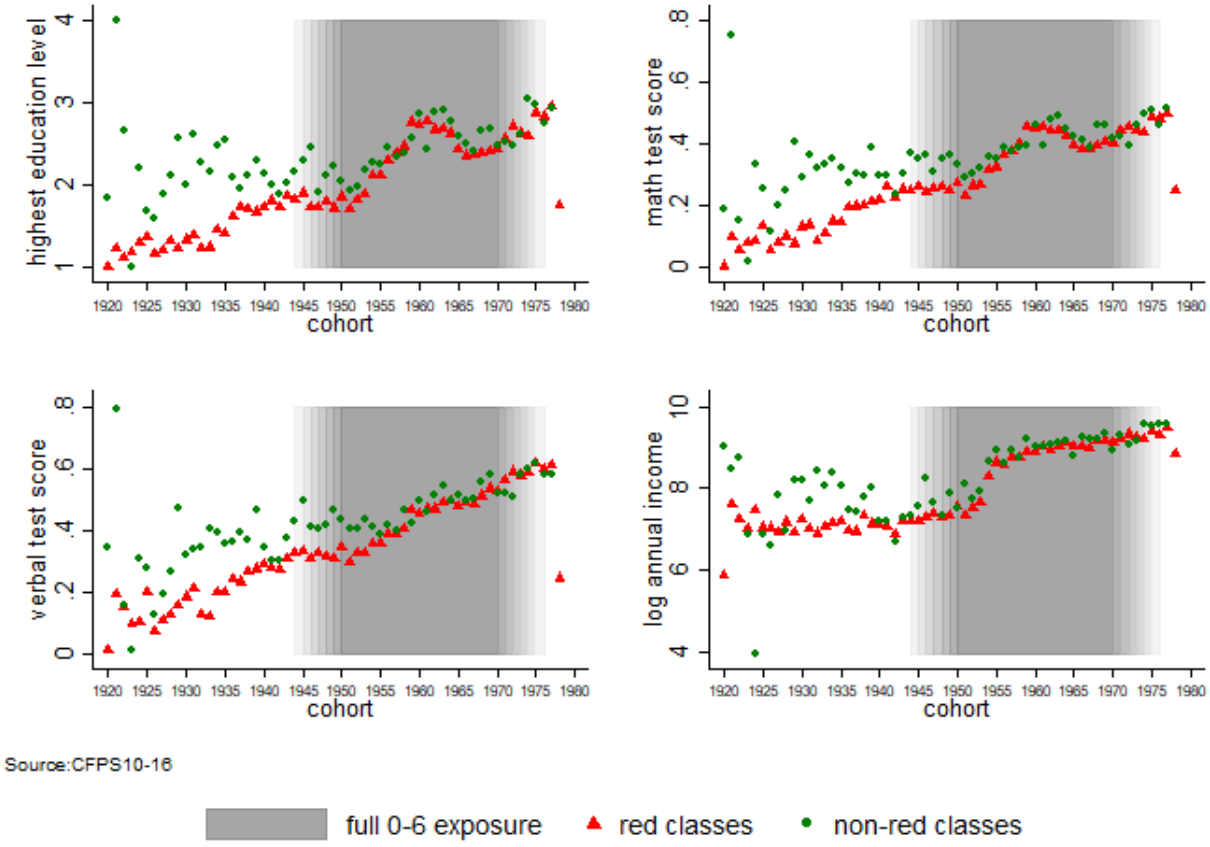
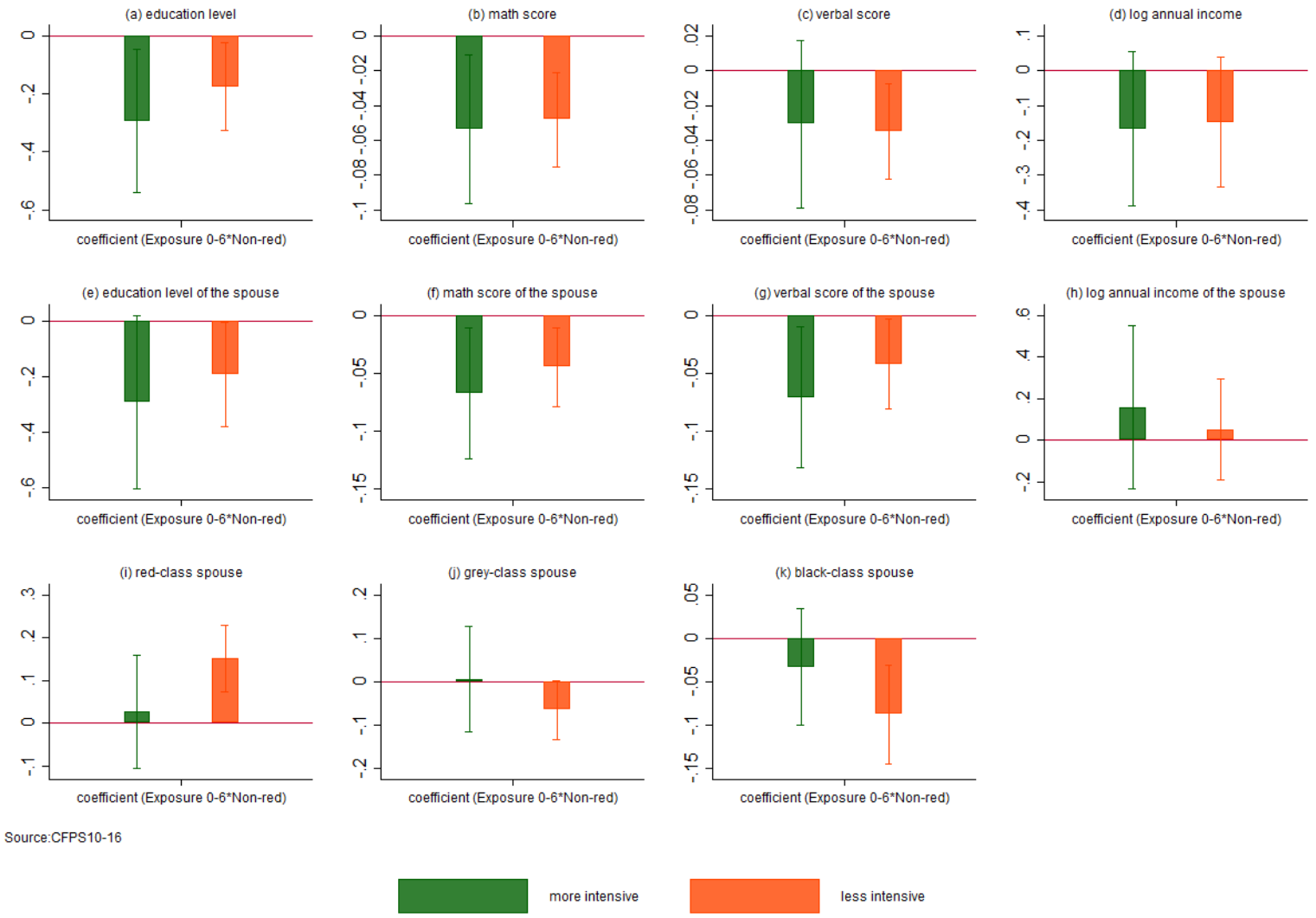
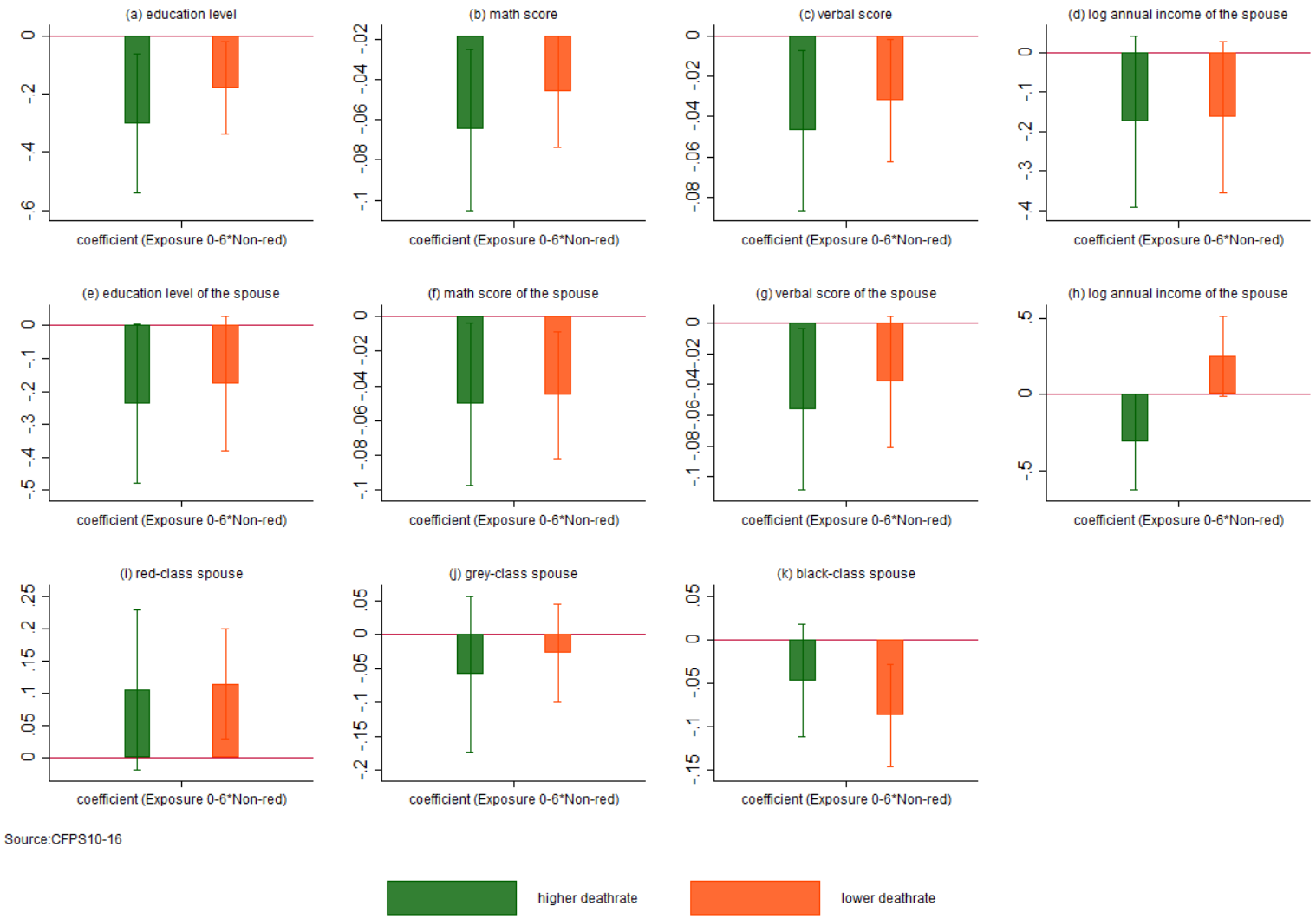


