



Childhood trauma among Chinese inmates[☆]

Han Liu^a, Lucy F. Ackert^b, Fang Chang^{a,*}, Ruth Uwaifo Oyelere^c, Li Qi^c, Yaojiang Shi^a

^a Shaanxi Normal University, Center for Experimental Economics in Education, 620 West Chang'an Ave, Xi'an, Shaanxi, China

^b Department of Economics and Finance, Michael J. Coles College of Business, Kennesaw State University, 1000 Chastain Road, Kennesaw, GA 30144, United States of America

^c Department of Economics and Business Management, Agnes Scott College, 141 E. College Avenue, Decatur, GA 30030, United States of America

ARTICLE INFO

JEL codes:

Z13
O19
R23

Keywords:

Adverse childhood experience
Childhood trauma
Migration
Parental alcohol use
Parental absence

ABSTRACT

The long-term effects of adverse childhood experiences (ACEs) negatively affect health, well-being, and life outcomes. We make use of a unique data set of survey responses from Chinese inmates to identify specific correlates of ACEs, measured by emotional abuse, emotional neglect, physical abuse, and childhood bullying. We find that having a troubled friend during childhood, parental alcohol use, and parental absence are positively correlated with all four measures of childhood trauma. In addition, an inmate's educational attainment has a strong relationship with self-reported trauma. Our data allow us to examine the relationships between life circumstances and ACEs for prison inmates, a group of people with poor life outcomes, thus providing direction for policy interventions.

PsycINFO code

3020
3233
3236

1. Introduction

An important societal goal is to provide youth with positive, nurturing childhoods so that they develop into productive and happy adults (Shonkoff et al., 2012). Prior research suggests that adverse experiences during childhood have negative repercussions in the life of an adult (e.g., Cheung, Huang, & Zhang, 2021; Kesternich, Smith, Winter, & Hörl, 2018; Liu, Ackert, Chang, Qi, & Shi, 2021; Xiao, Dong, Yao, Li, & Ye, 2008), even including the ability to grow wealthy (Malmendier & Nagel, 2011). The long-term impact on psychological and physical conditions in adulthood of childhood trauma and stress are well-recognized (Benjet, Borges, & Medina-Mora, 2010; Chapman et al., 2006; Chen, Fan, Nicholas, & Maitland, 2021; Dvir, Ford, Hill, & Frazier, 2014). Children who face adversity

[☆] The authors thank the Center for Experimental Economics in Education (CEEE) at Shaanxi Normal University for use of their facilities and Red Apple Foundation for assistance with arrangements at the prison facility.

* Corresponding author.

E-mail addresses: liuhanecon@163.com (H. Liu), lackert@kennesaw.edu (L.F. Ackert), changfang4421@163.com (F. Chang), ruwaifo@agnesscott.edu (R.U. Oyelere), lqi@agnesscott.edu (L. Qi), shiyaojiang7@gmail.com (Y. Shi).

early in life are more prone to problems in adulthood, including psychological disorders and suicidality (Bruwer et al., 2014; Reavis, Looman, Franco, & Rojas, 2013).

The goal of this study is to investigate the life circumstances related to adverse childhood experiences (ACEs) for individuals who are incarcerated. As Hagan and Lara (2021) point out, much of the large literature examining ACEs and life outcomes is based on surveys of American adults, typically from the general population. In the data, non-Hispanic, white adults are overrepresented, whereas other demographics receive little attention. A developing literature examines ACEs and life outcomes for citizens of Asian countries and, as in Western populations, ACEs are associated with mental health challenges (Ding, Lin, Lin, Yan, & He, 2014; Fung, Ross, Yu, & Lau, 2019; Lee et al., 2011). This paper contributes to the literature through its focus on a unique population: inmates at a large Chinese prison. Instead of considering a general, representative population, we focus on a group of people who have already experienced negative life outcomes. When completing the research instrument, respondents are incarcerated for a variety of criminal offences, clearly indicating problematic adulthoods. We measure ACEs with self-reports of emotional abuse, physical abuse, emotional neglect, and bullying during childhood, following psychologists who have developed instruments to detect a history of childhood abuse and neglect (Bernstein et al., 2003; Mullis, Martin, Foy, & Drucker, 2012).

Our unique data set of survey responses of Chinese inmates allows us to identify specific correlates of adverse childhood experiences for a disparate population. Based on extant research, we probe the life experiences of inmates that correlate with ACEs. Through this investigation, we can examine the correlations of specific living arrangements, demographics, and life circumstances correlated with ACEs. As a result, we provide direction for potential policy interventions.

Earlier work investigates behavior among the Chinese inmate population, though with disparate goals. For example, Cameron, Meng, and Zhang (2019) use self-reported inmate data to examine the variables that drive observed increases in criminality in China. Importantly, increases in risk taking and impatience are observed among male inmates. In contrast, Guo, Liang, and Xiao (2020) explore whether in-group bias impacts pro-social behavior among inmates. We do not seek to predict criminality or pro-social behavior. Instead, we explore correlates of adverse childhood experiences for a particular population of individuals who have experienced trying life outcomes. Though our goal is distinct, we share with these studies a focus on unique data including responses for a stigmatized group, prison inmates.

In addition to measuring emotional abuse, physical abuse, emotional neglect, and bullying, our survey instrument elicits a variety of demographic and life experience information. We include typical demographic information such as age and education. Children who stay in school longer are more resilient and have fewer ACEs (Houtepen et al., 2020). We also include a measure of intelligence as some evidence suggests that cognitive impairment is associated with psychological disorders, such as anxiety and depression (Castaneda, Tuulio-Henriksson, Marttunen, Suvisaari, & Lönnqvist, 2008). Importantly, the literature provides strong evidence that children of parents who abuse alcohol are quite likely to suffer psychological disorders later in life (Xiao et al., 2008). We also ask inmates if they hail from rural or urban areas. Scheineson (2009) reports that the Chinese registration system categorizing people as rural or urban has resulted in inequities for rural individuals. These inequities could arise from perceptions of social status. Discrimination based on social status has negative implications for mental health (Lee & Turney, 2012). Thus, we also ask about ethnic background which may relate to social status.

