The long shadow cast by childhood physical and mental problems on adult life

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In this article we assess and compare long-term adult socioeconomic status impacts from having experienced psychological and physical health problems in childhood. To do so, we use unique prospective data from the British National Child Development Study, a continuing panel study of a cohort of 17,634 children born in Great Britain during a single week in March 1958. To date there have been nine waves for this birth cohort to monitor their physical, educational, and social development, during childhood (at birth and 7, 11, and 16 y) and adulthood (age 23, 33, 42, 46, and 50 y). Excellent contemporaneous information exists throughout childhood on physical and psychological health, captured by doctor and nurse-led medical examinations and detailed parental and teacher questionnaires. This information is combined with a wealth of contemporaneous information on adult health and economic experiences collected from cohort members. Information includes their economic circumstances (earnings, labor supply, and other sources of family income), physical and psychological health, and relationship status. Large effects are found due to childhood psychological problems on the ability of affected children to work and earn as adults and on intergenerational and within-generation social mobility. Adult family incomes are reduced by 28% by age 50 y, with sustained impacts on labor supply, marriage stability, and the conscientiousness and agreeableness components of the "Big Five" personality traits. Effects of psychological health disorders during childhood are far more important over a lifetime than physical health problems.

Using prospectively collected data beginning during the week of birth, repeated at three additional ages in childhood and adolescence, and extended into adulthood to age 50 y, this study investigates long-term adult impacts of having experienced psychological and physical health problems during childhood. Stimulated by the work of Barker (1), recent research has established evidence of a strong link between various aspects of poor physical health during childhood (and even in utero) and adult health (2–7) and economic outcomes later during adulthood (8, 9). Much less studied have been long-term health and socioeconomic (SES) consequences of psychological conditions experienced during childhood (10, 11). This is even more surprising given the substantial rise in psychological disorders affecting young people in the United Kingdom in the past 25 y (12, 13).

Recently, Smith and Smith (14) used retrospective questions in the American Panel Study of Income Dynamics to find that impacts of childhood psychological problems on adult SES are large—a lifetime cost in lost family income of approximately $300,000 and total lifetime economic cost for all those affected of $2.1 trillion. An advantage of that study is that it compared siblings, so it was able to control for unobserved family and neighborhood effects, which were found not to be critical for this question. A disadvantage of that research is that it relied on retrospective self-reports of childhood physical and psychological problems, reports that could be colored by adult experiences, including those in the psychological domain. That disadvantage will be rectified here by using prospective panel data measuring at key points in childhood and adulthood the physical and psychological health of respondents alongside measures of the family and economic circumstances of their lives.

Model

Data. The National Child Development Study (NCDS) is a continuing longitudinal study following lives of a single cohort of 17,634 children born in Britain during 1 week of March 1958 (15). To date there have been nine waves of data collection to monitor their physical, educational, and social development. Four waves took place during childhood (birth and 7, 11, and 16 y) and five waves during adult years (age 23, 33, 42, 46, and 50 y). Seventy-one percent of the original respondents were in the study at the fifth wave, and discrimination between responders and nonresponders had not been marked (16). We do not use the age-46-y wave because it lacks some of our main SES outcomes [family income, social security receipts, and gross hourly wages (a routing error meant that 70% of earners were not asked how many hours per week they work)].

This study collected excellent contemporaneous information in childhood on physical and psychological health through doctor-led medical examinations, detailed parental questionnaires, teacher reports, and health visitors. The data contain a very rich set of information on parents, including parental SES and family circumstances (including family breakdown and instability in the home). In adulthood, NCDS collects contemporaneous information on respondents' current economic circumstances (earnings, labor supply, and other sources of family income), physical and psychological health, relationship status, and at age 50 y, cognitive and noncognitive traits.

The intent of NCDS was to follow all children born in Britain who were still alive and did not permanently migrate. Initial nonresponse at time of birth was remarkably low—less than 1% (17). Attrition in NCDS was also relatively small. At age 42 y, 71% of the target sample was interviewed. Attrition during adult years was especially quite low, with 91% of the age-23-y population still in the study at age 42 y. Hawkes and Plewis (18) show that in terms of observable attributes there are few differences in probability of retention between those who left the study and those who remained.

