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ABSTRACT

Childhood Adversity and Energy Poverty*

We use data from China Family Panel Studies to examine the effects of being a child or adolescent in China's Great Famine on the likelihood of being in energy poverty in adulthood. We find that a one unit increase in the intensity of the Famine, measured by the number of excess deaths per 100 people, is associated with a 1.8-3.5 percentage points decline in the probability of being in energy poverty in adulthood, depending on the exact specification and measure of energy poverty. We find that personal income is a channel through which being a child or adolescent during the Great Famine affects the proclivity to be in energy poverty later in life. These findings are robust to alternative ways of measuring childhood adversity and energy poverty.

JEL Classification: J13, I32, Q41

Keywords: childhood adversity, energy poverty, China, the Chinese Great Famine

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1. Introduction

Energy poverty, which arises when low-income households are confronted with having to pay high energy prices, is a recognised global problem (Belaid, 2019). Goal 7 of the United Nations Sustainable Development Goals (SDGs) is "to ensure universal access to affordable, reliable, sustainable and modern energy for all" by 2030 (United Nations, 2021). Yet, the International Energy Agency estimates that more than 1 billion people worldwide live in energy poverty (International Energy Agency, 2017). Rates of energy poverty are higher in developing countries, in which many households do not have access to affordable energy (Gafa and Egbendewe, 2021). In China, which is the country in which our study is situated, rates of energy poverty are estimated to be between one in five (Lin and Wang, 2020) and one half (Zhang et al., 2019) of households, depending on exactly how energy poverty is measured.

The increasing importance of energy as a serious policy issue has led to a growing literature on the determinants of energy poverty. Much of the literature focuses on the roles of low income, high energy prices and poor housing quality, which affect heating and cooling efficiency (Chai et al., 2021; Dalla Longa et al., 2021; Gafa and Egbendewe, 2021). A series of recent studies has sought to look behind why households have low incomes and/or pay high energy prices and link these reasons to the incidence of energy poverty. For example, recent studies have examined the roles of factors such as problem gambling (Farrell and Fry, 2021), neighbourhood ethnic diversity (Awaworyi Churchill and Smyth, 2020), forest fires (Paudel, 2021) and temperature shocks (Feeny et al., 2021) in contributing to the prevalence of energy poverty. Other studies have considered factors that potentially reduce the extent of energy poverty, such as greater financial inclusion (Dogan et al., 2021; Koomson and Danquah, 2021) and off-farm employment (Lin and Zhao, 2021). A common feature of these studies is that they focus exclusively on factors experienced in adulthood, which are contemporaneous to influencing whether one is in energy poverty.

A completely separate series of studies has examined the role of adversity experienced in childhood and adolescence on outcomes later in life (see, eg. Almond and Currie, 2011; Currie and Vogl, 2013). Much of this literature suggests that early life adversity causes neurobiological, somatic, and mental health problems for children and may lead to poor adulthood outcomes, such as impaired mental and physical health (Jones et al., 2018; Lynch et al., 2013; Mersky et al., 2018), higher rates of depression (Mansueto et al., 2021), lower levels of human capital attainment and income (Metzler et al., 2017) and higher rates of crime victimisation (Ports et al., 2016). In China, children who were left behind when one or both parents migrated to the cities to find work have been found to have a lower likelihood of finding a job (Wang et al., 2021), and that the quality of the work when they do find employment is of a lower standard (Liu et al., 2020).

Yet, not all individuals who experience adversity in childhood have negative outcomes in adulthood. Experiencing adversity in childhood may help foster resilience later in life that is beneficial in contributing to positive outcomes in adulthood (Rutter, 2006). Studies suggest that, to mitigate suffering and seek a better life, many children who experience early life adversity develop coping and adaptive skills. This has been described as a 'what does not kill you makes you stronger' mindset by Samuels and Pryce (2008) in which individuals who experience childhood adversity develop a well-defined sense of self, which builds self-reliance later in life. Rutter (2006) shows that those who experience traumatic conditions as children develop psychological assets that facilitate the development of self-esteem and self-efficacy early in life.

These psychological assets are all characteristics that are conducive to performing well at school, earning a higher income and other markers of success during adulthood (Fisher, 2015; Healey and Fisher, 2011). Studies also show that early life adversity fosters entrepreneurship (Awaworyi Churchill et al., 2021; Cheng et al., 2021b; Chu et al., 2016; Huang et al., 2021). Chu et al. (2016) note that in China "many successful entrepreneurs claimed to have learned everything they know from 'the school of hard knocks', rather than business schools". More generally, other studies find that a major factor in the background of many successful managers in large corporations is the development of self-sufficiency and coping strategies at an early age (Cox and Cooper, 1989).

In this study, we seek to advance our understanding of the reasons for energy poverty by examining the role that adversity experienced in childhood and adolescence plays in whether one is more likely to be in energy poverty later in life. To do so, we employ the 1959-1961 Chinese Great Famine, which is widely recognized as one of the worst famines of the last century, as a natural experiment. Specifically, we examine whether exposure to the Great Famine as a child or in adolescence influences the likelihood of being in energy poverty in adulthood. We robustly find that those who experienced the Great Famine in childhood or adolescence are less likely to be in energy poverty as adults. This finding is consistent with early life adversity building resilience, which leads those who experience adversity to be more successful later in life.

We explore Locus of Control (LoC), income and savings as channels through which early life adversity could potentially lower the incidence of energy poverty in adulthood. We find that early life adversity reduces the likelihood of being in energy poverty through the income channel.

We advance the literature on the reasons why people experience energy poverty in three main ways. The first is that we extend the literature on the causes of energy poverty to examine the role of events experienced early in life. Second, we consider various channels through which early life adversity affects the likelihood of being in energy poverty. Third, we contribute to the scant literature on the relationship between disasters and energy-related outcomes (Lee et al., 2021). Recent literature has started to consider the role of economic crisis and disasters experienced in adulthood on the prevalence of energy poverty (Bienvenido-Huertas, 2021; Halkos and Gkampoura, 2021; Paudel, 2021). We extend this literature to consider the effect of a man-made crisis experienced in childhood and adolescence on energy poverty in adulthood.

We also contribute to our understanding of the long-term consequences of adversity experienced early in life and how early life adversity should be construed. Most of the literature in economics on early life disadvantage has emphasised that early life adversity can have serious long-term adverse implications for health and labor market outcomes. As a result, the standard policy response has been to propose investment in early childhood education to offset these deficits (for example, see List et al., 2018). We contribute to a small literature in economics that shows through building resilience, early life adversity can foster positive outcomes later in life.

2. Childhood Adversity and Energy Poverty in Adulthood

2.1. Overwiew of The Chinese Famine

The 1959-1961 Great Chinese Famine was one of the most severe of the last century. It was partly a consequence of the Great Leap Forward, a few years earlier, that sought to accelerate collectivisation and industrialisation. The Great Leap Forward attempted to make farmers produce iron, steel and other industrial goods, which were of poor quality. Meanwhile, local

officials concocted stories of record-breaking grain harvests to create the illusion that agricultural communes promoted productivity and improved rural living standards. Communal dining halls, established as a communist-style welfare institution to provide 'free' meals to rural residents, resulted in enormous food wastage. In response to misinformation that grain harvests were high, the government over-procured grain outputs, resulting in insufficient food in rural areas. Overall, the Famine affected one-third of Chinese provinces with estimates suggesting that 45 million people perished from either lack of food or illness (Meng et al., 2015; Yang, 2013a).

Being a child or adolescent during the Famine was a source of considerable adversity. First, parents were largely focused on their own survival, leaving children to scavenge for food and water (Coale and Banister, 1994; Yang, 2013b). This, in some instances, resulted in child abandonment or neglect (Coale and Banister, 1994), but more generally created a sense of emotional detachment between parent and child (Repetti et al., 2002). Second, lack of food led to stunted development in survivors of famines, which has been linked to a higher prevalence of adverse health outcomes, such as anxiety, depression and heart disease (Steinberg and Morris, 2001). Third, because children were largely in survival mode, rather than being focused on attending, or doing well, at school, the Famine resulted in lower human capital for survivors (Huang and Zhou, 2013).

2.2. Adversity in early life generates psychological assets

Those who experience early life adversity often are faced with considerable challenges later in life. In order to survive and thrive throughout their life they develop skills to help them cope and adapt, which are sometimes called psychological assets (Rutter, 2006). Psychological assets include characteristics such as self-reliance, resilience, resourcefulness and risk-taking.

At one level, psychological assets can act as a protective layer against the impact of early life adversity on adverse outcomes in adulthood, such as depression (Mętel et al., 2019; Poole and Dobson, 2017). Recent studies suggest that many individuals who experienced intense childhood adversity develop positive interpersonal traits, such as social, emotional and cognitive functioning or adaptive coping strategies (Poole et al., 2018; Ross et al., 2020). Studies have shown that those who experience early life adversity often develop problem-focused coping or avoidance mechanisms, which serve to mitigate adverse responses to stressors (Sheffler et al., 2019; Suls and Fletcher, 1985). At another level, having to cope on one's own during childhood makes one more resourceful and helps build social skills that serve one well later in life. Crivello et al. (2021) demonstrate that children who survived the Ethiopian Famine of 1984-1986 fared well in adulthood because they developed a greater sense of self-reliance and proclivity to take calculated risks, which enabled them to overcome the challenges they faced during the Famine.

Coping and adaptive skills of individuals facing childhood famines include resilience, self-reliance, resourcefulness and risk-taking. Resilience is a predictor of career success since it protects individuals exposed to adverse life circumstances, helps them bounce back from adversity and move on, and helps them embrace change in a fast-paced world. Self-reliance is the ability to do things and make decisions independently. Children in rural areas of China had less food, clothes, or water compared to their counterparts in the urban areas during the Famine (Cheng et al., 2021a). Studies have found that rural survivors of the Famine exhibit high levels of endurance and the ability to overcome difficulties (Cheng et al., 2021a; Manning and Wemheuer, 2011). Survivors of the Famine, who have been successful later in life, attribute their success to self-reliance and resilience acquired during the Famine (Lothe, 2010; Lothe and Heggen, 2003).