In China, migration of parents from rural to urban areas has received attention and the children who are left-behind are of societal concern (e.g., Sudworth, 2016; Zhang, 2018). These children who are raised with absent parents are believed to experience negative outcomes (Chang et al., 2019; Liu, Chang, Corn, Zhang, & Shi, 2020; Murphy, Zhou, & Tao, 2016; Yu, Dai, Li, Wang, & Li, 2014). In addition to asking respondents whether one or both of their parents were migrant workers, we also ask a variety of questions regarding the circumstances of their upbringing such as primary caregivers.

The remainder of the paper is organized as follows. Section II provides information on the subject pool and survey method. Section III presents the results of our analysis. Section IV provides a summary and direction for future research.

2. Participants and survey method

Individuals incarcerated at a Chinese prison in Fujian Province completed the survey in October 2018. Inmates who participated did so voluntarily and all are men because the institution houses only male inmates. Participation requires approximately 1½ hours, with the inmates gathering in common areas but under continuous supervision. Some inmates completed other tasks not reported on in this paper.¹ The questionnaire collected demographic and life experience information, as described subsequently. Upon completion of the questionnaire, participants were free to leave.

Table 1 details all measures elicited for our sample of inmates. We begin with the four measures of adverse childhood experiences: emotional abuse, emotional neglect, physical abuse, and bullying. We adopt instruments developed by psychologists to reveal a history of childhood abuse and neglect. The Childhood Trauma Questionnaire developed by Bernstein et al. (2003) is validated with Chinese respondents by Zhao, Zhang, Li, and Zhou (2005). The questionnaire gives measures of emotional abuse (EAbuse), physical abuse (PAbuse), and emotional neglect (ENeglect) based on the self-reported responses of survey participants and a benefit of the instrument is its reasonable time requirement. The survey instrument includes 5 items related to each construct, with respondents reporting on a 5-point Likert scale with endpoints of “Never true” and “Very often true” or, in some cases reverse-coded. We reverse the coding of responses for reverse-coded questions prior to analysis. Each of the 3 childhood trauma measures is the sum of five items and, thus, can

¹ See Liu et al. (2021) who examine trust and reciprocity among adults in the generation of Chinese children impacted by the Great Migration.

Table 1
Variable definitions.

Variable	Definition
EAbuse	Emotional abuse is measured using the Childhood Trauma Questionnaire, as detailed in section II.
ENeglect	Emotional neglect is measured using the Childhood Trauma Questionnaire, as detailed in section II.
PAbuse	Physical abuse is measured using the Childhood Trauma Questionnaire, as detailed in section II.
Bullied	Childhood bullying experienced by the subject is measured as detailed in section II.
BadFriend	A dummy variable taking the value of 1 if the participant's self-assessment of friends indicates they engaged fighting that injured other people/theft/robbery/drug trafficking/other criminal behaviors etc., and 0 otherwise.
IQScore	Raven's z-score, measuring individual's intelligence.
ParentAlcohol	A dummy variable taking the value of 1 if either parent abused alcohol before the participant's 16th birthday, and 0 otherwise.
ParentDrugs	A dummy variable taking the value of 1 if either parent abused drugs before the participant's 16th birthday, and 0 otherwise.
Rural	A dummy variable taking the value of 1 if the participant hailed from a rural area, and 0 otherwise.
Minority	A dummy variable taking the value of 1 if the participant identifies himself as NOT Han (the majority ethnic group in China), and 0 otherwise.
EduM, H, C	Dummy variables taking the value of 1 if the participant's highest level of education is middle school (EduM), high school (EduH), or some college (EduC), and 0 otherwise.
Age	The participant's age in years.
ParentDiv	A dummy variable taking the value of 1 if the participant's parents were divorced or separated before his 16th birthday, and 0 otherwise.
ParentDied	A dummy variable taking the value of 1 if either of the participant's parents was deceased before the participant's 16th birthday, and 0 otherwise.
DadEdu	Dummy variables taking the value of 1 if the participant's father's highest level of education is middle school (DadEduM), high school (DadEduH), or some college (DadEduC), and 0 otherwise.
MomEdu	Dummy variables taking the value of 1 if the participant's mother's highest level of education is middle school (DadEduM), high school (DadEduH), or some college (DadEduC), and 0 otherwise.
DadRaised	A dummy variable taking the value of 1 if the participant was raised by his father before his 16th birthday, and 0 otherwise.
MomRaised	A dummy variable taking the value of 1 if the participant was raised by his mother before his 16th birthday, and 0 otherwise.
GrandRaised	A dummy variable taking the value of 1 if the participant was raised by his grandparents before his 16th birthday, and 0 otherwise.
NoParentRaised	A dummy variable taking the value of 1 if the participant was not raised by either parent or grandparent before his 16th birthday, and 0 otherwise.
MomMigrant	A dummy variable taking the value of 1 if the mother (only) became a migrant worker before the participant's 16th birthday, and 0 otherwise.
DadMigrant	A dummy variable taking the value of 1 if the father (only) became a migrant worker before the participant's 16th birthday, and 0 otherwise.
BothMigrant	A dummy variable taking the value of 1 if both parents became migrant workers before the participant's 16th birthday, and 0 otherwise.

This table provides definitions of the variables included in subsequent analysis.

range from 5 to 25. To elicit a measure of our fourth adverse childhood experience, bullying, we follow [Mullis et al. \(2012\)](#).² The childhood bullying (Bullied) measure is constructed by adding responses to six questions with responses ranging from 0 to 4, giving a range of 0 to 24.³

Next, we ask inmates to report if they have friends who are troubled individuals (BadFriend). To measure inmate intelligence, we adopt Raven's Standard Progressive Matrices, commonly referred to as Raven's IQ test ([Raven, Court, & Raven, 1987](#); [Zhang & Wang, 1985](#)). This test is a nonverbal, language-neutral measure of intelligence comprised entirely of pictorial questions related to spatial reasoning and pattern matching.