Measures. This study relies on repeated measurement of several key domains of individual's lives in childhood and adulthood. These domains include psychological and physical health during childhood and adult years; information about family background in which the children grew up; and the principal indicators of SES during adulthood, including education, employment status, wages, and family income.

Childhood Health Measures. The first set of key NCDS measures involves those collected about respondents' psychological and physical health in childhood. For psychological health, medical examinations captured emotional maladjustment (at ages 7 and 16 y), and parent reports captured whether the child had been

seen by a psychologist or psychiatrist (ages 11 and 16 y). In medical examinations, doctors judged degree of maladjustment to be "none," "a problem but no handicap to ordinary schooling," "a slight problem," "a moderate problem," or "a severe problem." We count moderate or severe problems only, to be consistent with our coding of childhood physical problems (see below). Using this information, we create an indicator variable equal to 1 if any psychological problems existed up to age 16 y and 0 otherwise. Thus, if a doctor detects a degree of emotional maladjustment that is moderate or severe at age 7 or 16 y, or if the parent reports the child has seen a psychologist or psychiatrist at age 11 or 16 y, we conclude that a child had a psychological problem by age 16 y.

We use data about several aspects of physical health problems at ages 7, 11, and 16 y. These cover a wide range of conditions, including severe headaches or migraines, skin abnormalities, other physical abnormalities, speech defects, hearing defects, vision defects, epilepsy, asthma, diabetes, other respiratory problems, urinary problems, heart disease, and digestive problems. Because of low prevalence rates of some physical conditions, we aggregate them into nine categories for our analysis: eye, ear, and skin conditions; asthma and other respiratory problems; headaches and migraines; speech defects; physical abnormalities; alimentary, urogenital, and blood problems; epilepsy and other central nervous system conditions; heart abnormalities; and any other conditions.

Where a scale of severity is available, we exclude anything indicating no handicap or a slight handicap. We make one exception, for heart conditions, where "slight" problems are included on the basis that any heart problem is serious for a child. At ages 7 and 16 y, this information comes from doctor assessments, with the exceptions of asthma and headaches or migraines, which are reported by parents of cohort members. At age 11 y, the information we use comes mostly from parent reports to a medical examiner (medical examinations were also carried out at this age, but they are not generally comparable with those at ages 7 and 16 y), with the exception of hearing defects, for which we use medical assessments.

Adult Health Measures. Adult follow-ups ask cohort members for an assessment of their general health, which can be rated as "poor," "fair," "good," or "excellent." Only 18% of respondents report less than "good" health, so we count both "poor" and "fair" as indicators of substandard general health. Adult follow-ups also include detailed assessments of psychological well-being, based on instruments such as the Malaise Inventory (19) and the General Health Questionnaire.

The Malaise Inventory is a 24 yes–no question scale based on factors such as whether a respondent is often irritated, worried, frightened, often depressed, annoyed, jittery, has sleep problems, has violent rages, has had a nervous breakdown, lets things get on their nerves, etc. Internal consistency and validity of the malaise inventory scale was shown to hold for different SES groups (20). Following the normal convention, we create a dummy variable, which is equal to 1 if the number of affirmative responses in the Malaise Inventory is greater than seven.

The General Health Questionnaire is a 12-question scale based on factors such as concentration, losing sleep, confidence, under strain, feeling depressed, happy, worthless, self-perceived capability, etc. (21, 22) that has been favorably tested for reliability and validity (23). For each of the 12 questions, responses are measured on a Likert scale and can score anything from 0 to 3 (not at all, no more than usual, rather more than usual, much more than usual). Total score is then summed across the 12 questions. A score >15 indicates psychological distress. A score >20 indicates severe psychological distress. Dummy variables for each of these are created.

