

The mediating effects of adulthood socioeconomic status and social support
on adulthood impacts of childhood poverty in Japan

Takashi Oshio

Institute of Economic Research, Hitotsubashi University

Maki Umeda[†]

Graduate School of Medicine, The University of Tokyo

Mayu Fujii

Institute of Economic Research, Hitotsubashi University

[†] **Corresponding author**

Department of Mental Health, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan.

Tel: +81-35841-3522, Fax: +81-35841-3392

E-mail: makiumedatky@umin.ac.jp

Abstract

Previous studies have provided evidence of the lasting impact of low socioeconomic status (SES) in childhood on adulthood health. However, the mediating pathway that links them is still under debate. In this study, we examine how educational attainment, household income, and social support mediate the impact of low SES in childhood on self-rated health and health-risk behaviors in adulthood on the basis of micro data collected from a survey in municipalities in and around the Tokyo metropolitan area in Japan ($N = 3,265$). As a comprehensive measure for childhood SES, we utilized a binary variable of childhood poverty constructed from the retrospective assessment of the living standard at the age of 15. We estimated recursive bivariate probit models that consisted of (1) the main equation to predict adulthood health outcome by childhood poverty and other variables and (2) the auxiliary equation to predict childhood poverty by parental SES. This method allowed us both to capture a wide dimension of childhood SES and to mitigate the potential recall bias to the retrospective assessment of the past living standard. We observed that educational attainment, household income, and social support, when combined, mediated 35–55 percent of the impact of childhood poverty on adulthood SRH and health-risk behaviors, confirming the substantial magnitude of mediation. However, a large proportion of the impact was unexplained by these mediating effects, underscoring the importance of social policies aimed at reducing risks of childhood poverty.

Keywords

Childhood poverty; Self-rated health; health-risk behaviors; bivariate probit models; mediating effects

Research highlights

- Childhood poverty was significantly associated with self-rated health and health-risk behaviors.
- Education, household income, and social support significantly mediated the impact of childhood poverty on adulthood health.
- A large proportion of the association was not mediated, underscoring the need for reducing risks of childhood adversity.

Introduction

Previous studies have provided evidence that disadvantages in socioeconomic status (SES) in childhood have a long-lasting, negative impact on a wide variety of adulthood health outcomes, such as health behaviors (Graham et al., 2006; Melotti et al., 2001; Osler et al., 2008), mental health (Gilman et al., 2002; Melchior et al., 2007), physical health (Galobardes et al., 2006; Pollitt et al., 2005; Ramsay et al., 2007; Senese et al., 2009; Tamayo et al., 2010), and mortality (Galobardes et al., 2004; Smith et al., 2009; Strand & Kunst, 2006).

In recent years, a growing number of researchers have explored pathways that link childhood SES and adulthood health. Sociological research has addressed the mediating effect of adulthood SES by showing that childhood SES reduces the chance of enhanced educational attainment and occupational achievement in later life, which results in higher risk for unfavorable health behaviors and outcomes (Duncan et al., 2010; Holzer et al., 2007). Interpersonal relationships, such as social support, social networks, and social capital, are possible adulthood factors that could affect the association between childhood SES and adulthood health (Evans & Kutcher, 2011; Lehman et al., 2005). Lower childhood SES affects the socializing experience of children, which could further lead to deterioration of interpersonal relationships in later life (Dodge et al., 1994).

However, results on the mediating effect of these adulthood variables have been mixed in general (Claussen et al., 2003; Osler et al., 2009). It is still under debate whether childhood SES is associated with adulthood health, independent of adulthood SES and social support (Lipowicz et al., 2007), or largely mediated by them (Hyde et al., 2006). Moreover, the mediation effects of adulthood SES and social support, if any, may work differently in different socio-institutional

contexts. However, previous studies on this topic have been concentrated in Western countries, and there has been little research in Asian countries other than Korea (Khang, 2006).