Raven's IQ Test is a cross-cultural reasoning tool and is commonly used around the world ([Borghans, Golsteyn, Heckman, & Humphries, 2016](#)). The instrument is divided into five parts, each of which is sorted into 12 questions according to difficulty. The total score on these 60 questions is converted to a final Raven's z-score (IQScore) using an established norm and the test takers' age ([Zhang & Wang, 1985](#)). The final IQ measure is equal to individual's total score minus mean score at his current age, and then divided by the standard error at his current age. IQScore is zero for the average of the general population, with a positive (negative) score of 1.0 (−1.0) indicating above (below) average IQ by one standard deviation.

As [Table 1](#) details, we next measure aspects of inmates' life and home environment prior to the age of 16. We ask respondents if their parents used alcohol (ParentAlcohol) or drugs (ParentDrugs) in the home. Participants indicate if they hail from a rural or urban area (Rural). Evidence indicates that the Chinese registration system categorizing people as rural or urban has resulted in inequities for rural individuals ([Scheineson, 2009](#)). We ask about ethnic background as this may relate to social status. Han is the majority ethnic group in China, and we create a dummy variable (Minority) taking the value of 1 if the inmate is a member of a minority group. Education is important to life success, and when a child must exit school early to help support the family, his life experience could be negatively impacted. We ask participants whether they completed middle school (EduM), high school (EduH), or some college (EduC). Because industrialization has evolved rapidly in China, an inmate's age may be important (Age).

The life circumstance of the parents is, of course, critical to a child's life experience. Inmates indicate whether their parents were divorced or separated (ParentDiv) or deceased (ParentDied) before the inmate's sixteenth birthday. We ask participants whether their father and mother completed middle school (DadEduM, MomEduM), high school (DadEduH, MomEduH), or some college (DadEduC, MomEduC). Respondents indicate if they were raised by either parent alone (DadRaised or MomRaised), grandparents (GrandsRaised),

² While we focus on four important ACE measures, other measures exist and have been used in prior research with Chinese subsamples (see [Ho et al., 2021](#)).

³ In the questionnaire the possible responses take values from 1 to 5 for all questions, but we re-code to 0 to 4 for bullying because the original source includes four possible responses.

someone other than a parent or grandparent (NoParentRaised). Parental absence due to migration is of special concern in China and inmates are asked whether either or both of their parents were migrant workers before the inmate's sixteenth birthday. DadMigrant (MomMigrant) takes the value of one if only the father (mother) was a migrant worker. BothMigrant takes the value of one if both parents were migrant workers.

3. Results

Table 2 provides descriptive statistics for our sample of prison inmates. We begin with 2643 survey respondents from a prison population of approximately 3000, but the sample falls due to non-response for some questions. For the four measures of negative life events, we observe variability in adverse childhood experiences for the inmates. The proportion of respondents with at least one ACE in our sample is quite high at 96.36%, which is not surprising given our sample includes individuals with difficult life outcomes. We compute the percentage of inmates who indicate the experience of childhood trauma, i.e., any response other than "never" experienced on the questionnaire. The prevalence of emotional abuse is 62.41%, emotional neglect is 84.74%, physical abuse is 46.40%, and childhood bullying is 84.23%.

To allow further comparison of our inmate sample with other groups, we searched the literature. Unfortunately, no perfect benchmark is available because there is variability across studies in ACE measures and reported information. In addition, the existing literature samples subpopulations of the Chinese citizenry including children (Li et al., 2021; Wan et al., 2018; Zhang et al., 2020), young adults (Ho, Chan, Chien, Bressington, & Karatzias, 2019), university students (Cheung et al., 2021; Wang et al., 2019; Xiao et al., 2008), drug users getting treatment at a rehabilitation center (Ding et al., 2014), rural high school graduates (Zhang, Mersky, & Topitzes, 2020), and middle aged and older citizens (Chen et al., 2021; Lin, Wang, Lu, Chen, & Guo, 2021), leaving us unable to compare our results to a general population of Chinese citizens. For references, consider Lin et al. (2021) who also use adult Chinese citizens, though their sample age is much higher, on average. Lin et al. (2021) report that the prevalence emotional neglect is 34.50%, physical abuse is 30.80%, and childhood bullying is 17.30%, while they do not include emotional abuse. Another possible benchmark is Zhang, Mersky, and Topitzes (2020) who study rural high school graduates and include the same four ACEs we include here. They report emotional abuse is 6.00%, emotional neglect is 8.20%, physical abuse is 4.70%, and childhood bullying is 3.50%. These comparisons suggest that the prevalence of ACEs among inmates is much higher than in other groups of Chinese people.

After the four measures of adverse childhood experiences, Table 2 summarizes demographic and other life experience variables. Many subjects report that they associate with individuals who are involved in criminal activity, with 11.3% reporting having a "bad" friend. We see variation in the intelligence measure, IQScore. With a negative average of -0.51 , the measured intelligence of our sample inmates is approximately one-half standard deviation below the population average, though many have above average IQScore. <1% of our inmates report parental drug use, but many (14%) had parents who abused alcohol. The vast majority of the respondents in our sample hails from rural areas (81%) and most identify as Han (93%), the ethnic majority in China. As for education, on average, the inmates in our sample have a middle school education, with both of their parents leaving school somewhat sooner. Participants range in age from 18 to almost 70 years old, with an average of 37. Our sample inmates report a low parental divorce rate with <3% of the inmates reporting parental divorce. In contrast, many more lost a parent to early death (9%). The majority of our sample inmates was raised by both parents (77%), though 4.5% of the inmates were raised by their father alone, 7.2% by their mother alone, 7.7% by their grandparents, and 3.3% by neither parents nor grandparents. The majority of our respondents (73%) did not have migrant parents, though some had a migrant mother (5.6%), father (11.3%), or both (10.4%).