Family Background Measures. Besides health, our data contain several salient measures on the background in which children were

raised. The variables that we label "family structure variables" include age, number of years in education of both parents; occupation status (SES) of father, marital status of mother at child's birth (married, never married, widowed/separated/divorced); whether a first-born; a twin; an only child; grew up with older brothers or sisters; number of people in household; whether breastfed; whether birth weight was low (<88 oz); mother is obese (body mass index >30 kg/m^2) or a heavy smoker before pregnancy; ethnicity (white or nonwhite); whether English is first language normally spoken by mother and child; region of residence; and early developmental indicators, such as age of walking, speech, and toilet training. Because low birth weight can be viewed as a physical health problem, we present estimated coefficients on low birth weight. We also include in models extensive measures of "family difficulties" during childhood: dummy variables for whether family had difficulties related to housing; financial; physical illness or disability; death of child's parent; divorce, separation, or desertion; domestic tension; unemployment; alcoholism, mental illness or neurosis, or mental subnormality in family; and any other serious difficulties affecting child's development.

Adult Outcome Measures. Our central adult SES outcome is family income (net of taxes and including government transfers) measured in natural logs so that coefficients are percent changes. Family income is arguably the most comprehensive measure of economic resources and is the best measure of economic impacts of childhood health. Family income is principally made up of respondents' earnings (hourly wages times hours worked) and any contribution to family income of a spouse/partner. To understand the relative importance of the components, we examine models of respondents' natural log (ln) hourly wages (of workers) and employment probability. To assess contributions of spouses/partners, we examine at each wave whether there is a partner, partner's education, and the probability partner is employed.

Family income is not the only useful index of economic advancement. There are two aspects of social mobility examined— intergenerational and within an adult life span. For intergenerational mobility, we compared both occupation status and education of respondents with that of the father when respondent was a child. Occupation is divided into five ordered groups: professional; managerial-technical; skilled; partly skilled; unskilled. Education is school-leaving age minus five. For occupation and education, we defined two binary outcomes equal to 1 if the cohort member is in a higher (lower) occupational class (education) class at age 42 y than father. Within-career social mobility was defined by whether occupation status was higher or lower at age 42 y than at age 23 y, using the same five-group occupation status.

There is more to life than economics, so we also model noneconomic outcomes mostly measured at age 50 y. These are as follows: number of words out of 10 correctly recalled (measure of cognitive function); "Big Five" noncognitive traits—extraversion, agreeableness, conscientiousness, emotional stability, and intellect—measured using the International Personality Item Pool inventory (20); and dummy variables for whether individuals usually get what they want out of life and whether they can run life more or less as they want.

Statistical Methods. We estimate ordinary least squares models for continuous outcomes and probit models for binary outcomes relating existence of childhood physical and physiological health issues to adult SES outcomes in NCDS at ages 23, 33, 42, and 50 y. Estimating models at ages spanning from young adulthood into middle age allows us to trace evolving impacts of childhood health issues as respondents age. To account for heteroscedasticity and outliers, we ran all analyses using robust SEs and experimented with deletion of outliers. The essentials of our findings were unchanged. All tests of statistical significance use robust SEs.

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We take advantage of panel data in several ways. First, we include models of between-age growth in ln family income. Second, we model outcomes combining data from several waves, including intergenerational occupational and education mobility and within-career occupational mobility, defined above. We also model number of waves respondents were unemployed, number of distinct job spells (a job is continuous employment with same employer) since age 23 y, and marriage stability (with the same partner at ages 42 and 33 y). Fixed effects estimation is not possible because individuals have only one childhood which cannot be differenced. Random-effects models produced essentially the same empirical estimates as those reported here.

Our key explanatory variables are having a childhood psychological disorder and the set of physical childhood health problems described above. Our models include all family structure and difficulties attributes listed above and sex of respondent. Including these family attributes means that estimated impacts of childhood physical and mental health are independent of these measurable problems in the family home environment during childhood.