Figure 5: The impacts of early childhood exposure to persecutions in more and less intensive birth provinces (constructed persecution intensity from CFPS)



Note: persecution intensity is defined as average types of persecution experience per person among the "non-red" sample in each birth province.

Figure 6: The impacts of early childhood exposure to persecutions in higher and lower deathrate birth provinces (abnormal deathrate 1966-1976)



Note: Birth province level abnormal deathrate is the abnormal death number per 1,000 people between 1966 to 1976.

Table 1: Summary Statistics

(a) All individuals (1931-1978)

	Pooled N=26588		Non-red N=2908		Red N=23680	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
A.Outcome variables						
Highest eduction level	2.40	1.29	2.52	1.39	2.38	1.28
Math test score (0-100%)	0.38	0.27	0.40	0.28	0.38	0.27
Verbal test score (0-100%)	0.45	0.32	0.48	0.32	0.45	0.32
Log(income)	8.20	2.02	8.24	2.02	8.19	2.02
B.Control variables						
Age	53.2	12.1	54.7	12.5	53.0	12.0
Male	0.54	0.50	0.55	0.50	0.54	0.50
Living in urban currently	0.49	0.50	0.54	0.50	0.48	0.50
Urban residential status at 12	0.16	0.37	0.29	0.45	0.15	0.35
Married	0.89	0.31	0.89	0.32	0.89	0.31
Red family	0.89	0.31	-	-	-	-
Grey family	0.06	0.23	0.51	0.50	-	-
Black family	0.05	0.23	0.49	0.50	-	-

(b) Married individuals (1931-1978)

	Pooled N=18523		Non-red N=1973		Red N=16550	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
A.Outcome variables of spouse						
Highest eduction level	2.42	1.27	2.49	1.33	2.41	1.26
Math test score (0-100%)	0.39	0.27	0.40	0.28	0.39	0.27
Verbal test score (0-100%)	0.46	0.31	0.47	0.32	0.46	0.31
Log(income)	8.30	1.96	8.28	1.95	8.30	1.96
Red family	0.89	0.31	0.71	0.46	0.91	0.28
Grey family	0.06	0.23	0.18	0.38	0.04	0.20
Black family	0.05	0.22	0.11	0.32	0.05	0.21
B.Control variables of spouse						
Age	52.7	11.3	54.2	11.7	52.6	11.3
Urban resdiental status at 12	0.15	0.36	0.24	0.43	0.14	0.35
C.Control variables of the main respondent						
Age	52.4	11.2	54.1	11.7	52.2	11.2
Male	0.44	0.50	0.47	0.50	0.44	0.50
Urban resdiental status at 12	0.16	0.36	0.28	0.45	0.14	0.35
Living in urban currently	0.48	0.50	0.53	0.50	0.48	0.50

Note: Highest education level is coded as: 1 "Illiterate" 2 "Primary education" 3 "Junior high school" 4 "Senior high school" 5 "3-year college" 6 "4-year college" 7 "Master degree" 8 "Ph.D. degree" .