Resilience and resourcefulness acquired during the Famine have been shown to foster skills associated with success at school (Fisher, 2015; Healey and Fisher, 2011), increased willingness to work longer hours in order to get ahead and commensurately higher income (Manning and Wemheuer, 2011). Finally, those who experienced the Famine might have a 'nothing to lose' attitude about the future, which increases risk-taking behaviours, which has been shown to be conducive to building wealth (Haushofer and Fehr, 2014). Cheng et al. (2021a) establish that, consistent with the underdog theory of entrepreneurship (Miller and Le Breton-Miller, 2017), those who were children and adolescents during the Famine have a higher propensity to be entrepreneurs later in life. Relatedly, Chu et al. (2016) find robust evidence of higher rates of entrepreneurship in counties in China that experienced greater hardship during the Famine.

Psychological assets borne out of childhood adversity will potentially affect several aspects of energy poverty. Perhaps, the most obvious is income. Individuals who have more psychological assets are likely to earn higher incomes and have higher savings, which act as a buffer against paying higher energy prices. Characteristics such as self-reliance, resilience, resourcefulness and risk-taking, though, are not only likely to affect one's income, but also other components of energy poverty as well. For instance, resourcefulness and willingness to take risks will affect one's ability to access lower energy prices. These attributes may also affect one's capacity to develop creative ways to reduce energy expenditure through the purchase of energy-efficient appliances, off-peak usage of electricity and taking advantage of tiered electricity rates. Thus, skills learned in childhood can influence income, the prices that people pay for energy and their energy usage, which determines energy expenditure, all contributing to whether one is in energy poverty.

Hypothesis 1

Those who experienced the Famine in childhood will be less likely to be in energy poverty during adulthood.

2.3 Channels through which resilience might lead to lower energy poverty

Locus of Control

The first possible channel is Locus of Control (LoC), which measures the extent to which people feel in control of their outcomes in life (James and Rotter, 1958; Rotter and Mulry, 1965). Those with a more internal LoC believe that their outcomes in life are their own doing, while those who are external on LoC believe outcomes are due to fate or luck. Coping strategies developed in response to dealing with adverse environments during middle and late childhood are conducive to being more internal on LoC (Knoop, 1981). Cheng and Smyth (2021) suggest that those who experienced the Chinese Great Famine in childhood will have a more internal LoC due to adversity building coping and adaptive skills. As a consequence, Cheng and Smyth (2021) argue that those who experienced the Famine in early life and are more internal on LoC will be more willing to engage in high-risk activities such as the decision to hold risky assets.

Awaworyi Churchill and Smyth (2021a) find that being more internal on LoC is associated with a lower likelihood of being in energy poverty. One reason is that those who are more internal on LoC will have higher human capital, invest more in general training, have higher earnings and higher savings (Ahn, 2015; Andrisani, 1977; Caliendo and Hennecke, 2020; Cobb-Clark et al., 2014; Coleman and DeLeire, 2003; Groves, 2005). The other reason is that those who are more internal on LoC are likely to be more proactive in taking positive steps to lower their overall expenditure on energy. This could be reflected, for example, in taking steps to actively manage their energy use, such that they use less energy during peak periods and/or are more efficient in how they use household appliances – for example waiting until the washing machine is full.

Therefore, we propose the following hypothesis.

Hypothesis 2a

LoC will mediate the relationship between childhood adversity and being in energy poverty, such that those who are more internal on LoC will be less likely to be in energy poverty later in life.

Income

A second potential channel through which early life adversity could affect proclivity to be in energy poverty is personal income. As discussed above, childhood adversity builds psychological assets, such as self-reliance, resilience, resourcefulness, and risk-taking, which are conducive to success at school, in paid employment and entrepreneurship. We expect that individuals who exhibit these traits are likely to work harder to achieve economic security and that their higher income could help them to afford access to energy. Thus, the hypothesis is as follows:

Hypothesis 2b

Personal income will mediate the relationship between childhood adversity and being in energy poverty, such that those who experience childhood adversity will earn more and be less likely to be in energy poverty later in life.

Savings

A third channel via which early life adversity could affect the probability of being in energy poverty is through savings. Households with higher income will save more than low income households and have more investment income (Huggett and Ventura, 2000). People who are more internal on LoC have been found to have higher savings and make better savings and investment decisions (Cobb-Clark et al., 2014; Pinger et al., 2018; Salamanca et al., 2020). Moreover, people in China with higher income might save more to self-fund retirement, given the uncertainty around pension reforms (Chamon et al., 2013). Chen et al. (2018) and Chen and Rupelle (2016) find that savings rates of rural households are higher in counties in which the Famine was more severe. Similar to the role of personal income, we expect that households are less likely to be in energy poverty if they have more savings to tap into when paying energy bills. We propose the following hypothesis:

Hypothesis 2c

Savings will mediate the relationship between childhood adversity and being in energy poverty, such that those who experience childhood adversity will save more and be less likely to be in energy poverty later in life.

3. Data and Measures

We use data from the 2014 wave of China Family Panel Studies (CFPS), which is a nationally representative survey of Chinese households conducted by Peking University in China. The 2014 CFPS surveyed 37,147 adults in 29 provinces using a multi-stage probability sample and was assembled employing the implicit stratification method. We utilise the 2014 wave because it contains detailed information on household energy consumption and spending, enabling us to construct different energy poverty measures. The CFPS has been used in other studies on energy poverty (Cheng et al., 2021b; Nie et al., 2021; Zhang et al., 2019; Zhang et al., 2021).

Our analysis focuses on the sub-sample from rural China. The main reason is that, as discussed in Section 2.1, the Famine affected rural areas more severely than urban areas due to the nature of the food procurement and allocation system. Thus, individuals in rural areas suffered relatively

homogenous effects of the Famine. Rates of energy poverty in rural China are also relatively higher than in urban areas (Lin and Zhao, 2021). Focusing on rural areas has two further advantages for our purposes. One is that it mitigates the possible influence of the Cultural Revolution, which was primarily centered in the cities (Walder and Su, 2003). The other is that it avoids the potential confounding effect caused by the high proportion of retirees in Chinese cities, reflecting the relatively high coverage of social insurance in urban areas (Cheng et al., 2021a).

3.1. Measures of energy poverty

There are both subjective and objective approaches to defining energy poverty. Since there is no subjective measure of energy poverty in the CFPS survey, we rely exclusively on objective indicators. Our primary measure of energy poverty is the low-income-high-cost (LIHC) indicator proposed by Hills (2012), which classifies households as energy poor if their energy costs per capita are above the national median, while their residual household income per capita is below 60 percent of the national median household income per capita. The LIHC indicator has the advantage over alternative measures, such as the 10 percent threshold indicator and expenditure share, that it does not understate or overstate energy poverty rates depending on household income and/or energy rationing practices, which the latter measures have been criticised for so doing (Awaworyi Churchill and Smyth, 2020; Herrero, 2017). For this reason, the LIHC indicator is the most commonly used objective measure of energy poverty in the literature (Awaworyi Churchill and Smyth, 2020, 2021a, 2021b; Faiella and Lavecchia, 2021). It has also been widely employed to measure energy poverty in China (Lin and Wang, 2020).

Given the considerable disparities in socioeconomic development and energy infrastructure that exist across provinces in China, as an alternative indicator we also employ an adjusted LIHC indictor, in which we replace the reference lines from the national median with the provincial median for household energy costs per capita and household income per capita.

Deller et al. (2021) emphasise that different definitions of energy poverty can produce different outcomes. Hence, we also employ three other measures of energy poverty in our robustness checks. The first is the ten-percent-rule (TPR) indicator, defined as whether a household needs to spend more than ten percent of its income on energy expenditure (Boardman, 1991, 2010). The second alternative measure is an adjusted TPR indicator. Since the TPR may overestimate the prevalence of energy poverty by including high income households, we construct an adjusted TPR indicator following Kahouli (2020). The adjusted TRP indicator defines a household as energy poor if its energy consumption to household income ratio is higher than 10 percent and its household income per capita is in the third decile of household income per capita.

The third alternative measure of energy poverty is an energy deprivation score (EDS), which is a weighted multidimensional score of the LIHC, adjusted TPR, double median (2M), and indoor air pollution measures. The 2M indicator identifies households as energy poor if their energy costs exceed twice the median energy cost-to-income ratio (Moore, 2012). The indoor air pollution indicator (yes=1; no=0) identifies a household as energy poor if it uses solid fuel as its primary fuel. We then calculate the EDS using the weight of 0.25 for each of these four indicators.

$$EDS = 0.25 \times (LIHC + Adjusted\ TPR\ + 2M\ + Indoor\ air\ pollution)$$

3.2. Definitions of Famine and post-Famine cohorts

We restrict our analytical samples to those born between 1945-1968. We employ two alternative approaches to classifying cohorts. The first measure is a dichotomous variable equal to one if the survey respondent was born between 1945-1962 (i.e., aged -1-17 and, hence, either *in utero*, an infant, a toddler, a child or an adolescent at the time of the Famine), or zero if the survey respondent was born between 1963 and 1968 (i.e., not yet born at the time of the Famine). Our second approach divides the sample into six cohorts, which are defined as follows: cohort 1 = born 5–7 years after the Famine; cohort 2 = born 2–4 years after the Famine; cohort 3 = just born or *in utero* during the Famine; cohort 4 = born 4–6 years before the Famine; cohort 5 = born 7–11 years before the Famine); and cohort 6 = born 12–17 years before the Famine).

3.3. Measures of famine severity

Our main measure of famine severity is the excess death rate (EDR) in 1960 in the province in which the respondent was born and resided during childhood. Since the largest number of deaths occurred in 1960, we use the difference between the death rate in 1960 and the average death rate in the three years before the Famine to calculate the EDR. This follows the approach employed in other studies to calculate the EDR (Chen and Zhou, 2007; Cheng et al., 2021a). The EDR is measured at the one percent level (i.e., one excess death per one hundred people).