Results

The top two rows of Table 1 list estimated effects of having any childhood psychological problem by age 16 y on two salient indicators of adult economic success—ln of net family income and ln of hourly wage (using a sample of workers). Separate parameter estimates for both economic outcomes are listed for ages 23, 33, 42, and 50 y. There are several salient patterns. First, childhood psychological problems have a significant negative impact on both economic outcomes measures, producing 14–28% lower incomes or wages from early adulthood into middle age (24). Second, a significant part of the estimated negative effects of childhood psychological problems are present at the beginning of adulthood. The initial negative impact at age 23 y of 19% lower family income is two thirds as large as the estimated effect on net family income at age 50 y. This large initial effect compared with long-term effect is even more evident for hourly wages. Third, the estimated effect on family income is larger than on hourly wages, and the difference between the two grows with age.

In the third row of Table 1, we summarize a model of between-age annual percent growth in family income. Similar to separate age-specific models, a large part of negative impacts of childhood mental problems is present at the beginning of adulthood (age 23 y), but there are negative decrements after that age, particularly in the early phase of the career.

Models in Table 1 estimating probability of employment and probability of living with a partner demonstrate that key sources of family income loss are a lower probability of being employed (10) and a lower probability of living with a partner (14). We also find that childhood mental health problems decrease partnership stability because the probability one is living with the same partner at ages 42 and 33 y (if partnered at age 33 y) is reduced. For those with a partner, we estimate a lower probability that a partner is employed and a lower partner education level. By age 50 y, those with childhood psychological problems experienced an 11 percentage point lower probability of working and a 6 percentage point lower probability of being married or cohabiting. All this helps explain why the negative effect of psychological problems on total net family income increases with age and is larger than estimated effects on hourly wages alone.

Table 2 compares estimated effects of childhood psychological problems on ln family income with estimates of impacts of childhood physical health problems on the same outcome. For comparative purposes, estimates for a psychological problem from Table 1 are placed in the first line in Table 2. Estimated family income effects of physical health problems seem in general to be much less than those of mental health problems because only a small number of physical problems have consistently significant negative effects throughout the life cycle. The most notable are speech defects and epilepsy or other central nervous system conditions, as well as "other" not specified, but the latter two have very low prevalence.

This conclusion is confirmed in Table 3, in which we aggregate physical health problems into three subcategories—minor, major, and low birth weight—to provide a more direct comparison with our "catch-all" measure of psychological problems. Low birth weight has consistently negative impacts on adult family income, and estimated effects of minor physical problems are smaller than those of major physical health problems. However, the starkest pattern remains the same—estimated effects of childhood psychological problems on net family income throughout the lifecycle are more substantial than effects of physical health problems.

Estimates in Table 4 examine impacts of childhood psychological health on noneconomic outcomes measured at age 50 y. These outcomes include number of words out of 10 correctly recalled (measure of cognitive functioning); and personality (the Big Five noncognitive traits—extraversion, agreeableness, conscientiousness, emotional stability, and intellect measured using the International Personality Item Pool inventory) (25). Scores on all these

Table 1. Effects of childhood psychological problems by age 16 y on income and SES as an adult

Variable (% change in)	Age (y)			
	23	33	42	50
Family income	−0.185* (11,515)	−0.220* (10,196)	−0.259* (11,019)	−0.278* (9,045)
Hourly wage	−0.142* (8,017)	−0.134* (6,795)	−0.197* (8,393)	−0.151* (6,877)
Real average percent annual growth in family income since prior wave	NA	−0.006[†] (8,333)	−0.005 (8,803)	−0.002 (8,341)
Δ probability employed	−0.116* (12,215)	−0.103* (11,102)	−0.107* (11,051)	−0.107* (9,522)
Is married or cohabiting	−0.027 (12,216)	−0.119* (11,139)	−0.114* (11,140)	−0.063* (9,520)
Partner employed	−0.064 (3,306)	−0.039[†] (4,536)	−0.140* (5,291)	−0.103* (3,614)
Partner at age 42 y stayed in postcompulsory schooling	NA	NA	−0.080[‡] (4,389)	NA
Living with same partner at age 42 y as at age 33 y	NA	NA	−0.076* (5,095)	NA

Values are estimated coefficient (sample size). Hourly wage is estimated only from the employed sample at each wave; partner's employment probability and education level are estimated only from the sample of cohort members who are married or cohabiting. Probability of living with same partner at age 42 as at age 33 is estimated only from sample who were cohabiting or married at age 33. Variables included in the model but not displayed in the Table are all family background characteristics and childhood physical health measures listed in the text and an indicator variable for the sex of the cohort member. NA, not applicable.
*Significant at 0.01 level.
[†]Significant at 0.10 level.
[‡]Significant at 0.05 level.