Table 2: Effects of exposure to persecutions on human capital outcomes in three stages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	A. Highest education level				B. Math test score			
Exposure 0-6*Non-red	-0.209***			-0.241***	-0.049***			-0.052***
	(0.063)			(0.079)	(0.011)			(0.015)
Exposure 7-12*Non-red		-0.118**		0.036		-0.023**		0.003
		(0.059)		(0.091)		(0.010)		(0.017)
Exposure 13-18*Non-red			-0.043	-0.093			-0.001	-0.009
			(0.051)	(0.078)			(0.010)	(0.015)
Observations	70,047	70,047	70,047	70,047	38,878	38,878	38,878	38,878
R-squared	0.399	0.399	0.399	0.400	0.404	0.403	0.403	0.404
	C. Verbal test score				D. Log(income)			
Exposure 0-6*Non-red	-0.034***			-0.032**	-0.159**			-0.174*
	(0.011)			(0.016)	(0.074)			(0.095)
Exposure 7-12*Non-red		0.011		0.005		-0.013		0.034
		(0.012)		(0.019)		(0.060)		(0.107)
Exposure 13-18*Non-red			0.034***	0.027*			0.052	0.019
			(0.011)	(0.016)			(0.059)	(0.094)
Observations	38,878	38,878	38,878	38,878	27,563	27,563	27,563	27,563
R-squared	0.398	0.397	0.398	0.398	0.384	0.384	0.384	0.384

Note: Age, gender, household registration status at 12, current residential area, and political classification group are controlled. In Panel D, age is replaced by formal education years, experience years and square of experience years and job sector is also controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 3: Effects of exposure to persecutions on marrying high human capital spouse in three stages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Spouse's							
	A. Highest education level				B. Math test score			
Exposure 0-6*Non-red	-0.192**			-0.209**	-0.048***			-0.061***
	(0.079)			(0.102)	(0.014)			(0.020)
Exposure 7-12*Non-red		-0.220***		-0.040		-0.036***		0.011
		(0.074)		(0.116)		(0.013)		(0.023)
Exposure 13-18*Non-red			-0.155**	-0.160*			-0.025**	-0.039**
			(0.063)	(0.097)			(0.011)	(0.019)
Observations	45,479	45,479	45,479	45,479	26,829	26,829	26,829	26,829
R-squared	0.398	0.398	0.398	0.399	0.398	0.398	0.397	0.398
	Spouse's							
	C. Verbal test score				D. Log(income)			
Exposure 0-6*Non-red	-0.046***			-0.073***	0.052			0.216
	(0.016)			(0.024)	(0.102)			(0.133)
Exposure 7-12*Non-red		-0.018		0.040		-0.091		-0.279**
		(0.014)		(0.025)		(0.071)		(0.120)
Exposure 13-18*Non-red			-0.016	-0.048**			-0.010	0.179*
			(0.013)	(0.022)			(0.070)	(0.106)
Observations	26,829	26,829	26,829	26,829	19,257	19,257	19,257	19,257
R-squared	0.391	0.390	0.390	0.391	0.379	0.379	0.379	0.379

Note: Main respondent's age, gender, household registration status at 12, current residential area, and political classification group are controlled. Spouse's age, household registration status at 12 and political classification group are controlled. In Panel D, spouse's age is replaced by his/her formal education years, experience years and square of experience years, as well as job sector. County and both parties' cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 4: Effects of exposure to persecutions on spouse's class in three stages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Spouse's											
	A. Red class				B. Grey class				C. Black class			
Grey classes	-0.292***	-0.266***	-0.202***	-0.279***	0.237***	0.243***	0.216***	0.245***	0.055***	0.022	-0.014	0.034
	(0.036)	(0.032)	(0.029)	(0.042)	(0.033)	(0.030)	(0.028)	(0.037)	(0.019)	(0.016)	(0.012)	(0.023)
Black classes	-0.200***	-0.175***	-0.110***	-0.187***	0.034	0.042**	0.014	0.043	0.166***	0.133***	0.096***	0.145***
	(0.035)	(0.029)	(0.024)	(0.042)	(0.025)	(0.018)	(0.013)	(0.030)	(0.027)	(0.022)	(0.018)	(0.028)
Exposure 0-6*Non-red	0.110***			0.043	-0.039			-0.007	-0.071***			-0.036
	(0.036)			(0.044)	(0.031)			(0.037)	(0.022)			(0.030)
Exposure 7-12*Non-red		0.082**		0.117**		-0.054**		-0.064*		-0.029		-0.053
		(0.032)		(0.048)		(0.024)		(0.034)		(0.019)		(0.035)
Exposure 13-18*Non-red			-0.015	-0.075*			-0.016	0.019			0.031*	0.056*
			(0.030)	(0.043)			(0.021)	(0.029)			(0.018)	(0.030)
Observations	18,067	18,067	18,067	18,067	18,067	18,067	18,067	18,067	18,067	18,067	18,067	18,067
R-squared	0.081	0.081	0.080	0.082	0.106	0.106	0.105	0.106	0.041	0.040	0.040	0.042

Note: Formal education years, experience years and square of experience years, gender, household registration status at 12, current residential area, and political classification group are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 5: Effects of early childhood exposure to persecutions on human capital outcomes: heterogenity in persecution risk

	(1)	(2)	(3)	(4)
	Highest educ level	Math test score	Verbal test score	Log(income)
	A. Heterogenity across class group			
Exposure 0-6*Grey	-0.188**	-0.049***	-0.023	-0.272***
	(0.088)	(0.016)	(0.017)	(0.097)
Exposure 0-6*Black	-0.229**	-0.049***	-0.044***	-0.059
	(0.091)	(0.016)	(0.017)	(0.099)
Observations	70,047	38,878	38,878	27,563
R-squared	0.399	0.404	0.398	0.384
	B. Heterogenity across birth province			
Exposure 0-6*Non-red*Persecution intensity	-0.926	-0.107	-0.084	-0.493
	(0.822)	(0.145)	(0.156)	(0.998)
Observations	69,934	38,815	38,815	27,518
R-squared	0.400	0.404	0.397	0.384
Exposure 0-6*Non-red*Abnormal deathrate	-0.047	-0.025	-0.026	-0.408**
	(0.155)	(0.030)	(0.033)	(0.188)
Observations	69,353	38,497	38,497	27,316
R-squared	0.398	0.402	0.397	0.383

Note: Age, gender, household registration status at 12, current residential area, and political classification group are controlled. In Column (4), age is replaced by formal education years, experience years and square of experience years, as well as job sector. County and cohort fixed effects have been controlled. In Panel B, persecution intensity is constructed from CFPS individual data as the average number of persecution related experience types per person among the "non-red group" in each birth province. Abnormal deathrate is contructed using Table 1, Table 7 from Walder and Su (2003) and provicial population from China Statistical Yearbook 1966. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 6: Effects of early childhood exposure to persecutions on marrying high human capital spouse: heterogenity in persecution risk

	(1)	(2)	(3)	(4)
	Spouse's			
	Highest educ level	Math test score	Verbal test score	Log(income)
	A. Heterogenity across class group			
Exposure 0-6*Grey	-0.245*	-0.043*	-0.035	-0.050
	(0.125)	(0.022)	(0.025)	(0.139)
Exposure 0-6*Black	-0.138	-0.053***	-0.058***	0.158
	(0.111)	(0.019)	(0.021)	(0.147)
Observations	45,479	26,829	26,829	19,257
R-squared	0.398	0.398	0.391	0.379
	B. Heterogenity across birth province			
Exposure 0-6*Non-red*Persecution intensity	-0.786***	-0.173***	-0.099*	-0.046
	(0.294)	(0.051)	(0.054)	(0.328)
Observations	45,419	26,792	26,792	23,601
R-squared	0.399	0.398	0.391	0.441
Exposure 0-6*Non-red*Abnormal deathrate	-0.333*	-0.073**	-0.055*	-0.473**
	(0.182)	(0.035)	(0.028)	(0.197)
Observations	45,032	26,568	26,568	23,411
R-squared	0.397	0.396	0.390	0.439

Note: Main respondent's age, gender, household registration status at 12, current residential area, and political classification group are controlled. Spouse's age, household registration status at 12 and political classification group are controlled. In Column (4), spouse's age is replaced by his/her formal education years, experience years and square of experience years, as well as job sector. County and both parties' cohort fixed effects have been controlled. In Panel B, persecution intensity is constructed from CFPS individual data as the average number of persecution related experience types per person among the "non-red group" in each birth province. Abnormal deathrate is contructed using Table 1, Table 7 from Walder and Su (2003) and provicial population from China Statistical Yearbook 1966. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 7: Effects of early childhood exposure to persecutions on spouse's class: heterogenity in persecution risk

