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Document de travail (Docweb) nᵒ 1803

The Long-Lasting Effects of Family and Childhood on Adult Wellbeing: Evidence from British Cohort Data

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Février 2018

The Long-Lasting Effects of Family and Childhood on Adult Wellbeing: Evidence from British Cohort Data

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Abstract: To what extent do childhood experiences continue to affect adult wellbeing over the life course? Previous work on this link has been carried out either at one particular adult age or for some average over adulthood. We here use two British birth-cohort datasets (the 1958 NCDS and the 1970 BCS) to map out the time profile of the effect of childhood experiences on adult outcomes, including life satisfaction. We find that the effects of many aspects of childhood do not fade away over time but are rather remarkably stable. In both birth-cohorts, child non-cognitive skills are the strongest predictors of adult life satisfaction at all ages. Of these, emotional health is the strongest. Childhood cognitive performance is more important than good conduct in explaining adult life satisfaction in the earlier NCDS cohort, whereas this ranking is inverted in the more recent BCS.

Keywords: life satisfaction, cohort data, childhood, adult outcomes.

Effets de long terme de la famille et de l'enfance sur le bine-être des adultes : enquête sur les cohortes britanniques

Abstract : Dans quelle mesure les événements de l'enfance ont un impact sur le bien-être ressenti à l'âge adulte ? Les études précédentes sur cette question ont été réalisées à un âge donné ou pour un âge moyen au cours de la vie adulte. Nous utilisons dans cet article deux bases de données de cohortes britanniques (le NCDS 1958 et le BCS 1970) qui nous permettent de retracer le profil temporel de l'effet de l'enfance sur le bien-être à l'âge adulte et notamment la satisfaction dans la vie. Nous trouvons que plusieurs aspects de l'enfance ont un impact durable et remarquablement stable. Pour les deux cohortes, les compétences non-cognitives dans l'enfance sont le facteur qui prédit le mieux la satisfaction à l'âge adulte à tout âge. Parmi ces dernières, la santé émotionnelle est celle qui a le plus fort pouvoir prédictif. Les compétences cognitives de l'enfant sont plus importantes que la bonne conduite pour expliquer la satisfaction dans la vie à l'âge adulte pour la cohorte la plus âgée NCDS, alors que l'ordre est inversé pour la cohorte la plus récente BCS.

Mots-clefs : Satisfaction de vie, données de cohorte, enfance, influence à l'âge adulte.

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1. Introduction

Previous work has established that the childhood environment plays a powerful role in shaping both adult socioeconomic success and adult wellbeing. In particular, the analysis of British Cohort Study (BCS) data in Layard *et al*. (2014) revealed that a substantial proportion of the variation across individuals in life satisfaction at age 34 results from childhood cognitive and non-cognitive skills, family economic characteristics and parental psychosocial background.[1] Analogous findings appear in Frijters *et al*. (2014) using National Child Development Study (NCDS) data, for both average life satisfaction over time and life satisfaction at age 50.

This existing work has considered adulthood as a single period, focusing on a single adult year or the average over adult years. The implicit assumption is thus that the effects of childhood on adult life satisfaction remain constant over adult ages. However, a growing body of evidence has argued that the formation of skills and/or capabilities (for example intellectual performance, health, and socio-emotional skills) is, in fact, dynamic (see Heckman and Mosso, 2014, for a recent literature review). And as individual life satisfaction is thought to reflect these dynamically-accumulated capabilities (e.g. Oreopoulos and Salvanes, 2011, and Powdthavee *et al.*, 2015), we might equally expect the determinants of life satisfaction to change by adult age.

In the conventional model of skill formation, cognitive and non-cognitive skills are accumulated over time, and earlier stocks of skills depreciate with age (Grossman, 1972). The influence of childhood on later outcomes may then be attenuated over time (Todd and Wolpin, 2003 and 2007). A relatively happy childhood – in terms of financial resources, parental employment and education, emotional support, intellectual performance and health – may yield satisfaction in early adulthood, but with an effect that fades away at older ages. However, recent work on early-childhood development has emphasised the non-linear technology of skill formation (Cunha and Heckman, 2007, and Cunha *et al*., 2010).[2] Here the effects of childhood at different adult ages may persist.

We contribute to this literature by estimating the life-cycle effects of family environment and child outcomes on adult wellbeing at a number of different adult ages: this has not been taken into account in the existing life satisfaction literature. Following Layard *et al.* (2014), we also establish which of the intermediate adult outcomes (income, education, employment, health, etc.) are the most important channels for the effect of childhood on adult life satisfaction. We can thus establish which early childhood circumstances cast the longest shadow over both adult outcomes and life satisfaction at later ages.

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[1] The childhood variables in Layard *et al*. (2014) are grouped into family economic, family psychosocial, emotional health, good conduct and intellectual performance variables.