Tables 3 and 4 report the results of OLS models for each of the four measures of adverse childhood experiences.⁴ We report robust standard errors below each coefficient estimate, with one (two) asterisk(s) indicating statistical significance at the 5% (1%) level. Tables 3 and 4 differ only in the last set of included explanatory variables. Table 3 includes four variables reflecting who raised the inmate when he was a child, whereas Table 4 includes three variables indicating whether the parents of the inmate were migrants when he was a child. Because of the high correlation between these variables, we do not include them in the same model. If we did, a multicollinearity problem would result. High correlations are documented in Table 5.

We observe that respondents who have troubled friends (BadFriend) report significantly more ACEs across all models in Tables 3 and 4. Those with higher measured intelligence (IQScore) report less emotional neglect in both tables. Though parental drug abuse does not appear to correlate with ACEs, parental alcohol abuse is very important. ParentAlcohol is significant at the 1% level in all eight regression models, across all four ACEs. The inmates' level of education also has an important relationship with ACEs. Inmates who stay in school longer report less emotional abuse, emotional neglect, and physical abuse. The education of the parents appears to be of less importance.⁵

The literature provides evidence that parents play a crucial role in a child's upbringing (Chen, Chen, & Liu, 2009; Meyerhoefer & Chen, 2011). Our results suggest that an inmate who spent his childhood without one or both parents is more likely to report more negative outcomes. Inmates whose parents are divorced or deceased report more ACEs. In Table 3 we observe that emotional neglect is higher when either (DadRaised and MomRaised) or both (Grandsraised and NoParentRaised) parents are absent from the home.

⁴ The numbers of observations in Tables 3 and 4 vary because some participants had incomplete responses.

⁵ In our survey, we asked inmates to report their number of siblings. To probe the correlation of family size and ACEs, we re-estimated the regressions reported in the paper with a family size dependent variable. Inferences regarding important correlates of childhood trauma are unchanged and the number of siblings does not have a significant relationship with any of the four ACEs. We encourage future researchers to delve into the role of family size and adverse childhood experiences.

Table 2
Descriptive statistics.

Variable	Mean	Standard Deviation	Minimum	Maximum
EAbuse	7.225	2.952	5	25
ENeglect	10.635	4.862	5	25
PAbuse	6.673	2.765	5	25
Bullied	3.948	3.368	0	23
BadFriend	0.113	0.317	0	1
IQScore	-0.506	1.201	-5.11	1.69
ParentAlcohol	0.140	0.347	0	1
ParentDrugs	0.004	0.060	0	1
Rural	0.807	0.396	0	1
Minority	0.065	0.247	0	1
Edu	2.022	0.846	0	4
Age	36.630	9.491	18.167	69.667
ParentDiv	0.029	0.168	0	1
ParentDied	0.087	0.282	0	1
DadEdu	1.684	0.978	0	4
MomEdu	1.406	0.855	0	4
DadRaised	0.045	0.207	0	1
MomRaised	0.072	0.258	0	1
GrandsRaised	0.077	0.266	0	1
NoParentRaised	0.035	0.183	0	1
MomMigrant	0.056	0.229	0	1
DadMigrant	0.113	0.316	0	1
BothMigrant	0.104	0.305	0	1

This table reports descriptive statistics for our sample of inmates. The variables are defined in [Table 1](#).

Having both parents absent (Grandsraised and NoParentRaised) impacts all measures of adversity, in general. From [Table 4](#) we observe that while parental migration has an impact on ACEs in some cases, the overall relationships are weaker.

To provide further evidence of the impact of childhood trauma on life outcomes for our inmates, we follow [Zhang, Mersky, and Topitzes \(2020\)](#) and examine the relationship between ACE scores and psychological functioning, as measured by self-reported health. In the questionnaire we asked the inmates to report on their health on a 5-point scale with endpoints “very unhealthy” and “very healthy.” We adopt [Zhang, Mersky, and Topitzes \(2020\)](#) multivariate approach to examine how health assessments change in response to increasing ACE values. Compared to inmates with no ACEs, health status ratings fall by 0.34 for inmates with one ACE, 0.35 for inmates with two ACEs, 0.45 for inmates with three ACEs, and 0.60 for inmates with four ACEs.

4. Discussion and conclusions

This paper reports new results on variables that correlate with adverse childhood experiences (ACEs). The literature reports that the long-term effects of ACEs are significant and negatively affect health, well-being, and life outcomes (e.g. [Kesternich et al., 2018](#); [Liu et al., 2021](#); [Xiao et al., 2008](#)). We make use of a unique data set of survey responses from Chinese inmates to add new insight to the extensive literature that is based primarily on data from general audiences, while underrepresenting important groups of people. With our data from Chinese inmates, we identify specific correlates of adverse childhood experiences, measured by emotional abuse, physical abuse, emotional negligence, and childhood bullying. We find that having a troubled friend during childhood, parental alcohol use, and parental absence are positively correlated with all four measures of childhood trauma. We also find that an inmate's educational attainment is strongly correlated with self-reported trauma. Our data allows us to pinpoint the impact of contributing factors, thus allowing us to provide suggestions for potential policy interventions.

It is important to note that our goal is not to predict criminality, but rather to understand how specific living arrangements and life circumstances correlate with ACEs. Future research into how childhood experiences predict future criminality is encouraged. In addition, we recognize that our results suggest correlation, not causation. Nonetheless, our results have three important policy implications. First, parental alcohol abuse has a highly significant relationship with a child's life experience. We encourage policy makers to devote additional resources to tackling the cycle of alcohol abuse. A voluminous literature documents that children of substance abusers are at high risk of becoming substance abusers as well ([Fawzy, Coombs & Gerber, 1983](#); [Johnson Jeannette & Leff, 1999](#)). Second, our results suggest that children who stay in school longer suffer less childhood trauma, likely leading to fewer physical and psychological problems later in life. Third, children may suffer when a parent is absent from the home. It does not matter if it is a mother or a father, or due to migration intended to financially improve the family's existence. Inmates who were raised without a parent suffered significantly more adverse childhood experiences. We encourage policymakers to direct effort toward promoting parents' ability to stay in their homes. Again, we recognize that our results call for further investigation into whether correlations suggest causation in this context. We encourage policy makers and stakeholders to direct more resources toward understanding the role of parental absence and promoting parents' ability to stay with children during childhood. As noted by [Shonkoff et al. \(2012\)](#) in a

Table 3
OLS models.