We also check the results using the EDR in a series of sensitivity tests with two other commonly employed measures of famine severity in the literature; namely, the cohort size shrinkage index (CSSI) and fertility reduction index (FRI) proposed by Huang et al. (2013). CSSI and FRI are based on the size of the survived cohort or live births as an alternative to the size of recorded deaths; thus, they are not subject to potential measurement error in recording deaths.[1]

3.4. Covariates

Consistent with the existing literature, we control for a set of individual and household characteristics likely to be correlated with energy poverty (Awaworyi Churchill and Smyth, 2020; Feeny et al., 2021). Covariates include age and its squared term, sex, education, ethnicity, *hukou* status, marital status, whether the respondent has a child or not, and migration status.

3.5 Potential mediators

We examine personal LoC, income and savings as potential mediators. LoC is measured by the difference between the standardised scores of internal LoC and the standardised scores of external LoC (Chen et al., 2020).[2] Thus, a higher LoC score indicates being more internal on LoC.

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[1] The CSSI is calculated by the following equation: $CSSI = ((mean\ size\ of\ cohorts\ born\ in\ 1956 - 58\ and\ 1962 - 64) - (mean\ size\ of\ cohorts\ born\ in\ 1959 - 1961))/(mean\ size\ of\ cohorts\ born\ in\ 1956 - 58\ and\ 1962 - 64)$.
The FRI is calculated by the following equation: $FRI = ((\text{mean size of live births in } 1956 - 58 \text{ and } 1962 - 64) - (\text{mean size of live births born in } 1959 - 1961))/(\text{mean size of live births born in } 1956 - 58 \text{ and } 1962 - 64)$. See Huang et al. (2013) for details.

[2] Internal LoC is measured by responses to the following three statements on a 10-point scale (1=lowest; 10=highest): (1) Education: The higher level of education that one receives, the higher the probability that he/she will be successful in the future; (2) Ability: The most important factor affecting one's future success is his/her ability, and (3) Effort: The most important factor affecting one's future success is his/her effort. The external LoC is measured by the response to the following three statements on a 10-point scale (1=lowest; 10=highest): (1) Family socioeconomic status: The higher a family's social status is, the higher the likelihood that the child will be successful in the future, while the lower a family's social status is, the smaller the likelihood that the child will be successful in the future; (2) Family connections: The most important factor affecting one's future success is whether his/her family has connections; and (3) Luck: The most important factor affecting one's future success is his/her luck.

Personal income is the annual total personal income for all jobs (including zero income). Savings is the total amount of cash and deposits (including zero savings).

Table 1 presents descriptive statistics for respondents on their age (and life stage) during the Famine; age at the time of the survey, the LIHC and adjusted LIHC indicators and the EDR. Descriptive statistics on alternative measures of energy poverty and famine intensity employed in the robustness checks, covariates and mediators are given in Appendix Table A1.

[Table 1 here]

4. Methods

We estimate the following specification using ordinary least squares (OLS) or probit with a difference-in-differences (DID) estimator.

$$EP_{ij} = \alpha_0 + \alpha_1 Famine_i + \alpha_2 EDR_j + \alpha_3 (Famine_i \times EDR_j) + X_i + \eta_c + \varepsilon_{ij}$$

where EP_{ij} is the energy poverty status of individual i in province j at the time of survey; $Famine_i$ indicates whether the individual i experienced the Famine in childhood or adolescence (yes=1; no=0) and EDR_j is the excess death rate in 1960 in province j. Thus, the interaction term $Famine_i \times EDR_j$ captures the effect of the Famine on the probability of being in energy poverty. X_i is a vector of individual covariates correlated with energy poverty, η_c is county fixed effects and ε_{ij} denotes the error term.

In the mediation analysis, we adopt the Baron and Kenny (1986) three-step approach to examine if childhood adversity has an impact on mediators, and whether the impact of childhood adversity on energy poverty will decrease when including mediators in the regressions. The three-step approach entails three regressions and there are three conditions that need to be satisfied. For the sake of illustration, assume we are testing whether income is a mediator. In the first regression, when income is regressed on the severity of the Famine and controls, the interaction term $Famine_i \times EDR_j$ has to be significant. In the second regression in which energy poverty is regressed on the severity of the Famine and controls, the interaction term $Famine_i \times EDR_j$ has to significantly influence the probability of being in energy poverty. In the third regression, in which energy poverty is regressed on the severity of the Famine, income and controls, the coefficient on income has to be significant and the magnitude of the coefficient on the interaction term $Famine_i \times EDR_j$ has to either decline or the coefficient become insignificant. This approach to testing mediation has been used in other recent studies on energy poverty and in energy economics more generally (Awaworyi Churchill et al., 2020; Awaworyi Churchill and Smyth, 2021a; Do et al., 2021).

5. Results

Table 2 presents the DID results for the effect of the Famine on the probability of being in energy poverty as measured by the LIHC and adjusted LIHC indicators. Model 1, based on DID-OLS, shows that one additional excess death per 100 people in 1960 decreases the probability of being in LIHC energy poverty by 2.4 percentage points among the Famine cohort. The results from model 2, based on DID-probit, show that one additional excess death per 100 people decreases the probability of being in LIHC energy poverty by 2.8 percentage points among the Famine cohort. Models 3 and 4 present results for the adjusted LIHC indicators. Models 3 and 4 show that one additional excess death per 100 people decreases the probability of being in LIHC energy poverty by 1.9 and 1.8 percentage points, respectively. Thus, a one

standard deviation increase in the EDR decreases the probability of being in energy poverty by 3.2, 3.7, 2.5 and 2.4 percentage points across models 1-4, respectively, supporting our first hypothesis.

[Table 2 here]

Table 3 presents the DID results for the effect of the Famine on energy poverty across different life stages. The results are consistent with those in Table 2. For example, model 1 shows that one additional excess death per one hundred people during the Famine decreases the probability of being in LIHC energy poverty by 2.8, 3.2, 2.9, 3.5 percentage points among cohorts 3-6 who experienced the Famine at different life stages, respectively. Thus, a one standard deviation increase in the EDR decreases the probability of being energy poor by 3.7, 4.2, 3.8 and 4.6 percentage points for cohorts 3-6, respectively. Again, these findings support the first hypothesis.

[Table 3 here]

6. Potential Mechanisms

We investigate LoC, personal income, and savings as potential channels through which the Great Famine affects energy poverty. Panel A and Panel C of Table 4 show that LoC and savings do not mediate the relationship between famine experience and energy poverty.

In Panel B of Table 4, Model 1 shows that experiencing the Famine in childhood or adolescence is positively related to personal income. Model 2 indicates that experiencing the Famine in childhood or adolescence negatively affects LIHC, consistent with the results in Table 2. Finally, Model 3 in Panel B shows that personal income mediates the relationship between experiencing the Famine in childhood or adolescence and LIHC. In Model 3, the coefficient on income continues to be positive and significant, while the magnitude of the coefficient on Famine cohort × EDR decreases marginally between Models 2 and 3. The Sobel test statistic for whether personal income mediates the influence of famine experience on energy poverty is significant at $p<0.0712$.[3] Overall, these findings support Hypothesis 2b, but not Hypotheses 2a or 2c.

[Table 4 here]

7. Robustness Checks

We consider several robustness checks. In our first check, we employ TPR, adjusted TPR and EDS as alternative indicators for energy poverty. In Table 5, Models 1 (DID-OLS) and 2 (DID-probit) show that experiencing the Famine in childhood and adolescence does not have a significant effect on the likelihood of being in energy poverty measured by TPR. The adjusted TPR, though, better reflects both energy usage and household economic status. Models 3 and 4 show that experiencing the Famine in early life has a negative effect on energy poverty measured by adjusted TPR. Estimates for Model 3 and Model 4 show that the likelihood that the Famine cohort will be in energy poverty decreases by 2.6 and 3.5 percentage points for every additional unit increase in excess deaths per 100 people in 1960 during the Famine, respectively. Alternatively, the likelihood of being in energy poverty for the Famine cohort decreases by 3.4 and 4.6 percentage points for a one standard deviation increase in the excess death per 100 people, respectively. In Model 5, the coefficient is -0.021 (i.e., -2.8 percentage points in response

[3] The Sobel test is a specific form of *t* test used in mediatrion analysis to ascertain whether the reduction in the magnitude of the coefficient on the independent variable (Famine cohort × EDR), after including the mediator (income) in the model, is significant and, hence, whether the mediation effect is statistically significant.

to a one standard deviation increase), which shows that cohorts who experienced the Famine have a lower EDS. Overall, the results in Table 5 are consistent with the main findings in Table 2.

[Table 5 here]

Next, instead of using the EDR to measure famine severity, we use two alternative measures of famine severity. In Table 6, the results in panel A based on CSSI and in panel B based on FRI show that those who experienced the Famine in their childhood and adolescence have a lower probability of being in energy poverty, consistent with the results based on EDR in Table 2.

[Table 6 here]

Our DID model has accounted for the level effects of cohort exposure and famine intensity. The DID model relies on a parallel cohort trend assumption between provinces with high and low Famine intensity (Bai and Wu, 2020). To validate the parallel trend assumption, we conduct a placebo (falsification) test by interacting a hypothetical famine-affected cohort born between 1963 and 1968 (relative to the cohort born between 1969-1975) and the EDR. Table 7 shows the interaction term between the hypothetical famine cohort and EDR is not statistically significant in predicting any one of the energy poverty indicators. Results for these control experiments show that the parallel tend assumption is satisfied, which lends confidence to our DID estimation.

[Table 7 here]

One concern is that our results capture other potential cohort differences that may simultaneously affect our dependent variable and independent variable. To account for this, we further control for year of birth linear trends to account for potential cohort-specific trends. Results in Table 8 suggest that our findings hold after controlling for year of birth linear trends.

[Table 8 here]

One may be worried be that that some inland provinces had higher EDRs during the Famine and slower economic growth during the reform era compared to the coastal provinces and, thus, may exhibit different impacts on specific cohorts in a systematically different way. For example, younger cohorts may be more likely to benefit from higher economic growth in the economic reform period and, thus, be less likely to be in energy poverty. To address this concern, we include a full set of province-year of birth linear interactions to control for province-specific policies and potential differences in both pre-famine and post-famine province-specific cohort trends. The results, reported in Table 9, are qualitatively similar to the results in Table 2.