[2] Cunha *et al*. (2010) find that the elasticity of substitution between cognitive skills at a given age and investment in them in producing cognitive skills at a later age is relatively small, while the corresponding figure for non-cognitive skills is larger and remains substantial at all ages.

We use data from two British birth cohorts (the 1958 NCDS and the 1970 BCS) to analyse the determinants of a successful adult life. The 1970 BCS follows approximatively 17,000 individuals from birth up to age 42 at the most recent data sweep. BCS respondents are interviewed roughly every five years on a variety of topics, including health, the labour market, individual behaviours and family formation. As the BCS is a birth cohort, we also have information collected during the respondent's childhood. Adult life satisfaction is recorded when the respondent is aged 26, 30, 34 and 42. The 1958 NCDS also contains measures of both childhood experiences and outcomes during adulthood, including life satisfaction at ages 33, 42 and 50. The comparison of these two cohort datasets will allow us to look for differences in the age profile of the effect of childhood on adult wellbeing across birth cohorts.

The remainder of the paper is organised as follows. Section 2 presents a brief overview of the literature on the impact of childhood on adult wellbeing. Section 3 describes the datasets that we use, and Section 4 discusses our main results. Section 5 then looks at the various pathways from childhood experiences to adult wellbeing. Last, Section 6 concludes.

2. Background

There is by now a substantial literature on the relationship between childhood and later adult outcomes (see for example, Keane and Wolpin, 1997, Currie and Almond, 2011 and Huggett *et al.*, 2011).[3] This literature has clearly shown that early-life characteristics and circumstances predict adult outcomes, including wages, schooling, participation in crime, and success in many aspects of social and economic life. In recent years, economists have included life satisfaction in the list of adult variables that may be determined by childhood circumstances (Frijters *et al.*, 2014, and Layard *et al.*, 2014).

Programme interventions with long-term follow-ups have confirmed that childhood conditions do affect adult outcomes (see the recent review by Heckman and Kautz, 2014). The success of the Perry Preschool Program[4] in the US in the early 1960s is widely-cited in support of early public investment in disadvantaged children. The Perry program, along with other similar contemporary projects were found to significantly improve adult outcomes, including education, employment, earnings, marriage

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[3] For further details of each itemised childhood factor (for example birthweight, early health conditions, family income and environmental-risk exposure), see Ahlburg, 1998, Currie and Thomas, 1995 and 1999, McLeod and Kaiser, 2004, Case *et al.*, 2005, Black *et al.*, 2007, Blanden *et al.*, 2007, Mensah and Hobcraft, 2008, Currie, 2009, Smith, 2009, Contoyannis and Dooley, 2010, Currie *et al.*, 2010, Frijters *et al.*, 2010, Currie, 2011, Goodman *et al.*, 2011, Salm and Schunk, 2011, and Conti and Heckman, 2014.

[4] The Perry Preschool Program was a randomised trial that targeted disadvantaged low-IQ African-American children aged between 3 and 4. After two years, all participants left the programme and entered the same public school. Data were collected on the treatment and control groups up to age 40.

and participation in healthy behaviours, and to reduce participation in crime (Heckman *et al.*, 2010 and García *et al.*, 2016).[5]

Parental influence and family environment are well-documented key childhood circumstances that affect both cognitive and non-cognitive skills (Cunha and Heckman, 2008, Cunha *et al.,* 2010, Heckman and Mosso, 2014, and Conti and Heckman, 2014). These former include financial resources and financial strain, parental education and employment, parenting style and the family psychosocial environment. These cognitive and non-cognitive skills in turn have direct effects on wages, schooling, participation in crime, and many other aspects of social and economic life (see e.g. Heckman, 2005, Borghans *et al.,* 2010, and Heckman and Rubinstein, 2011).

Taking these observations as established, child development is conventionally considered as a cumulative function of past family background and skill acquisition (see Becker, 1967 and Grossman, 1972). In these models, skill is accumulated via a weighted linear technology, so that a skill acquired in a given period may have a declining effect as the individual ages.

However, the recent literature on the economics of child development takes an alternative approach. There is growing evidence that the technology of skill formation is, in fact, non-linear with dynamic complementarity (Cunha *et al.,* 2010). A key empirical finding here is that family environment in childhood remains an important contributor to adult success, and its influence in later life can be as large as that earlier in adult life. Strong evidence has been found for the effects of early health conditions, for example low birth weight or parental health conditions, on later physical health status (see Case *et al.,* 2005, Smith, 2009, and Currie *et al.,* 2010).

We here contribute to the literature on the life-cycle impact of childhood variables by focusing on adult life satisfaction. Our contribution is two-fold. We first model the effects of childhood, through family economic and parental psychosocial background and investment in cognitive and non-cognitive skills, on adult life satisfaction at different ages. Second, we ask which intermediate adult outcomes (income, education, employment and health) are the most important channels for the effect of childhood on adult life satisfaction at different ages.