Variable	Emotional Abuse	Emotional Neglect	Physical Abuse	Childhood Bullying
BadFriend	1.603** (0.237)	1.378** (0.323)	1.709** (0.237)	1.040** (0.250)
IQScore	-0.064 (0.054)	-0.261** (0.084)	0.033 (0.048)	0.031 (0.062)
ParentAlcohol	1.313** (0.211)	1.696** (0.293)	1.346** (0.204)	0.693** (0.211)
ParentDrugs	-0.099 (0.976)	-1.192 (1.984)	-0.311 (1.043)	-0.043 (1.525)
Rural	-0.075 (0.166)	-0.329 (0.260)	-0.211 (0.162)	-0.111 (0.189)
Minority	0.011 (0.267)	0.129 (0.398)	-0.009 (0.243)	0.271 (0.310)
EduM	-0.329* (0.150)	-1.843** (0.244)	-0.352* (0.141)	0.009 (0.180)
EduH	-0.563** (0.196)	-3.156** (0.311)	-0.611** (0.179)	-0.218 (0.231)
EduC	-0.581* (0.241)	-3.751** (0.369)	-0.505* (0.224)	-0.296 (0.283)
Age	-0.011 (0.007)	-0.008 (0.011)	-0.015* (0.006)	-0.011 (0.008)
ParentDiv	0.950* (0.465)	1.584** (0.569)	0.565 (0.439)	0.334 (0.419)
ParentDied	0.430 (0.301)	0.114 (0.412)	0.225 (0.278)	0.835* (0.330)
DadEduM	-0.116 (0.143)	-0.593** (0.221)	-0.252 (0.136)	-0.165 (0.169)
DadEduH	-0.161 (0.186)	-0.446 (0.307)	-0.115 (0.183)	-0.301 (0.214)
DadEduC	-0.285 (0.316)	-0.734 (0.486)	-0.060 (0.305)	-0.303 (0.351)
MomEduM	0.099 (0.179)	-0.400 (0.267)	0.026 (0.176)	-0.222 (0.203)
MomEduH	0.547 (0.345)	0.303 (0.465)	0.327 (0.302)	0.270 (0.366)
MomEduC	-0.574 (0.487)	-0.015 (0.778)	-0.274 (0.486)	0.046 (0.628)
DadRaised	0.598 (0.322)	2.294** (0.501)	0.794* (0.326)	-0.331 (0.325)
MomRaised	0.543 (0.288)	1.327** (0.433)	0.200 (0.265)	0.110 (0.295)
GrandsRaised	1.482** (0.297)	2.614** (0.416)	0.991** (0.288)	0.888** (0.331)
NoParentRaised	1.910** (0.474)	3.272** (0.637)	1.554** (0.459)	0.924 (0.477)
Constant	7.298** (0.383)	12.022** (0.607)	7.168** (0.340)	4.181** (0.445)
Observations	2476	2471	2473	2473
R ²	0.144	0.187	0.137	0.044

Notes: The table reports Ordinary Least Squares estimates with robust standard errors below in parentheses. Significant explanatory variables are indicated with asterisks, ** $p < 0.01$, * $p < 0.05$.

report for the American Academy of Pediatrics, a strong foundation for lifelong health, productivity, and achievement must be developed early in a child's life. While our analysis does not confirm causation, they are consistent with the notion that children suffer when families do not stay together.

Funding

This work was supported by the Youth Project of Humanities and Social Sciences by Ministry of Education [Grant No.19YJC790080], National Natural Science Foundation of China [Grant No.72103114], the 111 Project [Grant No. B16031], and the Fundamental Research Funds for Central Universities [Grant No. 21SZYB20].

Table 4
Additional OLS models.

Variable	Emotional Abuse	Emotional Neglect	Physical Abuse	Childhood Bullying
BadFriend	1.798** (0.242)	1.702** (0.331)	1.840** (0.242)	1.175** (0.247)
IQScore	0.080 (0.054)	-0.287** (0.086)	0.017 (0.049)	0.027 (0.063)
ParentAlcohol	1.318** (0.221)	1.672** (0.303)	1.317** (0.212)	0.691** (0.216)
ParentDrugs	0.121 (1.147)	-1.457 (2.207)	0.193 (1.120)	0.482 (1.676)
Rural	-0.085 (0.168)	-0.400 (0.264)	-0.228 (0.163)	-0.199 (0.192)
Minority	-0.058 (0.256)	0.071 (0.392)	-0.070 (0.235)	0.262 (0.310)
EduM	0.333* (0.152)	-1.936** (0.251)	-0.357* (0.144)	0.019 (0.180)
EduH	-0.567** (0.196)	-3.224** (0.315)	-0.604** (0.179)	-0.127 (0.231)
EduC	-0.563* (0.240)	-3.817** (0.381)	-0.496* (0.223)	-0.209 (0.284)
Age	-0.018** (0.007)	-0.019* (0.011)	-0.020** (0.006)	-0.014 (0.008)
ParentDiv	1.337** (0.479)	2.498** (0.580)	0.860 (0.448)	0.304 (0.399)
ParentDied	1.056** (0.270)	1.570** (0.383)	0.659** (0.252)	1.041** (0.307)
DadEduM	-0.131 (0.145)	-0.612** (0.224)	-0.265 (0.139)	-0.204 (0.170)
DadEduH	-0.197 (0.191)	-0.415 (0.314)	-0.193 (0.181)	-0.370 (0.218)
DadEduC	-0.189 (0.332)	-0.488 (0.495)	-0.019 (0.321)	-0.295 (0.365)
MomEduM	0.180 (0.185)	-0.253 (0.280)	0.096 (0.179)	-0.188 (0.206)
MomEduH	0.650 (0.350)	0.521 (0.482)	0.417 (0.309)	0.264 (0.372)
MomEduC	-0.348 (0.547)	0.407 (0.830)	0.081 (0.528)	0.183 (0.689)
MomMigrant	0.255 (0.271)	-0.102 (0.411)	0.400 (0.261)	0.679* (0.288)
DadMigrant	0.205 (0.185)	0.466 (0.292)	0.144 (0.172)	0.692** (0.231)
BothMigrant	0.176 (0.192)	0.917** (0.329)	0.150 (0.182)	0.514* (0.241)
Constant	7.644** (0.378)	12.637** (0.610)	7.430** (0.343)	4.242** (0.446)
Observations	2440	2435	2437	2437
R ²	0.122	0.157	0.122	0.046