	(1)	(2)	(3)
	Spouse's		
	Red class	Grey class	Black class
	A. Heterogenity across class group		
Exposure 0-6*Grey	0.060	-0.033	-0.028
	(0.054)	(0.053)	(0.021)
Exposure 0-6*Black	0.168***	-0.047**	-0.120***
	(0.040)	(0.023)	(0.043)
Observations	18,067	18,067	18,067
R-squared	0.082	0.106	0.042
	B.Heterogenity across birth province		
Exposure 0-6*Non-red*Persecution intensity	0.020	-0.021	0.001
	(0.062)	(0.116)	(0.117)
Observations	18,040	18,040	18,040
R-squared	0.927	0.517	0.428
Exposure 0-6*Non-red*Abnormal deathrate	0.325	-0.208	-0.116
	(0.211)	(0.159)	(0.134)
Observations	17,882	17,882	17,882
R-squared	0.460	0.292	0.212

Note: Formal education years, experience years and square of experience years, gender, household registration status at 12, current residential area, and political classification group are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. In Panel B, persecution intensity is constructed from CFPS individual data as the average number of persecution related experience types per person among the "non-red group" in each birth province. Abnormal deathrate is contructed using Table 1, Table 7 from Walder and Su (2003) and provicial population from China Statistical Yearbook 1966. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 8: Effects of early childhood exposure to persecutions on human capital outcomes: heterogenity in gender

	(1)	(2)	(3)	(4)
	Highest educ level	Math test score	Verbal test score	Log(income)
		A. Male		
Exposure 0-6*Non-red	-0.284***	-0.062***	-0.039**	-0.148*
	(0.084)	(0.015)	(0.016)	(0.090)
Observations	33,500	18,803	18,803	15,674
R-squared	0.324	0.315	0.288	0.377
		B. Female		
Exposure 0-6*Non-red	-0.142*	-0.042***	-0.034**	-0.211*
	(0.079)	(0.015)	(0.017)	(0.120)
Observations	36,547	20,075	20,075	11,889
R-squared	0.463	0.465	0.477	0.352
T-test(P-value)	0.048	0.036	0.217	0.780

Note: Age, household registration status at 12, current residential area, and political classification group are controlled. In Column (4), age is replaced by formal education years, experience years and square of experience years, as well as job sector. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 9: Effects of early childhood exposure to persecutions on marrying high human capital spouse: heterogenity in gender

	(1)	(2)	(3)	(4)
	Spouse's			
	Highest educ level	Math test score	Verbal test score	Log(income)
	A. Male			
Exposure 0-6*Non-red	0.033	-0.010	-0.020	0.029
	(0.086)	(0.018)	(0.022)	(0.168)
Observations	22,704	13,403	13,403	8,065
R-squared	0.475	0.467	0.478	0.354
	B. Female			
Exposure 0-6*Non-red	-0.427***	-0.080***	-0.062***	0.108
	(0.125)	(0.019)	(0.022)	(0.130)
Observations	22,775	13,426	13,426	11,192
R-squared	0.329	0.316	0.288	0.370
T-test(P-value)	0.151	0.150	0.281	0.267

Note: Main respondent's age, household registration status at 12, current residential area, and political classification group are controlled. Spouse's age household registration status at 12 and political classification group are controlled. In Column (4), spouse's age is replaced by his/her formal education years, experience years and square of experience years, as well as job sector. County and both parties' cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 10: Effects of early childhood exposure to persecutions on spouse's class: heterogenity in gender

	(1)	(2)	(3)
		Spouse's	
	Red class	Grey class	Black class
		A. Male	
Exposure 0-6*Non-red	0.106***	-0.038	-0.068***
	(0.036)	(0.034)	(0.025)
Observations	9,004	9,004	9,004
R-squared	0.091	0.116	0.056
		B. Female	
Exposure 0-6*Non-red	0.118***	-0.040	-0.078***
	(0.045)	(0.037)	(0.029)
Observations	9,063	9,063	9,063
R-squared	0.098	0.125	0.057
T-test(P-value)	0.051	0.522	0.029

Note: Formal education years, experience years and square of experience years, household registration status at 12, current residential area, and political classification group are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 11: Effects of early childhood exposure to persecutions on health

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Self-reported		Objective measure				
	Health status	Health status change	Height(cm)	Short	BMI(kg/m^2)	Underweight(BMI$\leqslant$18.5)	Obesity(BMI$\geqslant$30)
Exposure 0-6*Non-red	-0.027	-0.010	-0.470	0.010*	-0.213	0.027*	-0.006
	(0.049)	(0.051)	(0.291)	(0.006)	(0.191)	(0.015)	(0.007)
Observations	70,426	68,905	53,414	53,414	53,147	53,147	53,147
R-squared	0.236	0.054	0.474	0.047	0.113	0.078	0.016

Note: Age, gender, household registration status at 12, current residential area, and political classification group are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 12: Effects of early childhood exposure to persecutions on human capital: through education

	(1)	(2)	(3)	(4)	(5)	(6)
	Math test score		Verbal test score		Log(income)	
Exposure 0-6*Non-red	-0.049***	-0.009	-0.034***	0.001	-0.159**	-0.141*
	(0.011)	(0.006)	(0.011)	(0.008)	(0.074)	(0.075)
Highest education level		0.179***		0.158***		0.240***
		(0.002)		(0.003)		(0.033)
Observations	38,878	38,878	38,878	38,878	27,557	27,557
R-squared	0.404	0.828	0.398	0.630	0.385	0.386

Note: Age, gender, household registration status at 12, current residential area, and political classification group are controlled. In Column (5) and (6), age is replaced by formal education years, experience years and square of experience years, as well as job sector. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 13: Effects of early childhood exposure to persecutions on marrying high human capital spouse: through education

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Spouse's							
	Highest educ level		Math test score		Verbal test score		Log(income)	
Exposure 0-6*Non-red	-0.205**	-0.144**	-0.052***	-0.042***	-0.051***	-0.042**	0.041	0.042
	(0.080)	(0.071)	(0.015)	(0.014)	(0.017)	(0.016)	(0.104)	(0.104)
Highest education level		0.285***		0.046***		0.038***		0.008
		(0.018)		(0.003)		(0.003)		(0.014)
Observations	45,398	45,398	26,818	26,818	26,818	26,818	19,243	19,243
R-squared	0.372	0.423	0.362	0.391	0.354	0.369	0.343	0.343

Note: Main respondent's age, gender, household registration status at 12, current residential area, and political classification group are controlled. Spouse's age, household registration status at 12 and political classification group are controlled. In Column (7) and (8), spouse's age is replaced by his/her formal education years, experience years and square of experience years. County and both parties' cohort fixed effects have been controlled. Standard error clustered at county level. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 14: Effects of early childhood exposure to persecutions on spouse's class: through education

	(1)	(2)	(3)	(4)	(5)	(6)
	Spouse's					
	Red class		Grey class		Black class	
Exposure 0-6*Non-red	0.111***	0.111***	-0.039	-0.039	-0.072***	-0.072***
	(0.036)	(0.036)	(0.031)	(0.031)	(0.022)	(0.022)
Highest education level		-0.012		0.014*		-0.002
		(0.009)		(0.007)		(0.005)
Observations	18,059	18,059	18,059	18,059	18,059	18,059
R-squared	0.081	0.081	0.106	0.106	0.040	0.040

Note: Formal education years, experience years and square of experience years, gender, household registration status at 12, current residential area, and political classification group are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 15: Effects of early childhood exposure to persecutions on on subjective well-being