[Table 9 here]

Next, we control for the total Marketisation Index to address the issue that energy poverty may be correlated with the level of local economic development.[4] Table 10 shows that, after controlling for the level of marketisation, which is a composite measure of the development of the market economy at the provincial level, the results are qualitatively similar to those in Table 2.

[Table 10 here]

In our main analysis, we cluster the standard errors at the county level. As a robustness check, we cluster the standard errors at the cohort and county levels to see if energy poverty is

[4] The Marketisation Index is obtained from the *Marketization Index of China's Provinces: NERI Report 2018*.

correlated within a specific cohort or county. The results, which are reported in Table 11, are qualitatively similar to the results in Table 2.

[Table 11 here]

Previous research suggests that adults who were children or adolescents during the Cultural Revolution have higher blood pressure, reduced ability to engage in daily life activities and lower cognition (Islam et al., 2017). Thus, experiencing the Cultural Revolution as an adoelescent might bias the estimate of the impact of the Famine on energy poverty. Our analytical sample is limited to rural areas, while the Cultural Revolution was concentrated in urban areas, so we think that experiencing the Cultural Revolution is unlikely to bias our estimates of the impact of childhood adversity on energy poverty. To confirm this, in Table 12 we control for experiencing the Cultural Revolution during adolescence. The results are qualitatively similar to those in Table 2.

[Table 12 here]

8. Conclusion

We have examined the effects of early life adversity, as proxied by experiencing the Great Chinese Famine in childhood or adolescence, on the probability of being in energy poverty in adulthood. The previous literature on the determinants of energy poverty has emphasised factors contemporary with experiencing energy poverty in adulthood, such as household characteristics (eg. household income, household size, socioeconomic status) and environmental attributes (eg. energy price, energy efficiency, ethnic diversity, and temperature) (Ambrose, 2015; Awaworyi Churchill and Smyth, 2020; Azpitarte et al., 2015; Boardman, 2010; Bouzarovski and Tirado Herrero, 2017; Simon et al., 2000). We extend this literature to show, for the first time, that the likelihood of experiencing energy poverty has its origins in early life adversity.

Most of the economics literature on early life adversity has emphasised that it has negative long-term effects. There are only a few studies in other areas (such as the underdog theory of entrepreneurship) that point to the benefits of early life adversity for building psychological assets, such as self-reliance, resilience, resourcefulness and risk-taking, which are important determinants of future economic success (Awaworyi Churchill et al., 2021; Cheng et al., 2021a; Cheng et al., 2021b; Cheng and Smyth, 2021). Consistently with previous research, we find that the effect of early life adversity on energy poverty channels through higher income.

Most studies in economics in the tradition of Heckman (2006) have focused on early life interventions to redress early life deficits. This literature focuses on putting in place strategies to counter the negative effects of early life adversity, rather than fostering the potential benefits. However, from a policy perspective, our results provide a different pathway, suggesting that early life adversity can build psychological assets that foster positive outcomes, such as lower proclivity to be in energy poverty later in life. Thus, rather than implement early life interventions designed to offset the negative consequences of early life disadvantage, our results point to the need for policies that reinforce the potential upside of early life adversity in reinforcing coping and adaptive skills, such as resilience, self-reliance, resourcefulness and risk-taking. In this respect, school boards in several countries are revising their curricula to teach resilience to children (see Schurer, 2017 for a discussion). Examples include the Penn Resilience Program in the United

States[5] and the BOOST project in Europe.[6] While we find that LoC is not a channel through which early life adversity affects energy poverty in our study, previous research has found that being more internal on LoC is associated with a lower likelihood of being in energy poverty (Awaworyi Churchill and Smyth, 2021a). Policies to build resilience in schoolchildren have the advantage of also nudging children to be more internal on LoC before LoC is stabilised during late adolescence.

More generally, measures to build resilience in survivors of catastrophic events could include training designed to enhance personal psychological resources (psychological capital or 'PsyCap'), which would reinforce coping and adaptive skills. PsyCap is as 'an individual's positive psychological state of development' Luthans et al. (2006, p.3.). It is "a higher order construct subsuming hope, resilience, optimism and self-efficacy" (Newman et al., 2018). The useful thing about PsyCap, identified in the psychology literature, is that it can be developed or nurtured (Luthans, 2012). This suggests that with appropriate training, it is possible to nudge people to be more resilient, optimistic and exercise greater control over their lives. Importantly, for our purposes, previous studies have shown that training in PsyCap has the potential to increase self-esteem and reduce anxiety in other vulnerable groups, such as refugees (Newman et al., 2018).

[5] For an overview of the Penn Resilience Program, see https://ppc.sas.upenn.edu/research/resilience-children.
[6] For an overview of BOOST see https://cordis.europa.eu/project/id/755175.

References

Ahn, T., 2015. Locus of control and job turnover. Economic Inquiry 53, 1350–1365. https://doi.org/10.1111/ecin.12173

Almond, D., Currie, J., 2011. Killing me softly: The fetal origins hypothesis. Journal of Economic Perspectives 25, 153–172. https://doi.org/10.1257/jep.25.3.153

Ambrose, A.R., 2015. Improving energy efficiency in private rented housing: Why don't landlords act? Indoor and Built Environment 24, 913–924. https://doi.org/10.1177/1420326X15598821

Andrisani, P.J., 1977. Internal-External attitudes, personal initiative, and the labor market experience of black and white men. The Journal of Human Resources 12, 308–328. https://doi.org/10.2307/145493

Awaworyi Churchill, S., Munyanyi, M.E., Smyth, R., Trinh, T.-A., 2021. Early life shocks and entrepreneurship: Evidence from the Vietnam War. Journal of Business Research 124, 506–518. https://doi.org/10.1016/j.jbusres.2020.11.009

Awaworyi Churchill, S., Smyth, R., 2021a. Locus of control and energy poverty. Working Paper.

Awaworyi Churchill, S., Smyth, R., 2021b. Energy poverty and health: Panel data evidence from Australia. Energy Economics 97. https://doi.org/10.1016/j.eneco.2021.105219

Awaworyi Churchill, S., Smyth, R., 2020. Ethnic diversity, energy poverty and the mediating role of trust: Evidence from household panel data for Australia. Energy Economics 86. https://doi.org/10.1016/j.eneco.2020.104663

Awaworyi Churchill, S., Smyth, R., Farrell, L., 2020. Fuel poverty and subjective wellbeing. Energy Economics 86. https://doi.org/10.1016/j.eneco.2019.104650

Azpitarte, F., Johnson, V., Sullivan, D., 2015. Fuel poverty, household income and energy spending: An empirical analysis for Australia using HILDA data. Brotherhood of St. Laurence, Fitzroy.

Bai, L., Wu, L., 2020. Political movement and trust formation: Evidence from the Cultural Revolution (1966–76). European Economic Review 122, 103331. https://doi.org/10.1016/j.euroecorev.2019.103331

Baron, R.M., Kenny, D.A., 1986. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology. https://doi.org/10.1037/0022-3514.51.6.1173

Belaid, F., 2019. Chapter 2 - Role of economy and income to fall in energy poverty: Policy act, in: Fabbri, K.B.T.-U.F.P. (Ed.). Academic Press, pp. 17–40. https://doi.org/10.1016/B978-0-12-816952-0.00002-8

Bethell, C.D., Newacheck, P., Hawes, E., Halfon, N., 2014. Adverse childhood experiences: Assessing the impact on health and school engagement and the mitigating role of resilience. Health Affairs 33, 2106–2115. https://doi.org/10.1377/hlthaff.2014.0914

Beutel, M.E., Tibubos, A.N., Klein, E.M., Schmutzer, G., Reiner, I., Kocalevent, R.-D., Brähler, E., 2017. Childhood adversities and distress - The role of resilience in a representative sample. PloS one 12, e0173826–e0173826. https://doi.org/10.1371/journal.pone.0173826

Bienvenido-Huertas, D., 2021. Do unemployment benefits and economic aids to pay electricity bills remove the energy poverty risk of Spanish family units during lockdown? A study of COVID-19-induced lockdown. Energy Policy 150, 112117. https://doi.org/10.1016/j.enpol.2020.112117

Boardman, B., 2010. Fixing fuel poverty: Challenges and solutions. Earthscan, London.

Boardman, B., 1991. Fuel poverty: From cold homes to affordable warmth. Belhaven Press, London.

Bonanno, G., 2004. Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? The American psychologist 59 1, 20–28. https://doi.org/10.1037/0003-066X.59.1.20

Bouzarovski, S., Tirado Herrero, S., 2017. Geographies of injustice: The socio-spatial determinants of energy poverty in Poland, the Czech Republic and Hungary. Post-Communist Economies 29, 27–50. https://doi.org/10.1080/14631377.2016.1242257

Bruce, J., Fisher, P.A., Pears, K.C., Levine, S., 2009. Morning cortisol Levels in preschool-aged foster children: Differential effects of maltreatment type. Developmental Psychobiology 51, 14–23. https://doi.org/10.1002/dev.20333

Cahill, H., Beadle, S., Forster, R., Smith, K., Farrelly, A., 2014. Building resilience in children and young people: A literature review for the Department of Education and Early Childhood Development (DEECD). Melbourne Graduate School of Education, Melbourne. https://www.education.vic.gov.au/Documents/about/department/resiliencelitreview.pdf

Caliendo, M., Cobb-Clark, D.A., Obst, C., Seitz, H., Uhlendorff, A., 2020. Locus of control and investment in training. Journal of Human Resources. https://doi.org/10.3368/jhr.57.4.0318-9377R2

Caliendo, M., Hennecke, J., 2020. Drinking is different! Examining the role of locus of control for alcohol consumption. IZA Discussion Paper Series no. 13273, Bonn.