Notes: The table reports Ordinary Least Squares estimates with robust standard errors below in parentheses. Significant explanatory variables are indicated with asterisks, ** $p < 0.01$, * $p < 0.05$.

Table 5
Correlates between parental migration and parental absence.

		Number of observations	Mother migration (mean proportion)	Chi-square test P-value
Mother-absence	No	2092	14.43%	0.0105
	Yes	401	19.45%	
		Number of observations	Father migration (mean proportion)	Chi-square test P-value
Father-absence	No	1955	16.47%	0.0002
	Yes	542	23.43%	

Notes: Mother is defined as absent when the prisoner was not raised by both parents and not raised by his mother only. Father is defined as absent when the prisoner was not raised by both parents and not raised by his father only.

Appendix A. Appendix

Experimental questionnaire

The questionnaire follows. Some participants completed other tasks not reported on in this paper and are included in a separate study. The excluded instructions are available upon request.

Questionnaire

Thank you for taking the time to complete this survey. Your cooperation and support are very important for this study. Please fill in the questionnaire carefully and accurately. Please do not confer with other participants at any time and raise your hands if you have any questions.

I. Basic information

Question	Choice	Answer
1. What's your height and weight?		Height ___ cm Weight ___ kg
2. What is your date of birth? (Solar calendar birthday)		19 ___ year ___ month
3. What is your zodiac?		
4. What is your ethnicity?	1 = Han 2 = Minority	
5. Where is your registered permanent residence?		___ Province ___ Prefecture ___ District/County
6. What type of registered permanent residence is yours?	1 = Agricultural registered permanent residence 2 = Non-agricultural registered permanent residence 0 = Never attended	
7. What is the highest grade of school that you had attended?	1 = Some primary school but did not graduate 2 = Primary school graduation 3 = Some Junior high school (but did not graduate) 4 = Junior high school graduation 5 = Some high school or secondary vocational school (but did not graduate) 6 = Graduation from high school or secondary vocational school 7 = Some junior college (but did not graduate) 8 = Junior college graduation 9 = Some university (but did not graduate) 10 = Graduated from university or above	
8. When you were 16 years old, what was your father's occupation? (single choice)	1 = Professional and technical groups (e.g. doctor, teacher, engineer, artist, accountant, nurse) 2 = Senior executive management (e.g. head of company and government, senior manager) 3 = Clerks (such as secretary, staff, office worker, civil servant) 4 = Sales (e.g. sales manager, shop owner, shop assistant, insurance agent) 5 = Service (e.g. as restaurant owner, waiter, hairdresser, guard) 6 = Worker 7 = Farmer 8 = Other, please specify	
9. If the answer to the previous question is 7 (farmer), did your father go out to work for 6 or more months before you were 16 years old?	1 = Yes 2 = No	
10. When you were 16 years old, which of the following occupation groups did your mother participate in? (single choice)	1 = Professional and technical groups (e.g. doctor, teacher, engineer, artist, accountant, nurse) 2 = Senior executive management (e.g. head of company and government, senior manager) 3 = Clerks (such as secretary, staff, office worker, civil servant) 4 = Sales (e.g. sales manager, shop owner, shop assistant, insurance agent) 5 = Service (e.g. as restaurant owner, waiter, hairdresser, guard) 6 = Worker	

(continued on next page)

(continued)

Question	Choice	Answer
	7 = Farmer 8 = Other, please specify	
11. If the answer to the previous question is 7 (farmer), did your mother go out to work for 6 months or more before you are 16 years old?	1 = Yes 2 = No	
12. How many siblings do you have? (not including yourself)	0 if you are the single child	—
13. What is your birth order?		
14. How healthy do you think you are now?	1 = Very healthy 2 = Healthy 3 = Neutral 4 = Unhealthy 5 = Very Unhealthy	

II. Childhood experience

15. Was your parent addicted to alcohol before you were 16?	1 = Yes 2 = No
16. Did your parent use drugs before you were 16?	1 = Yes 2 = No
17. Did any of the following situations occur before you were 16?	1 = Parents divorced 2 = Parents separated 3 = Father died 4 = Mother died
18. If any of the above situation occurred, how old were you?	0 = No caregiver 1 = Both parents 2 = Father only 3 = Mother only
19. Who was your major caregiver before you were 16 (single choice)?	4 = Grandparents 5 = Other relatives 6 = Foster care facilities 7 = Other, please specify _____ 0 = None
20. Did any of your friends engage in illegal activities before you were 16?	1 = Fighting that causes disability to others 2 = Theft 3 = Robbery 4 = Drug use/drug trafficking 5 = Other illegal activities, please specify