One of the challenges in previous research has been to assess the relative contribution of the mediating factors; few studies have quantitatively compared the effects of potential mediators except a study by McKenzie et al. (2011). What makes it difficult to assess and compare the mediation effects is cumulative causality among potential mediators. For example, the mediating effect of adulthood household income on the association between childhood SES and adulthood health is likely to include the effect of other aspects of adulthood SES such as educational attainment (Oshio et al., 2010). The mediation effect of social support may also face intervention effects from childhood and adulthood SES. Lower SES of parents is found to hinder their children developing diverse social networks and obtaining positive social support (Beatty et al., 2011; Lehman et al., 2005), whereas educational attainment and household income are positively associated with social support (Helliwell & Putnam, 2007; Milligan et al., 2004; Schulz et al., 2006). However, previous studies have utilized different adulthood SES measures and/or focused on specific types, failing to compare the relative contribution of these mediating factors (Cohen et al. 2010). It is crucial to take into consideration the cumulative causality in order to more precisely assess and compare the magnitudes of the mediation effects.

Another challenge in previous studies is an assessment of childhood SES. Among multifaceted constructs of childhood SES, economic deprivation can be most influential in determining health, restricting materials and opportunities that would promote health behaviors and living conditions of children (Galobardes et al. 2006; Laaksonen et al. 2005; Sacker et al. 2001). However, an assessment of childhood poverty can be problematic in cross-sectional

studies, because the retrospective assessment of childhood economic conditions cannot be free from recall bias. It is likely affected by respondents' current SES and neighborhood socioeconomic conditions (Braveman et al., 2005). Accordingly, many studies have focused on the parental—especially father's—educational attainment and/or occupational status as a variable to represent childhood SES (Lemelin et al., 2009; McKenzie et al., 2011; Osler et al., 2008; Glymour et al., 2008), though it does not necessarily reflect economic status in childhood. With limited precise information about family income in the past, it is important to make the estimation of childhood poverty as unbiased as possible by utilizing the information available from a cross-sectional data set.

In the current study, we attempted to examine how the impact of childhood poverty on adulthood health is mediated by adulthood SES and social support on the basis of cross-sectional population-based data in and around the Tokyo metropolitan area. We further aimed at assessing the relative contribution of each possible mediator: educational attainment, household income, and social support. In order to evaluate the effect of childhood poverty in a comprehensive and less biased manner using the retrospective self-reported data, we estimated self-reported childhood poverty using parental SES (parental educational attainment, occupational status, positions in a firm, and firm size) as instrumental variables. As adulthood health outcomes, we examined self-rated health (SRH) as a reliable proxy for general health conditions (Idler & Benyamini, 1997) and four types of health-risk behaviors (smoking, poor dietary habits, low exercise, and excessive alcohol consumption).

To our knowledge, this is one of the first attempts at examining the impact of childhood poverty on adulthood health in Japan. Japan used to be considered a relatively classless society

with no clear social stratification (Sawyer, 1976). However, since the collapse of the “bubble economy” and the plunge into the subpar growth period in the 1990s, income inequality has been widening and childhood poverty and its association with outcomes in later life have become a central issue to be addressed (Abe, 2010; Oshio et al., 2010; Tachibanaki, 2005). Hence, it is now of great importance to examine how childhood poverty affects adulthood health and related behaviors, and how it is mediated by SES and social support in Japan.

Following the observations from preceding studies outside Japan, we tentatively hypothesized that a substantial portion of the impact of childhood poverty is mediated by adulthood SES and social support, as generally observed in other countries. In addition, we predicted that childhood poverty would also have an independent association with adulthood health, beyond the mediating effect of adulthood SES and social support. If adulthood SES were found to mediate a substantial portion of the impact of childhood poverty, policy measures to help individuals improve adulthood SES would be effective in reducing the adverse effect of lower childhood SES. For example, if educational attainment is a key mediator, policy efforts to enhance human capital accumulation are needed. In contrast, if the mediation effects are found to be limited, policy measures that aim at alleviating childhood poverty itself should be the focus of social policies.