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Table 2. Effects of childhood psychological and physical health problems by age 16 y on log family income as an adult

Variable	Age (y)			
	23	33	42	50
Psychological problems (6.8%)	−0.185*	−0.220*	−0.259*	−0.278*
Eye, ear, or skin condition (19.2%)	−0.040*	−0.014	0.010	−0.048[†]
Respiratory problems including asthma (16.2%)	−0.015	−0.005	−0.028	0.004
Headaches or migraines (8.6%)	−0.013	0.023	−0.016	0.017
Speech defect (7.7%)	−0.049[†]	−0.082*	−0.082*	−0.120*
Physical abnormality (6.1%)	−0.055[†]	−0.066*	0.021	−0.069[†]
Low birth weight (6.0%)	−0.072*	−0.024	−0.055[‡]	−0.119*
Alimentary, urogenital, or blood problem (3.7%)	−0.015	0.031	0.016	−0.018
Abnormality of heart (1.0%)	−0.092	−0.126[‡]	0.046	−0.135
Epilepsy, other CNS condition (0.8%)	−0.151*	−0.272*	−0.209[†]	−0.519*
Any other condition (0.6%)	−0.190[†]	−0.308[†]	−0.158[‡]	−0.365[‡]

The model estimated is identical to that in the first rows of Table 1. Number of observations same as in first row in Table 1.
*Significant at 0.01 level.
[†]Significant at 0.05 level.
[‡]Significant at 0.10 level.

noneconomic measures are standardized, so estimated effects are in SD form. We also estimate models about whether one usually get what one wants out of life and can run life more or less as one wants. Other regressors are the same as in models in Table 1.

Negative estimated effects of childhood psychological problems on memory, agreeableness, conscientiousness, and emotional stability are striking. Children with mental health issues show reduced adult cognitive abilities (13), because the psychological problems may make it difficult to concentrate and remember (26). Although the association of childhood mental problems with adult emotional stability is not surprising, we find equally strong impacts on adult personality components of agreeableness and conscientiousness. Conscientiousness implies a higher level of impulse control and the ability to delay gratification and has been shown to be an important correlate of success in work and marriage (25). The ability to control your life and to get what you desire is also negatively impacted by childhood mental issues.

Table 5 examines impacts on our measures of social mobility both across generations and within careers. Whether we use oc-

Table 3. Effects of childhood psychological and summary of physical health problems by age 16 y on log family income as an adult

Variable	Age (y)			
	23	33	42	50
Psychological problems (6.8%)	−0.195*	−0.232*	−0.268*	−0.301*
Minor physical problem (43.8%)	−0.030*	−0.012	−0.013	−0.030[†]
Major physical problem (9.1%)	−0.067*	−0.099*	0.002	−0.086[‡]
Low birth weight (6.0%)	−0.075*	−0.025	−0.058[†]	−0.131*

The model estimated differs from that presented in Table 2 only in that the childhood physical problems have been aggregated. "Minor" physical problems include headaches and migraines, asthma or other respiratory problems, skin conditions, speech, vision or hearing defects, alimentary, urogenital, and blood problems. "Major" physical problems include physical abnormalities, heart problems, epilepsy and other problems with the central nervous system, and any other conditions (these are not specified in the data but their estimated effects in Table 2 are substantial, so we have categorized them as a "major" problem). Number of observations same as first row in Table 1.
*Significant at 0.01 level.
[†]Significant at 0.10 level.
[‡]Significant at 0.05 level.

cupation or education as the metric or consider upward or downward social mobility, childhood mental health problems have statistically significant effects on inhibiting social mobility. The same is true for within-career mobility. Childhood mental health problems reduce the number of distinct continuous jobs held as an adult, so that respondents stay with the same job longer. Movement from one job to another is an important mechanism for social and economic mobility, and childhood mental issues seem to inhibit it. Once again in sharp contrast, there is no consistent pattern of childhood physical health problems affecting social mobility.