	(1)	(2)	(3)	(4)	(5)	(6)
	Self-confidence	Satisfaction	Popularity	Easy-going	Happiness	Depression
Exposure 0-6*Non-red	-0.162***	-0.056	-0.090**	-0.109**	-0.057	-0.027
	(0.056)	(0.054)	(0.044)	(0.043)	(0.051)	(0.026)
Observations	46,327	46,496	27,874	27,828	27,841	39,379
R-squared	0.075	0.070	0.056	0.067	0.069	0.093

Note: Age, gender, household registration status at 12, current residential area, and political classification group are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table 16: Effects of early childhood exposure to persecutions on personal perceptions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Personal level				Family level		
	Efforts	Education	Talent	Luck	Econ condition	Social status	Connection
Exposure 0-6*Non-red	-0.031	-0.011	0.062	0.001	0.149**	0.121*	-0.036
	(0.031)	(0.049)	(0.047)	(0.066)	(0.070)	(0.073)	(0.052)
Observations	18,165	17,711	17,987	17,633	17,634	17,088	17,884
R-squared	0.103	0.056	0.093	0.061	0.079	0.061	0.071

Note: Dependent variables are individual perceived factors of personal success. Age, gender, household registration status at 12, current residential area, and political classification group are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Appendix

Figure A.1: Sampled provinces in China Family Panel Studies (CFPS)

Note: Tibet, Qianghai, Hong Kong, Macau and Taiwan are not surveyed.

Figure A.2: Population distribution of China (2010 Census)

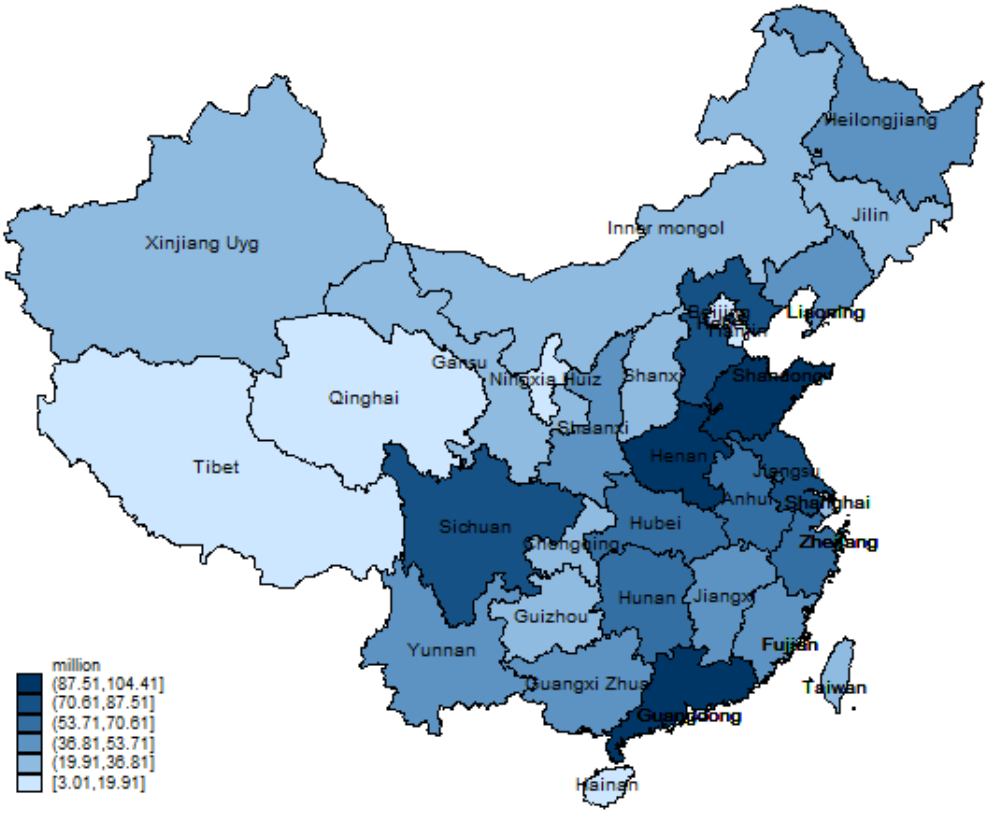
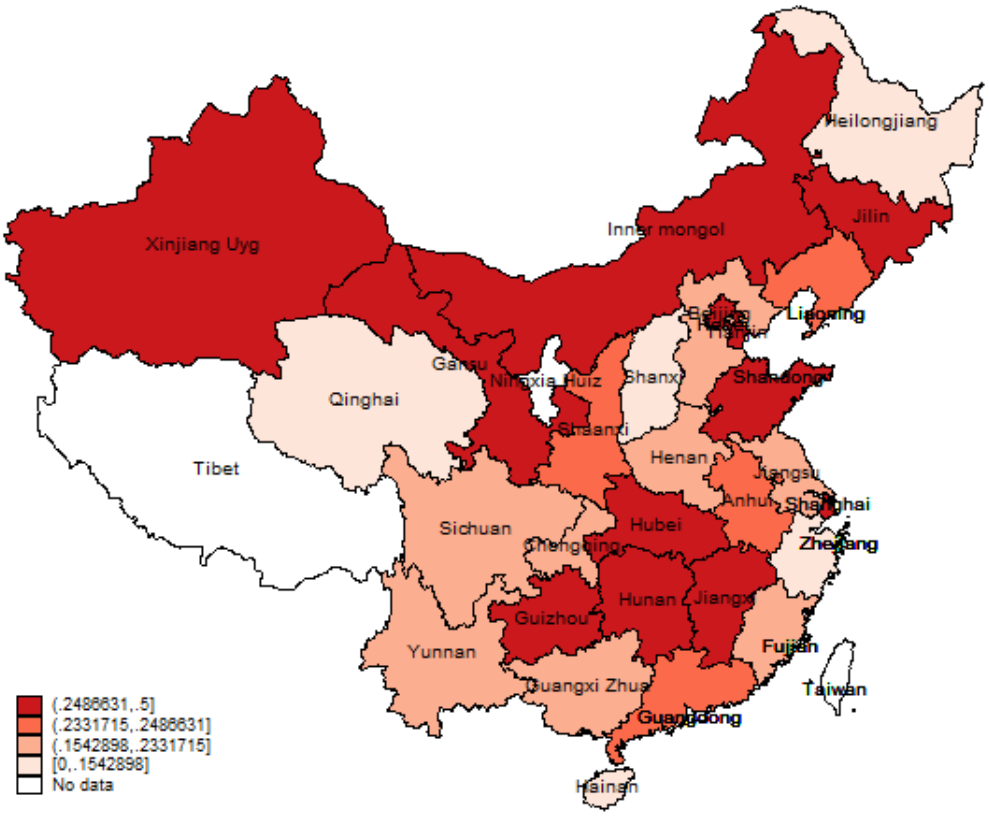
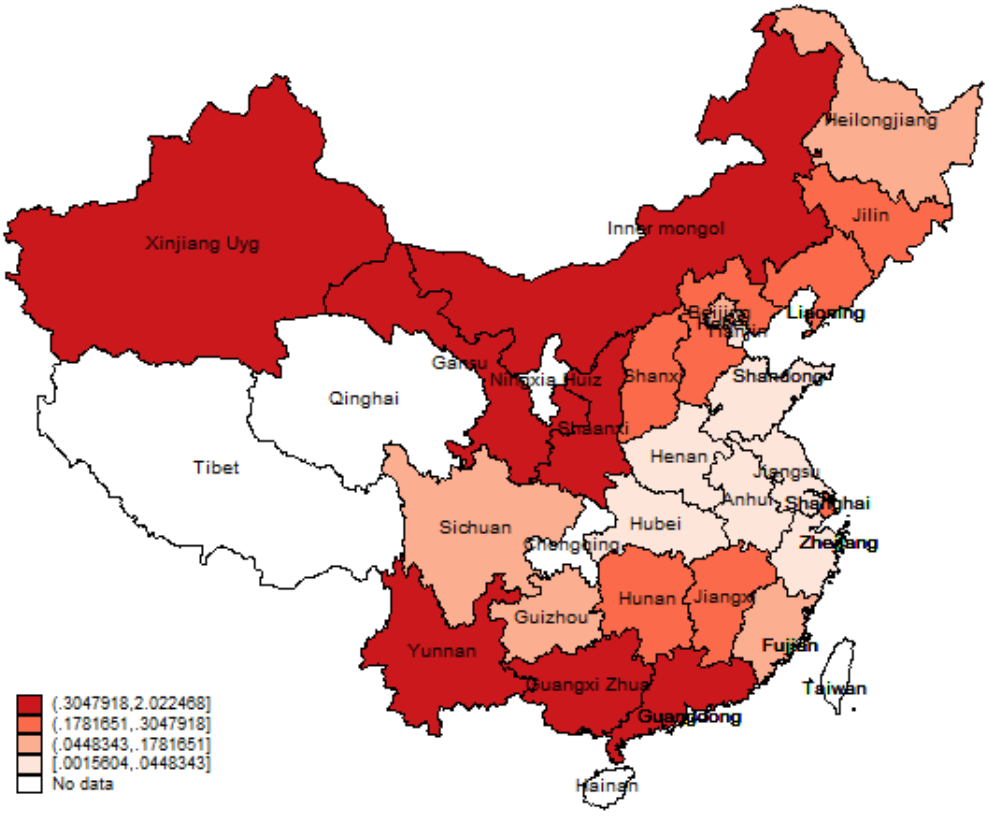