Method

Study sample

Our empirical analysis is based on data derived from the survey of the Japanese Study of Stratification, Health, Income, and Neighborhood (J-SHINE). The J-SHINE survey was

conducted during October 2010 and February 2011 in four municipalities in and around the Tokyo metropolitan area. The selection of survey sites was based on the cooperation of local governments. Survey participants were community residents aged 25 to 50 years and were randomly selected from voter registration lists. The questionnaire was self-administered using a computer-assisted personal interview unless the participants requested a face-to-face interview. The total sample size was 4,117 (response rate = 31.6%). We analyzed the data of 3,265 respondents (men $n = 1,567$, 48.0%; women $n = 1,698$, 52.0%) excluding 831 that had missing data such as household income and key variables of childhood poverty and adulthood health.

Dependent variables: SRH and health risk behaviors

SRH was measured by a single item using a five-point scale. The respondents were asked to rate their general health status as “healthy,” “somewhat healthy,” “average,” “somewhat poor,” or “poor.” We coded the responses of the lowest two scores as having poor SRH. In addition, four types of health-risk behaviors were measured: smoking, poor dietary habits, low exercise, and excessive alcohol consumption. Regarding smoking, the survey asked the respondents whether they currently smoke, used to smoke but do not currently smoke, or never smoked. We allocated a value of one to the response of smoking. Poor dietary habits were measured using five questions: “Do you eat breakfast every day?” “Do you try to eat vegetables?” “Do you try to cut down on sugar and salt intake?” “Do you try to purchase organic vegetables and additive-free food?” and “Do you try to eat nutritionally balanced meals?” Respondents were provided response options on a five-point scale [“agree” (= 1), “Somewhat agree,” “neither agree nor disagree,” “somewhat disagree,” and “disagree” (= 5)]. We summed up the five responses (ranging from 5 to 25) and defined 16 points or more as poor dietary habits. Low exercise was

measured by the frequency of exercising for ten minutes or more in the past year: every day, 5–6 days a week, 3–4 days a week, 1–2 days a week, once a month, or seldom. We categorized a response of “seldom” as low exercise. Excessive alcohol consumption was assessed by average daily ethanol intake calculated by types and amount of liquor respondents reported to consume. The intake of 46 ml of ethanol or more per day was defined as excessive alcohol consumption, on the basis of previous findings on the negative health impact of alcohol in Japan (Inoue et al., 2010).

Independent variable: childhood poverty

Childhood poverty was based on the respondents’ retrospective assessment of their living standard at the age of 15, the age at which they would have been at the final stage of compulsory education and fully dependent on parents for living costs in most cases. The level of economic condition was assessed on a five-point scale: “very poor,” “poor,” “average,” “affluent,” and “very affluent.” We constructed a binary variable of childhood poverty by allocating one to the lowest two responses (“very poor” and “poor”).

Instrumental variables for childhood poverty: parental SES

We predicted childhood poverty using four instrumental variables: parents’ educational attainment, occupational status, positions in a firm, and the size of firm they worked for when the respondent was 15 years old. These instrumental variables, if combined together, were expected to capture both parental socioeconomic position and income conditions during childhood. Parental educational attainment was grouped into four categories: graduated from junior high school, high school, college or above, and unknown. Occupational status of parents had six categories: regularly employed (including managers), non-regularly employed,

self-employed, unemployed, homemaker, and unknown. We also treated deceased and separated as occupational status. Firm size were coded into five categories according to the number of employees: 1–9, 10–99, 100–999, 1000 or more, public sector, and unknown. We included deceased and separated in the unknown category. Father’s position in a firm was categorized into six ranks from no position (including self-employed) to president/executive director and unknown. We included deceased and separated in the unknown category. We did not use the information about the positions of mothers because higher ranking positions for mothers were reported in limited numbers, reflecting the limited chances of promotion for female employees in Japan; therefore, mother’s position created no variance in the outcome (childhood poverty) in many model specifications.