Our final analyses attempt to isolate the primary pathways through which childhood mental health affects family income. Although a full structural model is beyond the scope of this article, we do so by sequentially controlling for plausible pathways and observing what happens to estimated impacts of childhood mental health. An important pathway should significantly reduce the size of the effect, whereas an unimportant one should not. The first line in Table 6 copies estimated effects on ln net family income contained in Table 1. The next rows sequentially add additional sets of variables that could be plausible pathways.

The first are indicator variables for whether a cohort member left school after 16 y and whether they have a degree. Adult education does not alter estimated coefficients much, so it seems not to be an important pathway. In the next row we add adult general health status in the current and all prior waves (based on a question asking whether current age adult general health is "poor," "fair," "good," or "excellent"). Adult health also has only a small impact until age 50 y as the onset of adult disease becomes a more serious issue.

Adding the Big Five personality traits (only possible at age 50 y and not including the emotional component) does reduce the estimated impact of childhood mental health. Most of this reduction is due to the conscientiousness component, suggesting that a contributing factor is a lessened ability to focus and act on behaviors that will improve one's future.

The final two rows in Table 6 demonstrate that the combined effects of adding employment and existence and attributes of a partner (in current and prior waves to capture the stability dimension) reduce estimated effects on family income to approximately two thirds or more of their original levels at all ages. Thus, two primary pathways through which childhood mental problems lower adult family income are that these transmitted effects into adult mental issues affect the probability of working

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Table 4. Effects of childhood psychological problems by age 16 y on noneconomic outcomes

	Outcome at 50 y							
Variable	No. of words recalled out of 10 (stdized)	Extraversion score (stdized)	Agreeableness (stdized)	Conscientiousness (stdized)	Emotional stability (stdized)	Intellect (stdized)	Usually gets what wants out of life	Usually can run life more or less as want
Psychological problems (6.8%)	−0.302* (9,411)	−0.075 (8,356)	−0.153* (8,336)	−0.185* (8,231)	−0.161* (8,343)	−0.065 (8,263)	−0.079* (9,369)	−0.036* (9,389)

Values are estimated coefficient (sample size). The set of regressors in each model here is identical to that in the model presented in Tables 1 and 3. See text for details of the outcome measures. "Stdized" indicates a standardized variable: the outcome has been divided by the sample SD of that outcome after subtracting the sample mean.
*Significant at 0.01 level.

and having a partner at any point in time, as well as the stability of work and partnership over time.

Discussion

In this study we estimated the net family income loss at adult ages associated with experiencing childhood psychological problems. To do so, we relied on unique prospectively collected data for a single birth cohort, for which the initial wave started at birth, with periodic sweeps in childhood and adult years currently up to age 50 y. These data are unique owing to simultaneous high-quality measurement of childhood psychological issues alongside high-quality measurement of economic outcomes in adult years. The prospective collection of all data elements eliminated the necessity of having to rely on retrospectively collected information (14).

On the basis of these data, we find large and statistically significant impacts of childhood psychological problems on family income that reach a peak of 28% lower net family income by age 50 y. Contributing to this loss are reduced conscientiousness, lower probabilities of being married, being at work, and the stability of both behaviors during the adult years. The experience of adult psychological problems is a major pathway through which these effects occur.

Some limitations of the study must be acknowledged. Even though attrition in NCDS is not large, a full analysis of its relation to childhood circumstances does not exist. Our data also do not allow for any control of genetic factors that may predispose one to poorer childhood mental health outcomes and worse midlife adult SES and health outcomes. Although NCDS has an unusually extensive array of measured family environment variables, the list will always be incomplete. With this in mind, we reestimated our models without including the "family difficul-

ties" variables listed above to assess what the bias would have been from omitting this large set of family difficulties variables. The estimated effects of a childhood psychological problem hardly changed. Moreover, Smith and Smith (14) found that within-sibling estimates were not very different from single respondent estimates of effects of mental health problems on later-life SES outcomes. This may indicate that any remaining left-out common family-level variables may not lead to large biases.