Figure A.3: Geographical variation of persecution intensity in CFPS



Note: persecution intensity is defined as average types of persecution experience per person among the "non-red" sample in each birth province.

Figure A.4: Geographical variation of abnomal death rate 1966-1976



Note: For each birth province, abnormal death number per 1,000 people equals to the product between abnormal death number per county from 1966 to 1976 and the number of county in 1966 divided by provincial population in 1966 (1,000 people).

Figure A.5: Trends in education attainment by gender

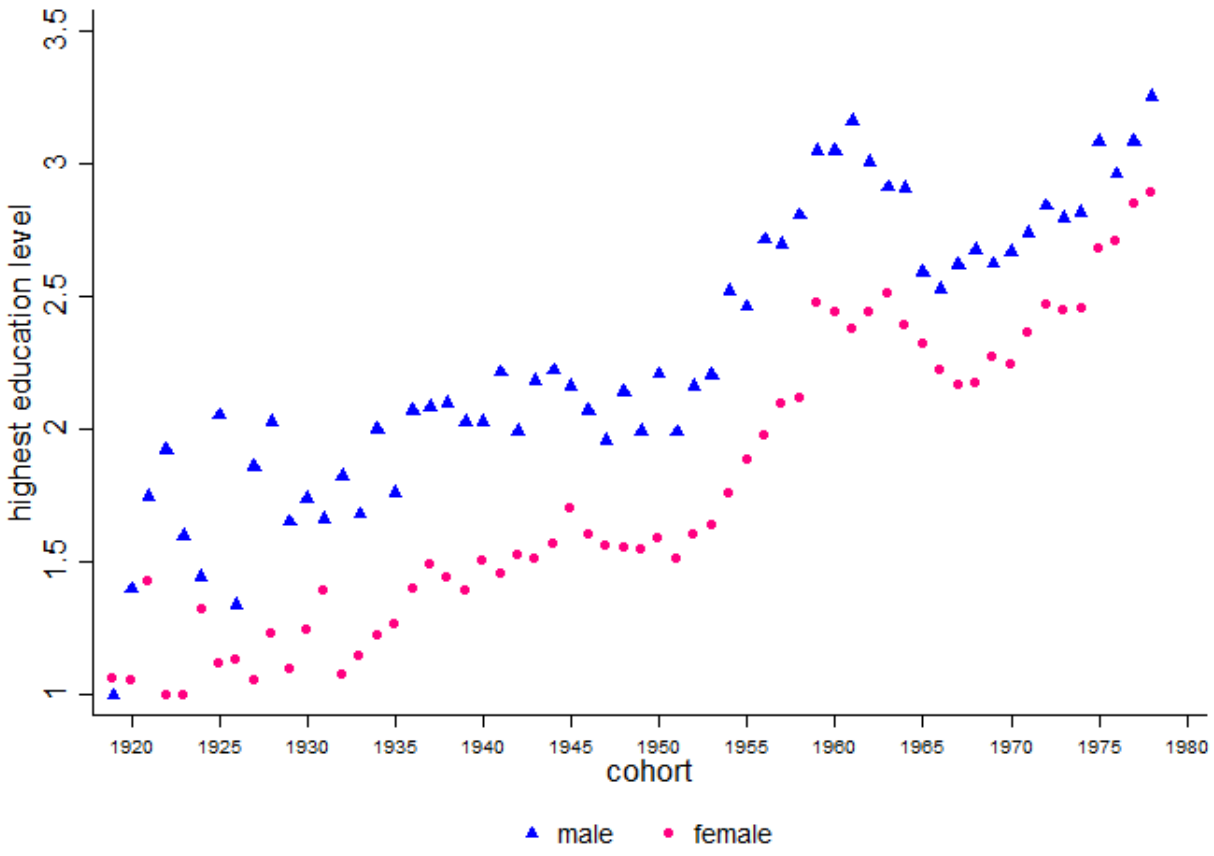


Table A.1: Mapping between CFPS family classification to standard GB 4764-84

"Red" Classes	"Grey" Classes	"Black" Classes	Minority Classes
Worker	**Revolutionary martyr**	**Capitalist**	Herder
Cooperative member	**Office clerk**	House lessor	Slave
Farmer	**Poor urban resident**	**Petty lessor**	Serf
Farmhand	**Freelancer**	**Landlord**	Lord
Poor farmer	Store clerk	**Wealthy farmer**	Tusi
Lower middle-class farmer	**Handicraftsman**	Wealthy farmer & businessman	Headman
Middle-class farmer	**Peddler**	Landlord & businessman	Baihu
Upper middle-class farmer	**Businessman**	Clerk & landlord	Qianhu
Rich middle-class farmer	Small businessman	**Bankrupt landlord**	Others
Cadre	**Vagrant**	**Administrator of communal lands**	
Revolutionary soldier		Clerk of former regime	
		Officer of former regime	
		Soldier of former regime	
		Official of former regime	
		Overseas Chinese	

Note: This table lists all 45 coded classes in official standard GB 4764-84. Bold categories can be mapped back to the options of the question about family class in CFPS 2010. Options of CFPS do not include classes related to former regime and any minority classes. Unlike Deng and Treiman (1997), family class of "revolutionary martyr" is included in "grey" group, since families of "revolutionary martyr" still face the risk of persecution. See example at: https://en.wikipedia.org/wiki/Peng_Pai.