Campbell, J.A., Walker, R.J., Garacci, E., Dawson, A.Z., Williams, J.S., Egede, L.E., 2020. Relationship between adverse childhood experiences and perceived discrimination in adulthood. Journal of Affective Disorders 277, 999–1004. https://doi.org/10.1016/j.jad.2020.09.023

Carpenter, J.N., Lu, F., Whitelaw, R.F., 2021. The real value of China's stock market. Journal of Financial Economics 139, 679–696. https://doi.org/10.1016/j.jfineco.2020.08.012

Chai, A., Ratnasiri, S., Wagner, L., 2021. The impact of rising energy prices on energy poverty in Queensland: A microsimulation exercise. Economic Analysis and Policy 71, 57–72. https://doi.org/10.1016/j.eap.2021.03.014

Chamon, M., Liu, K., Prasad, E., 2013. Income uncertainty and household savings in China. Journal of Development Economics 105, 164–177. https://doi.org/10.1016/j.jdeveco.2013.07.014

Chen, H., de la Rupelle, M., Zilibotti, F., 2018. The Great Famine and savings rate in China. Working Paper.

Chen, H., Rupelle, M.D. la, 2016. The Great Famine and household saving in China. Working Paper.

Chen, Y., Fan, Z., Gu, X., Zhou, L.-A., 2020. Arrival of young talent: The send-down movement and rural education in China. American Economic Review 110, 3393–3430. https://doi.org/10.1257/aer.20191414

Chen, Y., Zhou, L.-A., 2007. The long-term health and economic consequences of the 1959–1961 famine in China. Journal of Health Economics 26, 659–681. https://doi.org/10.1016/j.jhealeco.2006.12.006

Cheng, Z., Guo, W., Hayward, M., Smyth, R., Wang, H., 2021a. Childhood adversity and the propensity for entrepreneurship: A quasi-experimental study of the Great Chinese Famine. Journal of Business Venturing 36, 106063. https://doi.org/10.1016/j.jbusvent.2020.106063

Cheng, Z., Smyth, R., 2021. Does childhood adversity affect household portfolio decisions? Evidence from the Chinese Great Famine. Working Paper.

Cheng, Z., Tani, M., Wang, H., 2021b. Energy poverty and entrepreneurship. Energy Economics 105469. https://doi.org/10.1016/j.eneco.2021.105469

Chu, J., Png, I.P.L., Yi, J., 2016. Entrepreneurship and the school of hard knocks: Evidence from China's Great Famine. SSRN Working Paper. https://doi.org/10.2139/ssrn.2789174

Coale, A.J., Banister, J., 1994. Five decades of missing females in China. Demography 31, 459–479. https://doi.org/10.2307/2061752

Cobb-Clark, D.A., Kassenboehmer, S.C., Schurer, S., 2014. Healthy habits: The connection between diet, exercise, and locus of control. Journal of Economic Behavior & Organization 98, 1–28. https://doi.org/10.1016/j.jebo.2013.10.011

Coleman, M., DeLeire, T., 2003. An economic model of locus of control and the human capital investment decision. The Journal of Human Resources 38, 701–721. https://doi.org/10.2307/1558773

Covey, H.C., Menard, S., Franzese, R.J., 2013. Effects of adolescent physical abuse, exposure to neighborhood violence, and witnessing parental violence on adult socioeconomic status. Child Maltreatment 18, 85–97. https://doi.org/10.1177/1077559513477914

Cox, C.J., Cooper, C.L., 1989. The making of the British CEO: Childhood, work experience, personality, and management style. The Academy of Management Executive (1987-1989) 3, 241–245. https://www.jstor.org/stable/4164904

Crivello, G., Tiumelissan, A., Heissler, K., 2021. "The challenges made me stronger": What contributes to young people's resilience in Ethiopia? Young Lives Working Paper no. 197, London.

Currie, J., Spatz Widom, C., 2010. Long-Term consequences of child abuse and neglect on adult economic well-being. Child Maltreatment 15, 111–120. https://doi.org/10.1177/1077559509355316

Currie, J., Vogl, T., 2013. Early-life health and adult circumstance in developing countries. Annual Review of Economics 5, 1–36. https://doi.org/10.1146/annurev-economics-081412-103704

Dalla Longa, F., Sweerts, B., van der Zwaan, B., 2021. Exploring the complex origins of energy poverty in The Netherlands with machine learning. Energy Policy 156, 112373. https://doi.org/10.1016/j.enpol.2021.112373

Deller, D., Turner, G., Waddams Price, C., 2021. Energy poverty indicators: Inconsistencies, implications and where next? Energy Economics 103, 105551. https://doi.org/10.1016/j.eneco.2021.105551

Do, H., Nguyen, P.M.Q., Nepal, R., Smyth, R., 2021. When Pep comes calling, the oil market answers: The effect of football player transfer movements on abnormal fluctuations in oil price futures. Energy Economics 100, Article 105325. https://doi.org/10.1016/j.eneco.2021.105325

Dogan, E., Madaleno, M., Taskin, D., 2021. Which households are more energy vulnerable? Energy poverty and financial inclusion in Turkey. Energy Economics 99, 105306. https://doi.org/10.1016/j.eneco.2021.105306

Dozier, M., Stoval, K.C., Albus, K.E., Bates, B., 2001. Attachment for infants in foster care: The role of caregiver state of mind. Child Development 72, 1467–1477. https://doi.org/10.1111/1467-8624.00360

Faiella, I., Lavecchia, L., 2021. Energy poverty. How can you fight it, if you can't measure it? Energy and Buildings 233, 110692. https://doi.org/10.1016/j.enbuild.2020.110692

Farrell, L., Fry, J.M., 2021. Australia's gambling epidemic and energy poverty. Energy Economics 97, 105218. https://doi.org/10.1016/j.eneco.2021.105218

Feeny, S., Trinh, T.-A., Zhu, A., 2021. Temperature shocks and energy poverty: Findings from Vietnam. Energy Economics 99. https://doi.org/10.1016/j.eneco.2021.105310

Fisher, P.A., 2015. Review: Adoption, fostering, and the needs of looked-after and adopted children. Child and Adolescent Mental Health 20, 5–12. https://doi.org/10.1111/camh.12084

Gafa, D.W., Egbendewe, A.Y.G., 2021. Energy poverty in rural West Africa and its determinants: Evidence from Senegal and Togo. Energy Policy 156, 112476. https://doi.org/10.1016/j.enpol.2021.112476

Gertler, P., Martinez, S., Rawlings, L., Premand, P., Vermeersch, C., 2016. Impact evaluation in practice, Second. ed. The World Bank, Washington, DC. https://doi.org/10.1596/978-1-4648-0779-4

Green, B.L., Grace, M.C., Vary, M.G., Kramer, T.L., Gleser, G.C., Leonard, A.C., 1994. Children of disaster in the second decade: A 17-year follow-up of Buffalo Creek survivors. Journal of the American Academy of Child and Adolescent Psychiatry 33, 71–79. https://doi.org/10.1097/00004583-199401000-00011

Groves, M.O., 2005. How important is your personality? Labor market returns to personality for women in the US and UK. Journal of Economic Psychology 26, 827–841. https://doi.org/10.1016/j.joep.2005.03.001

Halkos, G.E., Gkampoura, E.-C., 2021. Evaluating the effect of economic crisis on energy poverty in Europe. Renewable and Sustainable Energy Reviews 144, 110981. https://doi.org/10.1016/j.rser.2021.110981

Haushofer, J., Fehr, E., 2014. On the psychology of poverty. Science 344, 862 LP – 867. https://doi.org/10.1126/science.1232491

Healey, C. v, Fisher, P.A., 2011. Young children in foster care and the development of favorable outcomes. Children and Youth Services Review 33, 1822–1830. https://doi.org/10.1016/j.childyouth.2011.05.007

Heckman, J.J., 2006. Investing in disadvantaged young children is both fair and efficient. Paper presented to the Committee for Economic Development/the Pew Charitable Trusts/PNC Financial Services Group Forum on "Building the Economic Case for Investments in Preschool", New York.

Herrero, S.T., 2017. Energy poverty indicators: A critical review of methods. Indoor and Built Environment 26, 1018–1031. https://doi.org/10.1177/1420326X17718054

Hills, J., 2012. Getting the measure of fuel poverty: Final report of the Fuel Poverty Review. http://eprints.lse.ac.uk/43153\

Huang, B., Tani, B., Zhu, Y. 2021. Does higher education make you more entrepreneurial? Causal evidence from China. Journal of Business Research, 135, 543-558.

Huang, C., Phillips, M.R., Zhang, Y., Zhang, J., Shi, Q., Song, Z., Ding, Z., Pang, S., Martorell, R., 2013. Malnutrition in early life and adult mental health: Evidence from a natural experiment. Social Science & Medicine 97, 259–266. https://doi.org/10.1016/j.socscimed.2012.09.051

Huang, W., Zhou, Y., 2013. Effects of education on cognition at older ages: Evidence from China's Great Famine. Social Science & Medicine 98, 54–62. https://doi.org/10.1016/j.socscimed.2013.08.021

Huggett, M., Ventura, G., 2000. Understanding why high income households save more than low income households. Journal of Monetary Economics 45, 361–397. https://doi.org/10.1016/S0304-3932(99)00058-6

International Energy Agency, 2017. Energy Access Outlook 2017. https://www.iea.org/reports/energy-access-outlook-2017 (accessed September 6, 2021).