Mediators: adulthood SES and social support

We assessed respondents’ educational attainment, household income, and social support as possible mediators. Educational attainment consisted of four categories: graduated from junior high school, high school, junior college, and college or higher educational institute. For household income, respondents selected their household income from 15 income bands. We calculated a median for each band and equivalized the income by dividing by the root of the number of household members. Then, we divided the equivalized household income into quintiles. Assessment of social support was based on respondents’ perceived emotional support. The survey asked the respondents “How much helpful guidance do the following persons give you when you have problem or are in trouble?,” where the “following persons” were (i) the spouse/partner, (ii) other co-residing family members, (iii) non-co-residing family members or relatives, (iv) neighbors, and (v) friends. The answers were chosen on a five-point scale (1 = a

lot, 2 = some, 3 = a little, 4 = never, 5 = not applicable). We reversed the order of responses, summed up the reversed scores for each source of support, and divided the sum (ranging 5–25) into tertiles of high, middle, and low. The standardized internal consistency estimate was 0.95.

Control variables: sociodemographics

Sex, age (25–29, 30–34, 35–39, 40–44, and 45–49), current family status (whether having a spouse or partner), and residential areas (binary indicator variables for each study site) were measured as control variables.

Analytic strategy

First, we examined the association of self-reported childhood poverty with adulthood SRH and health risk behaviors, controlling for sociodemographics (sex, age, family status, and residential area) only. To this end, we employed simple probit regression models to predict each adulthood health outcome by self-reported childhood poverty, which was not instrumented by parental SES, and the covariates.

Second, we investigated how adulthood SES mediates the relationship between childhood poverty and adulthood health. For the investigation, we adopted the recursive bivariate probit model that simultaneously estimated the two equations:

$$\text{Health related outcomes} = F_1 (\text{childhood poverty, adulthood SES, social support,} \\ \text{sociodemographics),}$$

$$\text{Childhood poverty} = F_2 (\text{parental SES at the age of 15}).$$

The first, main equation predicted health outcome, poor SRH, and health-risk behaviors, based on childhood poverty, potential mediators (educational attainment, income, and social support), and sociodemographics. The second, auxiliary equation predicted childhood poverty based on

parents' socioeconomic status. A correlation between the error terms of the two equations was assumed.

To assess the relative importance of educational achievement, income, and social support in mediating the relationship between childhood poverty and adulthood health, we estimated four models in which we cumulatively added the potential mediators. Model 1 included childhood poverty and sociodemographics in the prediction of health outcomes. In Model 2, we added educational attainment to Model 1. In Model 3, we added household income to Model 2. Finally, in Model 4, social support was added to Model 3. The association of adulthood health with each binary variable was expressed in terms of the marginal effect, that is, how a change of each binary variable from zero to one is projected to raise the probability of the health outcome with other variables kept unchanged.

The importance of a potential mediator was assessed by the magnitude by which its inclusion as a predictor in the main equation reduced the marginal effect of childhood poverty on adulthood health. While the results may depend on the order in which we cumulatively added the three potential mediators, we first added educational attainment because, in most cases, formal education is completed by young adulthood (i.e., determined prior to the current household income and social support). However, since the order of the inclusion of the remaining two mediators into the model may seem more arbitrary, we repeated our analysis using different orders to assess the robustness of the results.

Results

Association between self-reported childhood poverty and adulthood health

Table 1 shows the prevalence of SRH and health-risk behaviors and sociodemographic characteristics of the respondents. Table 2 shows the association between childhood poverty, which was self-reported and not instrumented by adulthood SES, and adulthood health in terms of the marginal effect, after adjusting for sociodemographics and including no mediator. Self-reported childhood poverty was significantly associated with health outcomes in adulthood except excessive alcohol consumption. The probabilities of poor SRH, smoking, low exercise, and poor dietary habits were 8.4%, 7.2%, 8.0%, and 4.3%, respectively, higher for those who reported the experience of childhood poverty than those who did not.