The following questions ask about your life before age 16

Question	Choices	Answer
21. At that time, someone at home called me "stupid", "lazy" or "ugly".	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
22. At that time, someone in the family valued me.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
23. At that time, I felt that my family loved me.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
24. At that time, I felt that my parents hoped that I had never been born.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
25. At that time, someone in the family injured me very seriously and I had to go to the hospital.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
26. At that time, my family's situation needed improvement.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
27. At that time, someone in the family beat me, causing bruises or scars.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
28. At that time, someone in the family hit me with belts, ropes, sticks or other hard things.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
29. At that time, the family members cared for each other.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
30. At that time, someone in the family insulted me or saddened me.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
31. I was physically abused at that time.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
32. I feel that my childhood is perfect compared to anyone else.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
33. I was beaten very hard at the time, causing the attention of teachers, neighbors, or doctors.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
34. At that time, I felt that someone at home hated me.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	

(continued on next page)

(continued)

The following questions ask about your life before age 16		
Question	Choices	Answer
35. At that time, the family relationship was very close.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
36. I think my family was extremely good at that time.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
37. At that time, my heart was tortured or abused.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
38. At the time, my home was the source of my strength.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
39. I was made fun of or called names.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
40. I was left out of games or activities by other students	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
41. Someone spread lies about me	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
42. Having something stolen	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
43. I was hit or hurt by other student(s)	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	
44. I was made to do things I didn't want to do by other students.	1 = never 2 = rarely 3 = sometimes 4 = often 5 = always	

III. Raven's test

The experimental questionnaire includes Raven's Standard Progressive Matrices (Raven, 2000) to measure intelligence. The test is nonverbal and implemented by presenting respondents with 5 series of pictures, each including 12 questions. Please see Raven's Fig. 1 for an illustration. The full set of illustrations is from Raven et al. (1987) and Zhang and Wang (1985).

References

- Benjet, C., Borges, G., & Medina-Mora, M. E. (2010). Chronic childhood adversity and onset of psychopathology during three life stages: Childhood, adolescence and adulthood. *Journal of Psychiatric Research*, *44*, 732–740.
- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., ... Zule, W. (2003). Development and validation of a brief screening version of the childhood trauma questionnaire. *Child Abuse & Neglect*, *27*, 169–190.
- Borghans, L., Golsteyn, B. H. H., Heckman, J. J., & Humphries, J. E. (2016). What grades and achievement tests measure. *Proceedings of the National Academy of the Sciences*, *113*, 13354–13359.
- Bruwer, B., Govender, R., Bishop, M., Williams, D. R., Stein, D. J., & Seedat, S. (2014). Association between Childhood Adversities and Long-term Suicidality among South Africans from the Results of the South African Stress and Health Study: A Cross-sectional Study. *BMJ open*, *4*(6), e004644.
- Cameron, L. A., Meng, X., & Zhang, D. (2019). China's sex ratio and crime: Behavioral change or financial necessity? *Economic Journal*, *129*(618), 790–820.
- Castaneda, A. E., Tuulio-Henriksson, A., Marttunen, M., Suvisaari, J., & Lönnqvist, J. (2008). A review on cognitive impairments in depressive and anxiety disorders with a focus on young adults. *Journal of Affective Disorders*, *106*(1–2), 1–27.
- Chang, F., Jiang, Y., Loyalka, P., Chu, J., Shi, Y., Osborn, A., & Rozelle, S. (2019). Parental migration, educational achievement, and mental health of junior high school students in rural China. *China Economic Review*, *54*, 337–349.
- Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2006). Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders*, *82*, 217–225.
- Chen, H., Fan, Q., Nicholas, S., & Maitland, E. (2021). The long arm of childhood: The prolonged influence of adverse childhood experiences on depression during middle and old age in China. *Journal of Health Psychology*. <https://doi.org/10.1177/13591053211037727>
- Chen, S. H., Chen, Y.-C., & Liu, J.-T. (2009). The impact of unexpected maternal death on education: First evidence from three national administrative data links. *American Economic Review*, *99*(2), 149–153.
- Cheung, S., Huang, C.-C., & Zhang, C. (2021). Passion and persistence: Investigating the relationship between adverse childhood experiences and grit in college students in China. *Frontiers in Psychology*, *12*, 429.
- Fawzy, F. I., Coombs, R. H., & Gerber, B. (1983). Generational continuity in the use of substances: The impact of parental substance use on adolescent substance use. *Addictive Behaviors*, *8*(2), 109–114.
- Ding, Y., Lin, H., Lin, Z., Yan, H., & He, N. (2014). Adverse childhood experiences and interaction with methamphetamine use frequency in the risk of methamphetamine-associated psychosis. *Drug and Alcohol Dependence*, *142*, 295–300.
- Dvir, Y., Ford, J. D., Hill, M., & Frazier, J. A. (2014). Childhood maltreatment, emotional dysregulation, and psychiatric comorbidities. *Harvard Review of Psychiatry*, *22*(3), 149–161.
- Fung, H. W., Ross, C. A., Yu, C. K.-C., & Lau, E. K.-L. (2019). Adverse childhood experiences and dissociation among Hong Kong mental health service users. *Journal of Trauma & Dissociation*, *20*(4), 457–470.
- Guo, S., Liang, P., & Xiao, E. (2020). In-group bias in prisons. *Games and Economic Behavior*, *122*, 328–340.
- Hagan, M., Lara, J., & Montanes, M. A. C. (2021). Childhood adversity, socioemotional functioning and generalized anxiety in young adults from mixed immigration status families. *Child Abuse & Neglect*, *118*, 105128.
- Ho, G. W. K., Chan, A. C. Y., Chien, W.-T., Bressington, D. T., & Karatzias, T. (2019). Examining patterns of adversity in Chinese young adults using the adverse childhood experiences—International questionnaire (ACE-IQ). *Child Abuse & Neglect*, *88*, 179–188.
- Houtepen, L. C., Heron, J., Suderman, M. J., Fraser, A., Chittleborough, C. R., & Howe, L. D. (2020). Associations of Adverse Childhood Experiences with Educational Attainment and Adolescent Health and the Role of Family and Socioeconomic Factors: A Prospective Cohort Study in the UK. *PLOS Medicine*. <https://doi.org/10.1371/journal.pmed.1003031>
- Johnson Jeannette, L., & Leff, M. (1999). Children of substance abusers: Overview of research findings. *Pediatrics*, *103*(2), 1085–1099.