Table A.2: Effects of early childhood exposure to persecutions on education attainments

	(1)	(2)	(3)	(4)
	Primary schoool	Junior high school	Senior high school	College & above
Exposure 0-6*Non-red	-0.047*	-0.053**	-0.052***	-0.033**
	(0.025)	(0.022)	(0.019)	(0.014)
Observations	70,047	70,047	70,047	70,047
R-squared	0.336	0.329	0.230	0.143

Note: Age, gender, household registration status at 12, current residential area, and political classification group are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.3: Intergenerational effects of early childhood exposure to persecutions

	(1)	(2)	(3)	(4)	(5)
	Birth weight (kg)	Highest educ level	Math test score	Verbal test score	Log(income)
Father's exposure 0-6*Non-red	-0.129	-0.082	-0.015	-0.014	-0.215
	(0.160)	(0.174)	(0.030)	(0.033)	(0.179)
Observations	4,483	10,149	5,796	5,796	5,834
R-squared	0.323	0.411	0.348	0.358	0.412
Mother's exposure 0-6*Non-red	-0.205	0.250	-0.022	-0.007	0.034
	(0.153)	(0.166)	(0.037)	(0.037)	(0.165)
Observations	4,483	10,149	5,796	5,796	5,834
R-squared	0.323	0.411	0.348	0.358	0.412

Note: Child's age, gender, household registration status at 12, current residential area, and both parents' political classification group are controlled. In Column (5), child's age is replaced by his/her formal education years, experience years and square of experience years, as well as job sector. County and parents' and child's cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.4: Effects of exposure to persecutions on human capital outcomes in three stages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	A. Highest education level				B. Math test score			
Heavy exposure 0-6*Non-red	-0.188***			-0.182***	-0.045***			-0.045***
	(0.064)			(0.065)	(0.012)			(0.012)
Heavy exposure 7-12*Non-red		-0.086		-0.040		-0.015		-0.004
		(0.064)		(0.077)		(0.010)		(0.012)
Heavy exposure 13-18*Non-red			-0.006	-0.017			0.003	-0.003
			(0.054)	(0.066)			(0.010)	(0.012)
Observations	70,047	70,047	70,047	70,047	38,878	38,878	38,878	38,878
R-squared	0.399	0.399	0.399	0.399	0.404	0.403	0.403	0.404
	C. Verbal test score				D. Log(income)			
Heavy exposure 0-6*Non-red	-0.035**			-0.024	-0.106			-0.045
	(0.013)			(0.015)	(0.091)			(0.102)
Heavy exposure 7-12*Non-red		0.012		-0.002		-0.032		-0.100
		(0.012)		(0.015)		(0.057)		(0.076)
Heavy exposure 13-18*Non-red			0.038***	0.035**			0.084	0.128*
			(0.011)	(0.014)			(0.056)	(0.073)
Observations	38,878	38,878	38,878	38,878	27,563	27,563	27,563	27,563
R-squared	0.398	0.397	0.398	0.398	0.384	0.384	0.384	0.384

Note: Age, gender, household registration status at 12, current residential area, and political classification group are controlled. In Panel D, age is replaced by formal education years, experience years and square of experience years, and job sector is also controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.5: Effects of exposure to persecutions on marrying high human capital spouse in three stages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Spouse's							
	A. Highest education level				B. Math test score			
Heavy exposure 0-6*Non-red	-0.241**			-0.260***	-0.057***			-0.064***
	(0.094)			(0.097)	(0.016)			(0.017)
Heavy exposure 7-12*Non-red		-0.180**		-0.066		-0.028**		-0.002
		(0.086)		(0.104)		(0.014)		(0.018)
Heavy exposure 13-18*Non-red			-0.117*	-0.124			-0.018	-0.026*
			(0.062)	(0.079)			(0.011)	(0.015)
Observations	45,479	45,479	45,479	45,479	26,829	26,829	26,829	26,829
R-squared	0.398	0.398	0.398	0.398	0.398	0.397	0.397	0.398
	Spouse's							
	C. Verbal test score				D. Log(income)			
Heavy exposure 0-6*Non-red	-0.049***			-0.052***	-0.017			0.005
	(0.018)			(0.020)	(0.126)			(0.135)
Heavy exposure 7-12*Non-red		-0.013		0.001		-0.072		-0.080
		(0.014)		(0.019)		(0.071)		(0.094)
Heavy exposure 13-18*Non-red			-0.001	-0.009			-0.023	0.012
			(0.013)	(0.017)			(0.066)	(0.086)
Observations	26,829	26,829	26,829	26,829	19,257	19,257	19,257	19,257
R-squared	0.391	0.390	0.390	0.391	0.379	0.379	0.379	0.379

Note: Main respondent's age, gender, household registration status at 12, current residential area, and political classification group are controlled. Spouse's age, household registration status at 12 and political classification group are controlled. In Panel D, spouse's age is replaced by his/her formal education years, experience years and square of experience years, as well as job sector. County and both parties' cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.6: Effects of exposure to persecutions on spouse's class in three stages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Spouse's											
	A. Red class				B. Grey class				C. Black class			
Grey classes	-0.353***	-0.280***	-0.192***	-0.361***	0.266***	0.243***	0.212***	0.286***	0.088***	0.036**	-0.020	0.075***
	(0.042)	(0.033)	(0.029)	(0.049)	(0.037)	(0.029)	(0.028)	(0.041)	(0.026)	(0.018)	(0.014)	(0.029)
Black classes	-0.262***	-0.189***	-0.100***	-0.271***	0.063**	0.041**	0.010	0.084**	0.198***	0.147***	0.090***	0.187***
	(0.042)	(0.033)	(0.024)	(0.049)	(0.029)	(0.021)	(0.014)	(0.036)	(0.034)	(0.023)	(0.018)	(0.034)
Heavy exposure 0-6*Non-red	0.166***			0.130***	-0.068**			-0.060*	-0.098***			-0.071**
	(0.039)			(0.041)	(0.032)			(0.034)	(0.028)			(0.028)
Heavy exposure 7-12*Non-red		0.089***		0.086**		-0.046*		-0.032		-0.043**		-0.054**
		(0.033)		(0.035)		(0.023)		(0.027)		(0.020)		(0.022)
Heavy exposure 13-18*Non-red			-0.028	-0.043			-0.007	-0.003			0.035**	0.046**
			(0.026)	(0.029)			(0.019)	(0.023)			(0.017)	(0.020)
Observations	18,067	18,067	18,067	18,067	18,067	18,067	18,067	18,067	18,067	18,067	18,067	18,067
R-squared	0.083	0.081	0.080	0.084	0.106	0.106	0.105	0.107	0.042	0.041	0.040	0.043

Note: Formal education years, experience years and square of experience years, gender, household registration status at 12, current residential area, and political classification group are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.7: Effects of early childhood exposure to persecutions and other national events on human capital outcomes

	(1)	(2)	(3)	(4)
	Highest educ level	Math test score	Verbal test score	Log(income)
Exposure 0-6*Non-red	-0.145**	-0.035***	-0.027**	-0.187**
	(0.067)	(0.012)	(0.013)	(0.081)
Exposure 0-6 in great famine*Non-red	-0.277**	-0.063***	-0.029	0.129
	(0.107)	(0.022)	(0.025)	(0.125)
Observations	70,047	38,878	38,878	27,563
R-squared	0.400	0.404	0.398	0.384
Exposure 0-6*Non-red	-0.258***	-0.058***	-0.032**	-0.135
	(0.065)	(0.012)	(0.013)	(0.086)
Exposure 0-6 in school shutdown*Non-red	0.182*	0.033	-0.009	-0.075
	(0.103)	(0.020)	(0.022)	(0.123)
Observations	70,047	38,878	38,878	27,563
R-squared	0.400	0.404	0.398	0.384