Islam, A., Raschky, P., Smyth, R., 2017. The long-term health effects of mass political violence: Evidence from China's Cultural Revolution. Social Indicators Research 132, 257–272. https://doi.org/10.1007/s11205-015-1030-6

James, W.H., Rotter, J.B., 1958. Partial and 100% reinforcement under chance and skill conditions. Journal of Experimental Psychology. https://doi.org/10.1037/h0045104

Jones, T.M., Nurius, P., Song, C., Fleming, C.M., 2018. Modeling life course pathways from adverse childhood experiences to adult mental health. Child Abuse and Neglect 80, 32–40. https://doi.org/10.1016/j.chiabu.2018.03.005

Kahouli, S., 2020. An economic approach to the study of the relationship between housing hazards and health: The case of residential fuel poverty in France. Energy Economics 85, 104592. https://doi.org/10.1016/j.eneco.2019.104592

Kim-Cohen, J., Moffitt, T.E., Caspi, A., Taylor, A., 2004. Genetic and environmental processes in young children's resilience and vulnerability to socioeconomic deprivation. Child Development 75, 651–668. https://doi.org/10.1111/j.1467-8624.2004.00699.x

Knoop, R., 1981. Age and correlates of locus of control. Journal of Psychology: Interdisciplinary and Applied 108, 103–106. https://doi.org/10.1080/00223980.1981.9915250

Koomson, I., Danquah, M., 2021. Financial inclusion and energy poverty: Empirical evidence from Ghana. Energy Economics 94, 105085. https://doi.org/10.1016/j.eneco.2020.105085

Korol, M., Kramer, T.L., Grace, M.C., Green, B.L., 2002. Dam break: Long-term follow-up of children exposed to the Buffalo Creek disaster. Helping children cope with disasters and terrorism. https://doi.org/10.1037/10454-011

Lee, C.-C., Wang, C.-W., Ho, S.-J., Wu, T.-P., 2021. The impact of natural disaster on energy consumption: International evidence. Energy Economics 97, 105021. https://doi.org/10.1016/j.eneco.2020.105021

Li, Y., Zhao, L., Yu, D., Ding, G., 2018. Exposure to the Chinese famine in early life and depression in adulthood. Psychology, Health & Medicine 23, 952–957. https://doi.org/10.1080/13548506.2018.1434314

Lin, B., Wang, Y., 2020. Does energy poverty really exist in China? From the perspective of residential electricity consumption. Energy Policy 143. https://doi.org/10.1016/j.enpol.2020.111557

Lin, B., Zhao, H., 2021. Does off-farm work reduce energy poverty? Evidence from rural China. Sustainable Production and Consumption 27, 1822–1829. https://doi.org/10.1016/j.spc.2021.04.023

List, J.A., Samek, A., Suskind, D.L., 2018. Combining behavioral economics and field experiments to reimagine early childhood education. Behavioural Public Policy 2, 1–21. https://doi.org/10.1017/bpp.2017.6

Liu, J., Zheng, X., Parker, M., Fang, X., 2020. Childhood left-behind experience and employment quality of new-generation migrants in China. Population Research and Policy Review 39, 691–718. https://doi.org/10.1007/s11113-020-09568-w

Lothe, E.A., 2010. Hope or horror? A follow-up study of resilience in survivors from the 1985 Famine in Ethiopia. Brill, Leiden, The Netherlands, pp. 165–188. https://doi.org/10.1163/9789042030237_012

Lothe, E.A., Heggen, K., 2003. A study of resilience in young Ethiopian famine survivors. Journal of Transcultural Nursing 14, 313–320. https://doi.org/10.1177/1043659603257161

Luthans, F., 2012. Psychological capital: Implications for HRD, retrospective analysis, and future directions. Human Resource Development Quarterly 23, 1–8. https://doi.org/10.1002/hrdq.21119

Luthans, F., Youssef, C.M., Avolio, B.J., 2006. Psychological capital: Developing the human competitive edge. Oxford University Press, New York. https://doi.org/10.1093/acprof:oso/9780195187526.001.0001

Lynch, L., Waite, R., Davey, M.P., 2013. Adverse childhood experiences and diabetes in adulthood: Support for a collaborative approach to primary care. Contemporary Family Therapy 35, 639–655. https://doi.org/10.1007/s10591-013-9262-6

Macmillan, R., Hagan, J., 2004. Violence in the transition to adulthood: Adolescent victimization, education, and socioeconomic attainment in later life. Journal of Research on Adolescence 14, 127–158. https://doi.org/10.1111/j.1532-7795.2004.01402001.x

Manning, K.E., Wemheuer, F. (Eds.), 2011. Eating bitterness: New perspectives on China's great leap forward and famine. UBC Press, Vancouver.

Mansueto, G., Cavallo, C., Palmieri, S., Ruggiero, G.M., Sassaroli, S., Caselli, G., 2021. Adverse childhood experiences and repetitive negative thinking in adulthood: A systematic review. Clinical Psychology and Psychotherapy 28, 557–568. https://doi.org/10.1002/cpp.2590

Meng, X., Qian, N., Yared, P., 2015. The institutional causes of China's Great Famine, 1959–1961. The Review of Economic Studies 82, 1568–1611. https://doi.org/10.1093/restud/rdv016

Mersky, J., Janczewski, C., Nitkowski, J., 2018. Poor mental health among low-income women in the U.S.: The roles of adverse childhood and adult experiences. Social Science & Medicine 206. https://doi.org/10.1016/j.socscimed.2018.03.043

Mętel, D., Arciszewska, A., Daren, A., Frydecka, D., Cechnicki, A., Gawęda, Ł., 2019. Resilience and cognitive biases mediate the relationship between early exposure to traumatic life events and depressive symptoms in young adults. Journal of Affective Disorders 254, 26–33. https://doi.org/10.1016/j.jad.2019.05.008

Metzler, M., Merrick, M.T., Klevens, J., Ports, K.A., Ford, D.C., 2017. Adverse childhood experiences and life opportunities: Shifting the narrative. Children and Youth Services Review 72, 141–149. https://doi.org/10.1016/j.childyouth.2016.10.021

Miller, D., le Breton-Miller, I., 2017. Underdog entrepreneurs: A model of challenge-based entrepreneurship. Entrepreneurship: Theory and Practice 41, 7–17. https://doi.org/10.1111/etap.12253

Moore, R., 2012. Definitions of fuel poverty: Implications for policy. Energy Policy 49, 19–26. https://doi.org/10.1016/j.enpol.2012.01.057

Newman, A., Nielsen, I., Smyth, R., Hirst, G., Kennedy, S., 2018. The effects of diversity climate on the work attitudes of refugee employees: The mediating role of psychological capital and moderating role of ethnic identity. Journal of Vocational Behavior 105, 147–158. https://doi.org/10.1016/j.jvb.2017.09.005

Nie, P., Li, Q., Sousa-Poza, A., 2021. Energy poverty and subjective well-being in China: New evidence from the China Family Panel Studies. IZA Discussion Paper Series no. 14429, Bonn.

Palmer, G., MacInnes, T., Kenway, P., 2008. Cold and poor: An analysis of the link between fuel poverty and low income. New Policy Institute, London.

Paudel, J., 2021. Beyond the blaze: The impact of forest fires on energy poverty. Energy Economics 101, 105388. https://doi.org/10.1016/j.eneco.2021.105388

Phoumin, H., Kimura, F., 2019. Cambodia's energy poverty and its effects on social wellbeing: Empirical evidence and policy implications. Energy Policy 132, 283–289. https://doi.org/10.1016/j.enpol.2019.05.032

Pinger, P., Schäfer, S., Schumacher, H., 2018. Locus of control and consistent investment choices. Journal of Behavioral and Experimental Economics 75, 66–75. https://doi.org/10.1016/j.socec.2018.05.004

Poole, J.C., Dobson, K.S., 2017. Childhood adversity and adult depression: The protective role of psychological resilience. Child Abuse and Neglect 64, 89–100. https://doi.org/10.1016/j.chiabu.2016.12.012

Poole, J.C., Dobson, K.S., Pusch, D., 2018. Do adverse childhood experiences predict adult interpersonal difficulties? The role of emotion dysregulation. Child Abuse and Neglect 80, 123–133. https://doi.org/10.1016/j.chiabu.2018.03.006

Ports, K.A., Ford, D.C., Merrick, M.T., 2016. Adverse childhood experiences and sexual victimization in adulthood. Child Abuse and Neglect 51, 313–322. https://doi.org/10.1016/j.chiabu.2015.08.017

Repetti, R.L., Taylor, S.E., Seeman, T.E., 2002. Risky families: Family social environments and the mental and physical health of offspring. Psychological Bulletin 128, 330–366. https://doi.org/10.1037/0033-2909.128.2.330

Ross, N., Gilbert, R., Torres, S., Dugas, K., Jefferies, P., McDonald, S., Savage, S., Ungar, M., 2020. Adverse childhood experiences: Assessing the impact on physical and psychosocial health in adulthood and the mitigating role of resilience. Child Abuse and Neglect 103. https://doi.org/10.1016/j.chiabu.2020.104440

Rotter, J.B., Mulry, R.C., 1965. Internal versus external control of reinforcement and decision time. Journal of Personality and Social Psychology. https://doi.org/10.1037/h0022473

Rutter, M., 2006. Implications of resilience concepts for scientific understanding. Annals of the New York Academy of Sciences 1094, 1–12. https://doi.org/10.1196/annals.1376.002

Salamanca, N., de Grip, A., Fouarge, D., Montizaan, R., 2020. Locus of control and investment in risky assets. Journal of Economic Behavior and Organization 177, 548–568. https://doi.org/10.1016/j.jebo.2020.06.032

Samuels, G.M., Pryce, J.M., 2008. "What doesn't kill you makes you stronger": Survivalist self-reliance as resilience and risk among young adults aging out of foster care. Children and Youth Services Review 30, 1198–1210. https://doi.org/10.1016/j.childyouth.2008.03.005

Sansone, R.A., Leung, J.S., Wiederman, M.W., 2012. Five forms of childhood trauma: Relationships with employment in adulthood. Child Abuse & Neglect 36, 676–679. https://doi.org/10.1016/J.CHIABU.2012.07.007

Schurer, S., 2017. Bouncing back from health shocks: Locus of control and labor supply. Journal of Economic Behavior & Organization 133, 1–20. https://doi.org/10.1016/j.jebo.2016.10.019

Sheffler, J.L., Piazza, J.R., Quinn, J.M., Sachs-Ericsson, N.J., Stanley, I.H., 2019. Adverse childhood experiences and coping strategies: identifying pathways to resiliency in adulthood. Anxiety, Stress and Coping 32, 594–609. https://doi.org/10.1080/10615806.2019.1638699