What is the total working lifetime economic cost of childhood psychological problems? If we linearly interpolate between our ages of data collection and conservatively assume that the income loss remains flat from age 50 y until the woman's retirement age at age 60 y, the discounted value of the working lifetime loss in net family income to this birth cohort discounted at a 3% real discount rate is £215,000. That was the historical work life cost for those born in 1958. If we consider instead a 23 y old entering the British labor market in 2008, the average lifetime net family income loss would be £388,000 because real incomes in Britain have grown considerably over this time period. This is an understatement of full costs because it does not include any psychological costs to the family, friends, and society, as well as the affected person.

The economic costs related to childhood mental disorders are far more important than physical illnesses during the childhood years, largely because the impacts of mental health problems occur early in adulthood whereas the physical health problems have a delayed impact. Effective treatments targeted to children that lower the risk of experiencing these psychological conditions or that mitigate adult psychological and economic consequences are likely to have long-lasting payoffs and to be very cost-effective.

Table 5. Effects of childhood psychological problems by age 16 y on indicators of social mobility and employment stability

Variable	Lower occupation status at age 42 y than father	Higher occupation status at age 42 y than father	Lower occupation status at age 42 y than age 23 y	Higher occupation status at age 42 y than age 23 y	No. of jobs between ages 23 and 42 y	Fewer years of education than father	More years of education than father
Psychological problems (6.8%)	0.120*	−0.130*	0.099*	−0.096*	−0.428*	0.014†	−0.057*
Minor physical problem (43.8%)	0.002	0.016	−0.018†	0.001	0.051	−0.003	0.000
Major physical problem (9.1%)	−0.003	−0.017	0.010	0.009	0.014	−0.001	−0.022‡
Low birth weight (6.0%)	0.023	−0.035	−0.004	−0.059†	−0.089	0.003	−0.021
Sample size	8,788	8,788	6,113	6,113	11,051	7,727	7,727

The set of regressors in each model here is identical to that in the model presented in Table 4. See text for details of the outcome measures.
*Significant at 0.01 level.
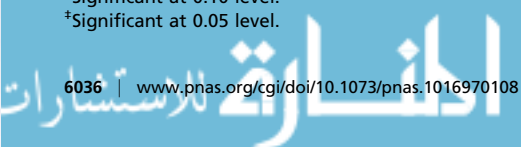†Significant at 0.10 level.
‡Significant at 0.05 level.

Table 6. Possible pathways between childhood psychological health problems and adult family income

Variable	Age (y)			
	23	33	42	50
Log family income	−0.185*	−0.220*	−0.259*	−0.278*
+ Formal education	−0.191*	−0.192*	−0.221*	−0.227*
+ Adult physical health	−0.182*	−0.163*	−0.198*	−0.159*
+ "Big Five" personality traits and life satisfaction indicators	NA	NA	NA	−0.115[†]
+ Employment status	−0.126*	−0.120*	−0.144*	−0.097[†]
+ Partnership status, partner's education, and employment status	−0.066*	−0.064*	−0.071[†]	−0.061

The estimates presented in the first row are from the same model as that estimated in the first row of Table 1. Subsequent rows sequentially add additional variables. "Formal education" consists of indicator variables for having left school after 16 y and having a degree; "adult physical health" is an indicator variable equal to 1 if the cohort member says their general health is "poor" or "fair" as opposed to "good or excellent"; the personality traits and life satisfaction indicators (measured at age 50 y only) are the "Big Five" personality traits shown in Table 4, minus emotional stability, and indicators for whether the cohort member gets what they want out of life and can run life as they want, also shown in Table 4; employment status and variables relating to partners are defined in the same way as in the models estimated in Table 1. We have contemporaneous measures of the physical health, employment, and partnership variables in each wave: in each wave we control for current and lagged measures of these variables. Number of observations same as first row in Table 1. NA, not applicable.
*Significant at 0.01 level.
[†]Significant at 0.05 level.

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