- Kesternich, I., Smith, J. P., Winter, J. K., & Hörl, M. (2018). Early-life circumstances predict measures of trust among adults: Evidence from hunger episodes in post-war Germany. *Scandinavian Journal of Economics*, 122(1), 280–305.
- Lee, H., & Turney, K. (2012). Investigating the relationship between perceived discrimination, social status, and mental health. *Society and Mental Health*, 2(1), 1–20.
- Lee, S., Guo, W. J., He, Y. L., Huang, Y. Q., Zhang, M. Y., Liu, Z. R., ... Kessler, R. C. (2011). The prevalence of family childhood adversities and their association with first onset of DSM-IV disorders in metropolitan China. *Psychological Medicine*, 41(1), 85–96.
- Li, S., Wang, S., Gao, X., Jiang, Z., Xu, H., Zhang, S., ... Wan, Y. (2021). Patterns of adverse childhood experiences and suicidal behaviors in adolescents: A four-province study in China. *Journal of Affective Disorders*, 285, 69–76.
- Lin, L., Wang, H. H., Lu, C., Chen, W., & Guo, V. Y. (2021). Adverse childhood experiences and subsequent chronic diseases among middle-aged or older adults in China and associations with demographic and socioeconomic characteristics. *JAMA Network Open*. <https://doi.org/10.1001/jamanetworkopen.2021.30143>
- Liu, H., Ackert, L. F., Chang, F., Qi, L., & Shi, Y. (2021). Social division, trust, and reciprocity in a general with left-behind children. *Research in Economics*, 75(3), 259–273.
- Liu, H., Chang, F., Corn, H., Zhang, Y., & Shi, Y. (2020). "The impact of parental migration on non-cognitive abilities of left behind children in Northwestern China," Working paper.
- Malmendier, U., & Nagel, S. (2011). Depression babies: Do macroeconomic experiences affect risk taking? *The Quarterly Journal of Economics*, 126(1), 373–416.
- Meyerhoefer, C. D., & Chen, C.-L. J. (2011). The effect of parental labor migration on children's educational progress in rural China. *Review of Economics of the Household*, 9(3), 379–396.
- Mullis, I. V., Martin, M. O., Foy, P., & Drucker, K. T. (2012). *PIRLS 2011 international results in reading*. Herengracht, 487, Amsterdam, 1017 BT, The Netherlands: International Association for the Evaluation of Educational Achievement.
- Murphy, R., Zhou, M., & Tao, R. (2016). Parents' migration and Children's subjective well-being and health: Evidence from rural China. *Population, Space, and Place*, 22, 766–780.
- Raven, J. (2000). The Raven's progressive matrices: Change and stability over culture and time. *Cognitive Psychology*, 41, 1–48.
- Raven, J. C., Court, J. H., & Raven, J. (1987). *Manual for Raven's progressive matrices and vocabulary scales, general overview*. London: H. K. Lewis & Co. LTD.
- Reavis, J. A., Looman, J., Franco, K. A., & Rojas, B. (2013). Adverse childhood experiences and adult criminality: How long must we live before we possess our own lives? *The Permanente Journal*, 17(2), 44–48.
- Scheineson, A. (2009). "China's internal migrants," Council on Foreign Relations. May 14 <https://www.cfr.org/backgrounders/chinas-internal-migrants>.
- Shonkoff, J. P., Garner, A. S., the Committee on Psychosocial Aspects of Child and Family Health, & Committee on Early Childhood, Adoption, and Dependent Care; Section on Developmental and Behavioral Pediatrics. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, 129(1). <https://doi.org/10.1542/peds.2011-2663>
- Sudworth, J. (2016). Counting the cost of China's left-behind children. *BBC News*, (April 12).
- Wan, Y., Chen, R., Ma, S., McFeeters, D., Sun, Y., Hao, J., & Tao, F. (2018). Associations of adverse childhood experiences and social support with self-injurious behaviour and suicidality in adolescents. *The British Journal of Psychiatry*, 214(3), 146–152.
- Wang, Y.-R., Sun, J.-W., Lin, P.-Z., Zhang, H.-H., Guo-Xia, M., & Cao, F.-L. (2019). Suicidality among young adults: Unique and cumulative roles of 14 different adverse childhood experiences. *Child Abuse & Neglect*, 98, 104183.
- Xiao, Q., Dong, M.-X., Yao, J., Li, W.-X., & Ye, D.-Q. (2008). Parental alcoholism, adverse childhood experiences, and later risk of personal alcohol abuse among Chinese medical students. *Biomedical and Environmental Sciences*, 21(5), 411–419.
- Yu, X., Dai, X., Li, Q., Wang, L., & Li, L. (2014). Logistic regression analysis on behavior problems and influence factors of left-behind children in rural areas of Ningxia. *China Journal of Health Psychology*, 6, 53.
- Zhang, H., & Wang, X. (1985). *Manual for Raven's standard progressive matrices: China urban revision*. Beijing: Beijing Normal University Press.
- Zhang, L., Fang, J., Wan, Y., Gong, C., Puyu, S., Tao, F., & Sun, Y. (2020). The patterns of adverse childhood experiences among Chinese children: four-year longitudinal associations with psychopathological symptoms. *Journal of Psychiatric Research*, 122, 1–8.
- Zhang, L. (2018). One of 60 million: Life as a 'Left-behind' Child in China. *This Week in Asia*, (January 21).
- Zhang, L., Mersky, J. P., & Topitzes, J. (2020). Adverse childhood experiences and psychological well-being in a rural sample of Chinese young adults. *Child Abuse & Neglect*, 108, 1–11. <https://doi.org/10.1016/j.chiabu.2020.104658>
- Zhao, X., Zhang, Y., Li, L., & Zhou, Y. (2005). Evaluation on reliability and validity of Chinese version of childhood trauma questionnaire. *Chinese Journal of Tissue Engineering Research*, 9(16), 209–211.