Mediation of the impact of childhood poverty on adulthood SRH

Tables 3 summarizes the results of recursive bivariate probit models that estimate the multivariate associations between childhood poverty and adulthood SRH, controlling for possible mediators and sociodemographics. Childhood poverty was instrumented by parental SES: educational attainment, parental occupational status, the size of firm parents worked for, and fathers' position in a firm at the time respondents were 15 years old (see Appendix).

We first observed that childhood poverty raised the probability of poor SRH by 14.0% in Model 1, which included no mediator. This impact was larger than that of the measure not instrumented by parental SES (8.2%; see Table 2). Second, accumulatively adding possible mediators in Model 2 to Model 4 reduced the impact of childhood poverty on adulthood SRH. The marginal effect of childhood poverty declined to 10.4% by adjusting for educational attainment, to 9% by additionally adjusting for household income, and to 8% by further adding social support. However, the association between childhood poverty and adulthood SRH remained significant at the 5% level even after controlling for all three mediators.

Third, we observed different patterns in the changes in statistical significance of the associations of adulthood SES with each mediator: from Model 2 to Model 3 and from Model 3 to Model 4. The association between educational attainment and adulthood health became insignificant when household income was included in Model 3, suggesting that educational attainment mediated the impact of childhood poverty on adulthood SRH largely through income. In contrast, comparing the results of Models 3 and 4 revealed that including social support did not much affect the magnitude and statistical significance of the associations of adulthood SRH with household income, suggesting that household income affects adulthood SRH directly as well as through its mediation effect.

Mediation of the impact of childhood poverty on health-risk behaviors

Table 4 compares how the association of childhood poverty with each of four health-risk behaviors in adulthood is mediated by educational attainment, household income, and social support. For comparison purposes, the table also presents the results for poor SRH (reported in Table 2) in the first row. Except for excessive alcohol consumption, we found a similar pattern of results to that of poor SRH in Table 3 for all risk behaviors. In Model 1, we found a substantial impact of childhood poverty on smoking, low exercise, and poor dietary habits, which was even larger than that of the self-reported measure not instrumented by parental SES. After controlling for educational attainment in Model 2, the impact of childhood poverty declined substantially but remained significant at the 1% level. Adding further household income and social support in Models 3 and 4, the magnitudes of the impacts of childhood poverty declined, albeit to a lesser degree compared to when adding educational attainment. However, the association between childhood poverty and health-risk behaviors remained

significant even in Model 4, indicating that the impact of childhood poverty was not fully explained by the three mediators.

Proportions of mediating effects

Table 5 compares the proportions of the mediating effects attributable to educational attainment, household income, and social support for each adulthood health outcome based on the results obtained in Table 3. For instance, we observed that childhood poverty raised the probability of poor SRH by 14.0%, 10.4%, 9.0%, and 8.0% in Models 1–4, respectively. The mediating effect of educational attainment was calculated as 25.7% [= (14.0 – 10.4)/14.0], on the basis of the comparison between Models 1 and 2. In the same manner, we calculated the mediation effect of household income as 10.0% [= (10.4 – 9.0)/14.0], etc. We would obtain different results by reversing the adding orders of household income and social support, but we found that the results remained virtually intact (not reported).

From Table 5, we first found that 35.3 to 55.0% of the association between childhood poverty and adulthood health was mediated by adulthood SES and social support in combination. Educational attainment mediated the association to a greater degree than did household income and social support. It is most remarkable for current smoking; the mediation effect of educational attainment was 50.8% while the total mediation effect of the three factors was 55.0%. It is also noticeable that childhood poverty's association with low exercise was mediated by household income and social support to a greater extent than with smoking and poor dietary habit.

Discussion and conclusion

We examined how educational attainment, household income, and social support mediate the impact of low SES in childhood on SRH and health behaviors in adulthood, using population-based data collected in multiple sites in Japan. The estimation results underscored the mediation effects of educational attainment, household income, and social support, in line with observations from various many studies conducted in countries other than Japan. The mediation effects of these variables accounted for 35–55% of the impact on adulthood SRH and health-risk behaviors; a large proportion of the association was explained by childhood poverty itself.