Simon, M., Houghton, S.M., Aquino, K., 2000. Cognitive biases, risk perception, and venture formation: How individuals decide to start companies. Journal of Business Venturing 15, 113–134. https://doi.org/10.1016/S0883-9026(98)00003-2

Stein, A., Pierik, F., Verrips, G., Susser, E., Lumey, L., 2009. Maternal exposure to the Dutch famine before conception and during pregnancy. Epidemiology (Cambridge, Mass.) 20, 909–915. https://doi.org/10.1097/EDE.0b013e3181b5f227

Steinberg, L., Morris, A.S., 2001. Adolescent development, Annual Review of Psychology. https://doi.org/10.1146/annurev.psych.52.1.83

Suls, J., Fletcher, B., 1985. The relative efficacy of avoidant and nonavoidant coping strategies: a meta-analysis. Health Psychology 4, 249–288. https://doi.org/10.1037/0278-6133.4.3.249

Tang, X., Liao, H., 2014. Energy poverty and solid fuels use in rural China: Analysis based on national population census. Energy for Sustainable Development 23, 122–129. https://doi.org/10.1016/j.esd.2014.08.006

Thomson, H., Snell, C., Bouzarovski, S., 2017. Health, well-being and energy poverty in Europe: A comparative study of 32 European countries. International Journal of Environmental Research and Public Health 14, 584. https://doi.org/10.3390/ijerph14060584

Traub, F., Boynton-Jarrett, R., 2017. Modifiable resilience factors to childhood adversity for clinical pediatric practice. Pediatrics 139, e20162569. https://doi.org/10.1542/peds.2016-2569

United Nations, 2021. The 17 Goals. https://sdgs.un.org/zh/goals (accessed September 6, 2021).

Walder, A.G., Su, Y., 2003. The Cultural Revolution in the countryside: Scope, timing and human impact. The China Quarterly 74–99. http://www.jstor.org/stable/20058959

Wang, H., Cheng, Z., Zhe Wang, B., Chen, Y., 2021. Childhood left-behind experience and labour market outcomes in China. Journal of Business Research 132, 196–207. https://doi.org/10.1016/j.jbusres.2021.04.014

Yang, J., 2013a. Tombstone: The Great Chinese Famine, 1958–1962. Farrar, Straus and Giroux, New York.

Yang, J., 2013b. Social exclusion and young rural-urban migrants' integration into a host society in China. Annals of the American Academy of Political and Social Science 648, 52–69. https://doi.org/10.1177/0002716213482441

Zhang, D., Li, J., Han, P., 2019. A multidimensional measure of energy poverty in China and its impacts on health: An empirical study based on the China family panel studies. Energy Policy 131, 72–81. https://doi.org/10.1016/j.enpol.2019.04.037

Zhang, Q., Appau, S., Kodom, P.L., 2021. Energy poverty, children's wellbeing and the mediating role of academic performance: Evidence from China. Energy Economics 97. https://doi.org/10.1016/j.eneco.2021.105206

Table 1. Descriptive Statistics

	Full sample	Post-Famine cohort	Famine cohort
Year of birth	1945 to 1968	1963 to 1968	1945 to 1962
Age during the Famine	Unborn to 17	Unborn	Fetus to 17
Life stages during the Famine (1959-1961)	Unborn to adolescence	Unborn	Fetus to adolescence
Age during the survey	46 to 69	46 to 51	52 to 69
Low-income-high-cost (LIHC) energy poverty indicator (yes=1; no=0)	13.9%	13.5%	14.0%
Adjusted LIHC energy poverty indicator (yes=1; no=0)	12.0%	11.6%	12.1%
Excess death rate (EDR) in home province in 1960 (%)	1.576 (SD: 1.313)		
Observations	5105	1530	3575

Notes: SD is the standard deviation. Life stages for the Famine cohort include fetus/infancy/toddlerhood, early childhood, middle childhood, and adolescence.

Table 2. The Impact of Famine on Energy Poverty

	LIHC indicator				Adjusted LIHC indicator			
	(1) DID-OLS		(2) DID-probit		(3) DID-OLS		(4) DID-probit	
Famine cohort × EDR	-0.024**	(0.009)	-0.111***	(0.040)	-0.019**	(0.009)	-0.095**	(0.044)
Famine cohort	-0.029	(0.025)	-0.143	(0.121)	-0.027	(0.024)	-0.163	(0.127)
EDR	0.019*	(0.011)	0.084*	(0.047)	0.003	(0.008)	0.013	(0.041)
Age	0.038**	(0.018)	0.190**	(0.089)	0.020	(0.017)	0.120	(0.088)
Age squared	-0.000*	(0.000)	-0.001*	(0.001)	-0.000	(0.000)	-0.001	(0.001)
Male	-0.002	(0.007)	-0.008	(0.034)	-0.003	(0.007)	-0.013	(0.034)
Education level	-0.031**	(0.012)	-0.158**	(0.063)	-0.022*	(0.012)	-0.126*	(0.067)
Han ethnicity	-0.103***	(0.030)	-0.402***	(0.097)	-0.077**	(0.032)	-0.350***	(0.123)
Non-agricultural *hukou*	-0.073***	(0.017)	-0.443***	(0.129)	-0.042**	(0.019)	-0.238**	(0.120)
Married	-0.001	(0.047)	0.025	(0.181)	0.022	(0.050)	0.111	(0.209)
Has child	-0.093**	(0.043)	-0.378**	(0.155)	-0.109**	(0.046)	-0.470***	(0.171)
Migrate to another city	-0.014	(0.014)	-0.065	(0.069)	-0.017	(0.013)	-0.088	(0.070)
Constant	-0.808	(0.533)	-6.065**	(2.592)	-0.350	(0.502)	-4.191	(2.607)
Observations	5105		5105		5105		5105	
Adjusted/Pseudo R^2	0.018		0.025		0.012		0.019	
Calculated interaction effect: Famine cohort × EDR			-0.028				-0.018	

Notes: Robust standard errors are clustered by county and reported in parentheses. EDR is the excess death rate in 1960.

* p <.10, ** p <.05, *** p <.01

Table 3. The Impact of Famine on Energy Poverty: Alternative Definitions of Cohorts

	LIHC indicator				Adjusted LIHC indicator			
	(1) DID-OLS		(2) DID-probit		(3) DID-OLS		(4) DID-probit	
Cohort 2 × EDR	-0.005	(0.009)	-0.023	(0.037)	-0.002	(0.008)	-0.011	(0.038)
Cohort 3 × EDR	-0.028**	(0.012)	-0.132**	(0.052)	-0.025**	(0.010)	-0.141**	(0.056)
Cohort 4 × EDR	-0.032***	(0.012)	-0.150***	(0.053)	-0.024**	(0.010)	-0.123**	(0.053)
Cohort 5 × EDR	-0.029**	(0.013)	-0.138**	(0.057)	-0.022*	(0.012)	-0.108*	(0.062)
Cohort 6 × EDR	-0.035***	(0.013)	-0.165***	(0.056)	-0.025**	(0.012)	-0.119**	(0.058)
Control variables, cohorts and EDR	Yes		Yes		Yes		Yes	
Observations	5105		5105		5105		5105	
Adjusted/Pseudo R^2	0.017		0.025		0.011		0.019	

Notes: Robust standard errors are clustered by county and reported in parentheses. EDR is the excess death rate in 1960. All specifications control for cohorts, EDR and other variables as in Table A1. Full results are available from the authors.

* p <.10, ** p <.05, *** p <.01

Table 4. The Impact of Famine on Energy Poverty: Potential Mediators

Panel A: Locus of Control	(1) Locus of Control		(2) LIHC indicator		(3) LIHC indicator	
Famine cohort × EDR	-0.175	(0.300)	0.015	(0.068)	0.016	(0.066)
Locus of Control					0.008	(0.014)
Control variables, Famine cohort and EDR	Yes		Yes		Yes	
Observations	196		196		196	
Adjusted R^2	-0.006		-0.014		-0.018	
Method	DID-OLS		DID-OLS		DID-OLS	

Panel B: personal income	(1) log(Personal income)		(2) LIHC indicator		(3) LIHC indicator	
Famine cohort × EDR	0.19525*	(0.116)	-0.02406**	(0.011)	-0.02356**	(0.011)
log(Personal income)					-0.00254*	(0.001)
Control variables, Famine cohort and EDR	Yes		Yes		Yes	
Observations	3381		3381		3381	
Adjusted R^2	0.138		0.016		0.016	
Method	DID-OLS		DID-OLS		DID-OLS	

Panel C: savings	(1) log(Savings)		(2) LIHC indicator		(3) LIHC indicator	
Famine cohort × EDR	0.144	(0.147)	-0.024**	(0.009)	-0.023**	(0.009)
log(Savings)					-0.004***	(0.001)
Control variables, Famine cohort and EDR	Yes		Yes		Yes	
Observations	5105		5105		5105	
Adjusted R^2	0.015		0.018		0.021	
Method	DID-OLS		DID-OLS		DID-OLS	

Notes: Robust standard errors are clustered by county and reported in parentheses. EDR is the excess death rate in 1960. All specifications control for cohort, EDR and other variables as in Table A1. Full results are available from the authors.

* p <.10, ** p <.05, *** p <.01

Table 5. Robustness Checks: Alternative Measures of Energy Poverty

	(1) TPR indicator		(2) TPR indicator		(3) Adjusted TPR indicator		(4) Adjusted TPR indicator		(5) EDS	
Famine cohort × EDR	-0.015	(0.014)	-0.040	(0.037)	-0.026*	(0.013)	-0.101**	(0.044)	-0.021**	(0.008)
Control variables, Famine cohort and EDR	Yes		Yes		Yes		Yes		Yes	
Observations	5105		5105		5105		5105		5096	
Adjusted/Pseudo R^2	0.010		0.009		0.042		0.041		0.057	
Methodology	DID-OLS		DID-probit		DID-OLS		DID-probit		DID-OLS	
Calculated interaction effect: Famine cohort × EDR			Nonsignificant				-0.035			

Notes: Robust standard errors are clustered by county and reported in parentheses. EDR is the excess death rate in 1960. All specifications control for cohort, EDR and other variables as in Table A1. Full results are available from the authors.