Note: The Great Famine lasts from 1958 to 1962, and schools were shut down between 1966 to 1970. Age, gender, household registration status at 12, current residential area, and political classification group are controlled. In Column (4), age is replaced by formal education years, experience years and square of experience years, as well as job sector. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.8: Effects of early childhood exposure to persecutions and other national events on marrying high human capital spouse

	(1)	(2)	(3)	(4)
	Spouse's			
	Highest educ level	Math test score	Verbal test score	Log(income)
Exposure 0-6*Non-red	-0.187**	-0.048***	-0.048***	0.033
	(0.080)	(0.015)	(0.017)	(0.104)
Exposure 0-6 in great famine*Non-red	-0.318***	-0.072***	-0.043	0.156
	(0.114)	(0.024)	(0.027)	(0.161)
Observations	45,479	26,829	26,829	19,257
R-squared	0.372	0.362	0.354	0.343
Exposure 0-6*Non-red	-0.211***	-0.053***	-0.051***	0.045
	(0.079)	(0.015)	(0.017)	(0.105)
Exposure 0-6 in school shutdown*Non-red	0.113	0.024	0.007	-0.079
	(0.117)	(0.022)	(0.023)	(0.125)
Observations	45,479	26,829	26,829	19,257
R-squared	0.372	0.362	0.354	0.343

Note: The Great Famine lasts from 1958 to 1962, and schools were shut down between 1966 to 1970. Main respondent's age, gender, household registration status at 12, current residential area, and political classification group are controlled. Spouse's age, household registration status at 12 and political classification group are controlled. In Column (4), spouse's age is replaced by his/her formal education years, experience years and square of experience years, as well as job sector. County and both parties' cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.9: Effects of early childhood exposure to persecutions and other national events on spouse's class

	(1)	(2)	(3)
		Spouse's	
	Red class	Grey class	Black class
Exposure 0-6*Non-red	0.183***	-0.081***	-0.102***
	(0.035)	(0.031)	(0.022)
Exposure 0-6 in great famine*Non-red	-1.657***	0.886***	0.772***
	(0.028)	(0.052)	(0.054)
Observations	18,070	18,070	18,070
R-squared	0.274	0.204	0.124
Exposure 0-6*Non-red	0.177***	-0.075**	-0.101***
	(0.036)	(0.030)	(0.023)
Exposure 0-6 in school shutdown*Non-red	-1.677***	0.826***	0.851***
	(0.029)	(0.050)	(0.057)
Observations	18,070	18,070	18,070
R-squared	0.313	0.207	0.160

Note: The Great Famine lasts from 1958 to 1962, and schools were shut down between 1966 to 1970. Formal education years, experience years and square of experience years, household registration status at 12, current residential area, and political classification group are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.10: Effects of early childhood exposure to persecutions on human capital outcomes with linear time trend

	(1)	(2)	(3)	(4)
	Highest educ level	Math test score	Verbal test score	Log(income)
Exposure 0-6*Non-red	-0.176**	-0.038***	-0.003	-0.147*
	(0.076)	(0.012)	(0.013)	(0.075)
Observations	70,047	38,878	38,878	27,563
R-squared	0.400	0.404	0.398	0.384

Note: Age, gender, household registration status at 12, current residential area, and political classification group are controlled. In Column (4), age is replaced by formal education years, experience years and square of experience years, as well as job sector. Group specific linear time trend, county and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.11: Effects of early childhood exposure to persecutions on marrying high human capital spouse with linear time trend

	(1)	(2)	(3)	(4)
	Spouse's			
	Highest educ level	Math test score	Verbal test score	Log(income)
Exposure 0-6*Non-red	-0.225**	-0.055***	-0.042**	0.059
	(0.089)	(0.016)	(0.018)	(0.104)
Observations	45,479	26,829	26,829	19,257
R-squared	0.398	0.398	0.391	0.379

Note: Main respondent's age, gender, household registration status at 12, current residential area, and political classification group are controlled. Spouse's age, household registration status at 12 and political classification group are controlled. In Column (4), spouse's age is replaced by his/her formal education years, experience years and square of experience years, as well as job sector. Group specific linear time trend, county and both parties' cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.12: Effects of early childhood exposure to persecutions on spouse's class with linear time trend

	(1)	(2)	(3)
		Spouse's	
	Red class	Grey class	Black class
Grey classes	-0.326***	0.236***	0.089***
	(0.042)	(0.037)	(0.024)
Black classes	-0.233***	0.034	0.199***
	(0.042)	(0.030)	(0.033)
Exposure 0-6*Non-red	0.078*	-0.040	-0.039
	(0.041)	(0.034)	(0.024)
Observations	18,067	18,067	18,067
R-squared	0.082	0.106	0.042

Note: Formal education years, experience years and square of experience years, household registration status at 12, current residential area, and political classification group are controlled. Group specific linear time trend, county and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.13: Effects of early childhood exposure to persecutions on human capital outcomes: young V.S. old cohorts

	(1)	(2)	(3)	(4)
	Highest educ level	Math test score	Verbal test score	Log(income)
Exposure 0-6*Non-red*70-76	0.012	0.021	0.029	-0.200
	(0.181)	(0.035)	(0.039)	(0.165)
Exposure 0-6*Non-red	-0.224***	-0.055***	-0.046***	-0.136
	(0.065)	(0.012)	(0.013)	(0.094)
Observations	70,047	38,878	38,878	27,563
R-squared	0.400	0.404	0.398	0.384

Note: Age, gender, household registration status at 12, current residential area, political classification group, dummy of younger cohorts (born 1970-1976), interaction between younger chorts indicator and early childhood exposure, and interaction between younger chorts indicator and non-red indicator are controlled. In Column (4), age is replaced by formal education years, experience years and square of experience years, as well as job sector. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.14: Effects of early childhood exposure to persecutions on marrying high human capital spouse: young V.S. old cohorts

	(1)	(2)	(3)	(4)
	Spouse's			
	Highest educ level	Math test score	Verbal test score	Log(income)
Exposure 0-6*Non-red*70-76	-0.222	-0.098**	-0.070	-0.396*
	(0.229)	(0.043)	(0.046)	(0.214)
Exposure 0-6*Non-red	-0.203**	-0.051***	-0.050***	0.044
	(0.080)	(0.015)	(0.017)	(0.104)
Observations	45,479	26,829	26,829	19,257
R-squared	0.372	0.362	0.355	0.343

Note: Main respondent's age, gender, household registration status at 12, current residential area, political classification group, dummy of younger cohorts (born 1970-1976), interaction between younger chorts indicator and early childhood exposure, and interaction between younger chorts indicator and non-red indicator are controlled. Spouse's age, household registration status at 12 and political classification group are controlled. In Column (4), spouse's age is replaced by his/her formal education years, experience years and square of experience years, as well as job sector. County and both parties' cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.

Table A.15: Effects of early childhood exposure to persecutions on spouse's class: young V.S. old cohorts

	(1)	(2)	(3)
		Spouse's	
	Red class	Grey class	Black class
Exposure 0-6*Non-red*70-76	-0.045**	0.014	0.031
	(0.022)	(0.083)	(0.086)
Exposure 0-6*Non-red	0.093***	-0.030	-0.063***
	(0.036)	(0.031)	(0.021)
Observations	18,067	18,067	18,067
R-squared	0.218	0.176	0.100

Note: Formal education years, experience years and square of experience years, household registration status at 12, current residential area, political classification group, dummy of younger cohorts (born 1970-1976), interaction between younger chorts indicator and early childhood exposure, and interaction between younger chorts indicator and non-red indicator are controlled. County and cohort fixed effects have been controlled. Standard error clustered at county level. Significant at *p<0.1, **p<0.05, ***p<0.01.