Among the potential mediators we examined, educational attainment was shown to have the most significant mediation effects: it mediated 22–26% of the impact of childhood poverty on SRH and health-risk behaviors in adulthood. This result is in line with the findings of previous studies indicating that education is an important mediator of the association between childhood SES and adulthood health (McKenzie et al., 2011; Strand & Kunst, 2006). It has been widely acknowledged that children from poorer families tend to be less successful in school, and lower educational attainment constrains income earnings, social participation, and healthy lifestyle, all of which affect adulthood health (Bowles et al., 2005; Duncan & Brooks-Gunn, 1997; Duncan et al., 2010).

Another noticeable finding is that social support is a key mediator, confirming the importance of interpersonal relations in adulthood. This is in line with the view that stresses the psychosocial pathway of childhood poverty. Children in lower SES families tend to be exposed to a conflict-ridden, neglectful, or harsh family environment and hence experience more adverse

interpersonal relationships that could hinder access to positive social support in later life (Cohen et al., 2010; Evans & Kim, 2010; Lehman et al., 2005).

The most important finding was that a large portion of the association between childhood poverty and adulthood health remained unexplained by adulthood SES and social support, even though the mediating effects of adulthood SES and social support were substantial as a whole. We found that childhood poverty was associated with SRH and two of four health-risk behaviors (smoking and poor dietary habits) significantly at the 5% level, and one health behavior (low exercise) at the 10% level in the fully adjusted model (Table 4). In addition, any of the associations with poor SRH and health risk behaviors were not moderated by adulthood SES and social support. This is consistent with the result from a sociological study that stressed the direct impact of childhood poverty on later-life outcomes in Japan (Abe, 2010; Oshio et al., 2010).

Our findings that childhood poverty had substantial impact on adulthood health independent of adulthood SES and social support are supported by previous literature. Childhood stressors related to low income and social status can adversely affect a child's physical and mental health, which has a long-lasting impact on health in later life (Duncan et al., 2010; Poulton & Caspi, 2005). It was found that psychologically stressful family environments damaged homeostatic processes, causing health problems in children (Evans, 2003). Early-emerging psychiatric disorders and related personality vulnerabilities of negative affectivity may mediate the impact of childhood adversity on adulthood health (Gallo & Matthews, 2003). In addition, limited access to social support or social capital during childhood due to lower SES may account for the lifelong impact of childhood poverty (Beatty et al., 2011).

The results highlight the magnitude of impact childhood poverty has on adulthood health, which was unexplained by the examined mediators. Hence, we suggest that policy measures to enhance levels of adulthood SES and social support cannot fully offset adverse consequence of lower childhood SES, although enhancement of educational attainment may be a possible mean to alleviate the negative impact of childhood poverty. More focus should be placed on policies that aim to reduce childhood poverty.

We recognize that this study has several limitations. First, forms of childhood adversity other than poverty should be addressed. Childhood adversities such as family turmoil and parental psychopathology may accompany poverty and may affect adulthood health (Evans & Kim, 2007; Taylor et al., 2000). The timing of exposure to poverty may also affect the consequence of the economic deprivation (Cohen et al., 2010; Duncan & Brooks-Gunn, 1997).

Second, there may be important mediators of the impact of childhood poverty on adulthood health other than educational attainment, household income, and social support. Occupational status in adulthood and social capital are possible mediators to be addressed in future studies (Evans & Kutcher, 2011; Hyde et al., 2006; Melchior et al., 2007). Personality and sense of coherence were also found to be a pathway between childhood SES and adulthood health, especially mental health (Chapman et al., 2009; Richardson & Ratner, 2005).

Third, our analysis was based on a cross-sectional dataset, which made it difficult to identify any causality between adulthood health outcomes and mediators. We cannot rule out the possibility that poor health status affected adulthood SES and social support. Recall bias on the retrospective assessment of childhood poverty also needs to be considered, although we instrumented childhood poverty through more exogenous measures. In order to fully understand

the impact of childhood adversity on health outcomes in later life, we would need longitudinal data. These issues should be addressed in future research.