* p <.10, ** p <.05, *** p <.01

Table 6. Robustness Checks: Alternative Measures of Famine Intensity

Panel A	(1) LIHC indicator		(2) LIHC indicator		(3) Adjusted LIHC indicator		(4) Adjusted LIHC indicator	
Famine cohort × CSSI	-0.260**	(0.112)	-1.219**	(0.526)	-0.219*	(0.111)	-1.081*	(0.563)
Control variables, CSSI and Famine cohort	Yes		Yes		Yes		Yes	
Observations	5105		5105		5105		5105	
Adjusted/Pseudo R^2	0.017		0.025		0.012		0.019	
Method	DID-OLS		DID-probit		DID-OLS		DID-probit	
Calculated interaction effect: Famine cohort × CSSI			-0.291				-0.199	

Panel B	(1) LIHC indicator		(2) LIHC indicator		(3) Adjusted LIHC indicator		(4) Adjusted LIHC indicator	
Famine cohort × FRI	-0.297**	(0.120)	-1.388**	(0.574)	-0.246**	(0.110)	-1.220**	(0.560)
Control variables, FRI and Famine cohort	Yes		Yes		Yes		Yes	
Observations	5105		5105		5105		5105	
Adjusted/Pseudo R^2	0.018		0.025		0.013		0.021	
Method	DID-OLS		DID-probit		DID-OLS		DID-probit	
Calculated interaction effect: Famine cohort × FRI			-0.319				-0.213	

Notes: Robust standard errors are clustered by county and reported in parentheses. CSSI is the cohort size shrinkage index, and FRI is the fertility reduction index. All specifications control for cohort, CSSI (or FRI) and other variables as in Table A1. Full results are available from the authors.

* p <.10, ** p <.05, *** p <.01

Table 7. Robustness Checks: Placebo Test

	(1) LIHC indicator		(2) LIHC indicator		(3) Adjusted LIHC indicator		(4) Adjusted LIHC indicator	
Hypothetical Famine cohort × EDR	0.025**	(0.010)	0.118***	(0.045)	0.021**	(0.010)	0.107**	(0.048)
Control variables, EDR and hypothetical Famine cohort	Yes		Yes		Yes		Yes	
Observations	4505		4505		4505		4505	
Adjusted/Pseudo R^2	0.023		0.029		0.019		0.025	
Method	DID-OLS		DID-probit		DID-OLS		DID-probit	
Calculated interaction effect: Hypothetical Famine cohort × EDR			0.024				0.015	

Notes: Robust standard errors are clustered by county and reported in parentheses. EDR is the excess death rate in 1960. All specifications control for cohorts, EDR and other variables as in Table A1. Full results are available from the authors.

* p <.10, ** p <.05, *** p <.01

Table 8. Robustness Checks: Controlling for Year of Birth Linear Trends

	(1) LIHC indicator		(2) LIHC indicator		(3) Adjusted LIHC indicator		(4) Adjusted LIHC indicator	
Famine cohort × EDR	-0.024***	(0.009)	-0.111***	(0.040)	-0.019**	(0.009)	-0.095**	(0.044)
Control variables, EDR and Famine cohort	Yes		Yes		Yes		Yes	
Year of birth linear treands	Yes		Yes		Yes		Yes	
Observations	5105		5105		5105		5105	
Adjusted/Pseudo R^2	0.018		0.025		0.012		0.019	
Method	DID-OLS		DID-probit		DID-OLS		DID-probit	
Calculated interaction effect: Famine cohort × EDR			-0.028				-0.018	

Notes: Robust standard errors are clustered by county and reported in parentheses. EDR is the excess death rate in 1960. All specifications control for cohorts, EDR and other variables as in Table A1 and year of birth linear trends. Full results are available from the authors.

Table 9. Robustness Checks: Controlling for the Province-Year of Birth Linear Interaction

	(1) LIHC indicator		(2) LIHC indicator		(3) Adjusted LIHC indicator		(4) Adjusted LIHC indicator	
Famine cohort × EDR	-0.031***	(0.010)	-0.146***	(0.043)	-0.023**	(0.010)	-0.116**	(0.051)
Control variables, EDR and Famine cohort	Yes		Yes		Yes		Yes	
Proince × Year of birth linear treands	Yes		Yes		Yes		Yes	
Observations	4383		4383		4383		4383	
Adjusted/Pseudo R^2	0.019		0.028		0.014		0.022	
Method	DID-OLS		DID-probit		DID-OLS		DID-probit	
Calculated interaction effect: Famine cohort × EDR			-0.034				-0.021	

Notes: Robust standard errors are clustered by county and reported in parentheses. EDR is the excess death rate in 1960. All specifications control for cohorts, EDR and other variables as in Table A1 and province-year of birth linear interaction. Full results are available from the authors.

Table 10. Robustness Checks: Controlling for the Marketisation Index

	(1) LIHC indicator		(2) LIHC indicator		(3) Adjusted LIHC indicator		(4) Adjusted LIHC indicator	
Famine cohort × EDR	-0.022**	(0.009)	-0.105***	(0.039)	-0.019**	(0.009)	-0.095**	(0.044)
Control variables, EDR and Famine cohort	Yes		Yes		Yes		Yes	
Marketisation Index	Yes		Yes		Yes		Yes	
Observations	5105		5105		5105		5105	
Adjusted/Pseudo R^2	0.025		0.035		0.012		0.020	
Method	DID-OLS		DID-probit		DID-OLS		DID-probit	
Calculated interaction effect: Famine cohort × EDR			-0.023				-0.018	

Notes: Robust standard errors are clustered by county and reported in parentheses. EDR is the excess death rate in 1960. All specifications control for cohorts, EDR and other variables as in Table A1 and the Marketisation Index. Full results are available from the authors.

Table 11. Robustness Checks: Clustered by Cohort and County

	(1) LIHC indicator		(2) LIHC indicator		(3) Adjusted LIHC indicator		(4) Adjusted LIHC indicator	
Famine cohort × EDR	-0.024*	(0.013)	-0.111*	(0.058)	-0.019*	(0.011)	-0.095*	(0.056)
Control variables, EDR and Famine cohort	Yes		Yes		Yes		Yes	
Observations	5105		5105		5105		5105	
Adjusted/Pseudo R^2	0.018		0.025		0.012		0.019	
Method	DID-OLS		DID-probit		DID-OLS		DID-probit	
Calculated interaction effect: Famine cohort × EDR			-0.028				-0.018	

Notes: Robust standard errors are clustered by cohort and county and reported in parentheses. EDR is the excess death rate in 1960. All specifications control for cohorts, EDR and other variables as in Table A1. Full results are available from the authors.

* p <.10, ** p <.05, *** p <.01

Table 12. Robustness Checks: Controlling for whether the Respondent Experienced the Cultural Revolution in Adolescence

	(1) LIHC indicator		(2) LIHC indicator		(3) Adjusted LIHC indicator		(4) Adjusted LIHC indicator	
Famine cohort × EDR	-0.024**	(0.009)	-0.113***	(0.040)	-0.019**	(0.009)	-0.096**	(0.044)
Control variables, EDR and Famine cohort	Yes		Yes		Yes		Yes	
Experienced the Cultural Revolution during adolescence	Yes		Yes		Yes		Yes	
Observations	5105		5105		5105		5105	
Adjusted/Pseudo R^2	0.018		0.026		0.012		0.020	
Method	DID-OLS		DID-probit		DID-OLS		DID-probit	
Calculated interaction effect: Famine cohort × EDR			-0.027				-0.018	

Notes: Robust standard errors are clustered by cohort and county and reported in parentheses. EDR is the excess death rate in 1960. All specifications control for cohorts, EDR and other variables as in Table A1. Full results are available from the authors.

* p <.10, ** p <.05, *** p <.01

Appendix Table A1. Descriptive Statistics

	Full sample		Famine cohort		Post-Famine cohort		Welch's t-statistic
	Mean	SD	Mean	SD	Mean	SD	
Alternative measures of energy poverty							
Ten-percent-rule (TPR) indicator (yes=1)	0.434	0.496	0.444	0.497	0.409	0.492	-2.325**
Adjusted TPR indicator (yes=1)	0.262	0.439	0.282	0.450	0.214	0.410	-5.287***
Energy deprivation score (EDS)	0.316	0.296	0.331	0.296	0.282	0.294	-5.485***
Alternative measures of famine intensity							
Cohort size shrinkage index (CSSI)	0.395	0.201					
Fertility reduction index (FRI)	0.368	0.187					
Potential mediators							
Locus of Control	-0.136	1.866	-0.692	1.859	-0.028	1.854	1.849*
Personal income (thousand *yuan*)	4.712	11.796	3.354	9.994	7.249	14.238	8.355***
Savings (thousand *yuan*)	18.514	51.220	17.215	47.088	21.550	59.677	2.525**
Control variables							
Age	56.634	6.710	60.081	4.831	48.578	1.740	-124.706***
Male (yes=1)	0.481	0.500	0.483	0.500	0.476	0.500	-0.414
Education level	1.356	0.497	1.312	0.480	1.459	0.522	9.423***
Han ethnicity (yes=1)	0.914	0.281	0.914	0.280	0.912	0.283	-0.198
Non-agricultural *hukou* (yes=1)	0.077	0.267	0.088	0.283	0.052	0.223	-4.800***
Married (yes=1)	0.983	0.128	0.985	0.121	0.979	0.143	-1.457*
Has child (yes=1)	0.975	0.156	0.976	0.153	0.973	0.162	-0.564
Migrant (yes=1)	0.204	0.403	0.196	0.397	0.222	0.416	2.062**

Notes: SD is the standard deviation. Welch's *t*-statistics are presented for the differences across the Famine and post-Famine cohorts. For education levels, primary school and below=1; junior high school and senior high school=2; 2- or 3-year college=3; 4-year college/bachelor's degree, master's degree, and doctoral degree=4.
* p <.10, ** p <.05, *** p <.01