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Table 1
Prevalence of SRH and health risk behaviors (%) and sociodemographic characteristics of J-SHINE respondents, 2010–2011

		All (N = 3,265)	Men (n = 1,567)	Women (n = 1,698)
Childhood poverty		18.5	19.7	17.4
Poor SRH		10.5	9.5	11.4
Smoking		23.4	35.5	12.2
Poor dietary habits		24.4	35.0	14.6
Low exercise		41.8	37.6	45.7
Excessive alcohol consumption		13.4	16.3	10.7
Educational attainment				
Junior high school		2.9	3.7	2.2
High school		39.4	38.2	40.5
Junior college		12.1	2.1	21.4
College or above		45.5	56.0	35.9
Social support				
Low		35.1	44.3	26.7
Middle		32.1	32.9	31.4
High		32.8	22.8	41.9
Having a partner		70.1	67.9	72.1
Residential area				
Area 1		19.3	19.7	18.8
Area 2		23.2	23.4	23.1
Area 3		29.3	29.5	29.2
Area 4		28.2	27.4	28.9
<hr/>				
Age	Mean	37.6	37.8	37.4
	S.D.	7.1	7.0	7.2
Household income ('000 yen)	Mean	4,140	4,284	4,008
	S.D.	2,488	2,518	245.4
Number of observations		3,265	1,567	1,698

Table 2.

Associations between self-reported childhood poverty and adulthood health^a

	Marginal effect ^a	S.E.
Poor SRH	0.084 ^{***}	(0.016)
Smoking	0.072 ^{***}	(0.020)
Low exercise	0.080 ^{***}	(0.023)
Poor dietary habits	0.043 [*]	(0.020)
Excessive alcohol consumption	-0.002	(0.011)

Note:

^a Adjusted for sex, age, marital status, and regional areas. Childhood poverty was not instrumented by parental SES.

^b The marginal effect indicates how the experience of childhood adversity raised the probability of having each health outcome.

* $p < 0.05$, *** $p < 0.001$.

Table 3
 Association between childhood poverty and adulthood SRH, with childhood poverty instrumented by parental SES^a

	Model 1	Model 2	Model 3	Model 4
Controlling for:				
Educational attainment		✓	✓	✓
Household income			✓	✓
Social support				✓
Marginal effect ^b (S.E.)				
Childhood poverty ^c	0.140 ^{***} (0.042)	0.104 [*] (0.042)	0.090 [*] (0.041)	0.080 [*] (0.040)
Educational attainment (ref = College or above)				
Junior high school		0.017 [*] (0.033)	0.010 (0.032)	0.006 (0.031)
High school		0.031 [*] (0.012)	0.020 (0.012)	0.020 (0.012)
Junior college		-0.011 (0.018)	-0.017 (0.018)	-0.016 (0.017)
Household income (ref = 1st quintile)				
2nd quintile			-0.032 [*] (0.014)	-0.033 [*] (0.014)
3rd quintile			-0.053 ^{***} (0.013)	-0.053 ^{***} (0.013)
4th quintile			-0.048 ^{**} (0.015)	-0.048 ^{**} (0.015)
5th quintile (highest)			-0.053 ^{***} (0.015)	-0.053 ^{***} (0.015)
Social support (ref = Low)				
Middle				-0.030 [*] (0.013)
High				-0.036 ^{**} (0.014)

Note:

^a All models were adjusted for sex, age, marital status, and residential areas.

^b The marginal effect indicates how much an increase of each predictor from zero to one raises the probability of poor SRH.

^c The estimation results of childhood poverty instrumented by parental SES are provided in the Appendix.

[†] $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4

Association between childhood poverty and adulthood health, with childhood poverty instrumented by parental SES^a

	Model 1	Model 2	Model 3	Model 4
Controlling for:				
Educational attainment		✓	✓	✓
Household income			✓	✓
Social support				✓
Marginal effect ^b (S.E.)				
Poor SRH	0.140** (0.042)	0.104* (0.042)	0.090* (0.041)	0.080* (0.040)
Smoking	0.295*** (0.056)	0.145** (0.059)	0.137* (0.059)	0.133* (0.059)
Low exercise	0.221*** (0.059)	0.172** (0.063)	0.148* (0.060)	0.125 [†] (0.065)
Poor dietary habits	0.241*** (0.058)	0.184** (0.060)	0.174** (0.061)	0.156* (0.061)
Excessive alcohol consumption	0.020 (0.033)	-0.012 (0.029)	-0.009 (0.029)	-0.010 (0.029)

Note:

^a All models were adjusted for sex, age, marital status, and residential areas, and childhood poverty was instrumented by parental SES.

^b The marginal effect indicates how much childhood poverty raises the probability of each adulthood health outcome.

[†] $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5

Contributions of mediation effects of adulthood SES and social support (%) to the total association between childhood poverty and adulthood health, with childhood poverty instrumented by parental SES^a

Adulthood health outcome	Educational attainment	Household income	Social support	Total
Poor SRH	25.7	10.0	7.1	42.9
Smoking	50.8	2.7	1.4	55.0
Low exercise	22.0	11.0	10.3	43.3
Poor dietary habits	23.8	4.1	7.4	35.3

Note:

^a All models were adjusted for sex, age, marital status, and residential areas. The results for excessive alcohol consumption were not calculated because it was not significantly associated with childhood adversity (see Table 4).

Appendix

Estimated association between childhood poverty and parental SES at the age of 15^a

	Father		Mother	
	Marginal effect ^b	S.E.	Marginal effect	S.E.
Parental educational attainment (Ref = College or above)				
Junior high school	0.108 ^{***}	(0.032)	0.077 [*]	(0.033)
High school	0.050 [*]	(0.020)	0.043 [*]	(0.020)
Unknown	0.065 [*]	(0.027)	0.044	(0.029)
Parental occupational status (Ref = Regularly employed)				
Non-regularly employed	0.207 ^{**}	(0.074)	0.037 [†]	(0.020)
Self-employed	0.013	(0.023)	-0.055 [*]	(0.022)
Unemployed	0.389 [*]	(0.152)	0.397 [†]	(0.215)
Homemaker	0.487 ^{***}	(0.132)	-0.031	(0.023)
Deceased	0.354 ^{***}	(0.064)	-0.064	(0.055)
Separated	0.390 ^{***}	(0.073)	0.245 [†]	(0.135)
Unknown	0.221 ^{**}	(0.071)	-0.053	(0.033)
Parental firm size (number of employees) (Ref = 1,000 or more)				
1-9	0.207 ^{***}	(0.041)	0.052	(0.043)
10-99	0.168 ^{***}	(0.041)	0.016	(0.038)
100-999	0.061	(0.037)	0.018	(0.045)
Public sector	0.061	(0.044)	-0.019	(0.060)
Unknown	0.109 ^{***}	(0.028)	0.050	(0.034)
Paternal position in a firm (Ref = Rank 6)				
Rank 1 (= lowest)	0.138 ^{***}	(0.027)		
Rank 2	0.059	(0.054)		
Rank 3	0.099 [*]	(0.045)		
Rank 4	0.068 [†]	(0.038)		
Rank 5	-0.058 [†]	(0.030)		
Unknown	0.063 [*]	(0.028)		

Note:

^aThis table presents the results of the auxiliary equation to predict childhood adversity in Model 1 for poor SRH. We obtained almost the same results for Models 2-5 for poor SRH and four adulthood health risk behaviors.

^bThe marginal effect indicates how much an increase of each predictor from zero to one raises the probability of poor SRH. The figures in parentheses are their standard errors.

[†] $p < 0.1$, ^{*} $p < 0.05$, ^{**} $p < 0.01$, ^{***} $p < 0.001$.