3. Data and Methods

We use two British cohort datasets. The first is the 1970 British Cohort Study (BCS), which follows around 17,000 individuals from birth up to age 42 (at the latest data release). The data here provide a broad range of information on socioeconomic characteristics, subjective wellbeing, family

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[5] Examples of early-childhood programmes are the Carolina Abecedarian Project (ABC) and the Carolina Approach to Responsive Education (CARE). Both programmes were launched in the 1970s and have long-term follow-ups through to age in the mid-30s. The programmes started with early interventions (begun at the age of 8 weeks) and engaged participants from disadvantaged backgrounds up to age 5.

environment and individual life circumstances. Information is available on respondents at birth and ages 5, 10, 16, 26, 30, 34 and 42. Subjective wellbeing is assessed using the life satisfaction question "*How dissatisfied or satisfied you are about the way your life has turned out so far*", with responses on a 0-10 scale, from age 26 onwards. The descriptive statistics for adult life satisfaction and the main BCS childhood variables we use in our analysis appear in the left-hand panel of Table 1.

The second cohort dataset is the National Child Development Study (NCDS), which covers 17,000 children born in England, Scotland and Wales in a single week in 1958. Following the birth survey in 1958, there have been nine public-use sweeps of the survey members at ages 7, 11, 16, 23, 33, 42, 46, 50 and 55. At ages 33, 42 and 50, cohort members answered the same life satisfaction question as in the BCS above, with answers on the scale from 0 "completely dissatisfied" to 10 "completely satisfied". The right-hand panel of Table 1 describes the main NCDS variables, which mirror closely those from the BCS.

Figures 1A and 1B depict the kernel distribution of life satisfaction in the BCS (at ages 26, 30, 34 and 42) and the NCDS (at ages 33, 42 and 50) respectively. The modal life satisfaction score is 8 in both cohorts and at all ages. Just under 10% of BCS respondents reported being completely satisfied and around 5% dissatisfied (which we define as scores from 0 to 3). Average life satisfaction rises slightly from 26 to 34 and then falls from 34 to 42, but these movements are not statistically significant. Life satisfaction in early and middle adulthood is also flat in the NCDS.[6] Average NCDS life satisfaction does fall slightly in the later waves (i.e. at older ages)[7] but remains between seven and eight.

We estimate four specifications of the relationship between childhood variables and adult wellbeing. The first, simplest, one considers the direct relationship between childhood variables and adult subjective well-being:

$$LS_{i.t+s} = \alpha_1 + \beta_F FAMILY_{i,t} + \beta_C CHILD_{i,t} + \varepsilon_{i,t+s} \tag{1}$$

where $LS_{i.t+s}$ refers to the reported life satisfaction of individual i at period s after the childhood period of t. $FAMILY_{i,t}$ and $CHILD_{i,t}$ are vectors of family-background and childhood characteristics respectively (and so are measured at time t). If the error term $\varepsilon_{i,t+s}$ is orthogonal to $FAMILY_{i,t}$ and $CHILD_{i,t}$ then the estimated values of β_F and β_C will show us how family and childhood circumstances affect adult life satisfaction. Identification in equation (1) comes from between-person variation in the childhood and family variables.

We carry out this analysis for each of the different adult ages at which we have life satisfaction information (26, 30, 34 and 42 for the BCS; 33, 42, and 50 for the NCDS). This allows us to test

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[6] In the 2008 sweep, 7.8% of respondents were completely satisfied and 4% dissatisfied with their lives.
[7] This fall is significant at the 10% level, but not at the 5% level.

whether the estimated coefficients β_F and β_C in equation (1) are stable over different adult ages (i.e. for different values of s). We use balanced samples of respondents, so that the comparison across adult ages will always be carried out using data from the same individuals.[8] This produces balanced observations on 5,046 individuals in the BCS and 6,875 individuals in the NCDS. The summary statistics for the balanced sample appear in Table 1 and can be compared to those for the full sample in Appendix Table A1. In the NCDS, the individuals in the balanced sample are similar to those in the full sample with respect to many characteristics. Nevertheless, household income and the measure of intact families (both natural parents living in the household) are both higher in the balanced sample. The differences between the balanced and full sample in the BCS seem smaller. In both datasets, the child outcomes in the balanced sample reveal somewhat better intellectual performance, but similar levels of childhood emotional health and conduct.

We have a number of variables that characterise childhood and the family environment, and we may worry about multi-collinearity. We circumvent this problem by following the approach in Layard *et al*. (2014), where the childhood and family variables are aggregated into five composite indicators: family economic, family psychosocial, emotional health, good conduct and intellectual performance (see Layard *et al*., 2014, for a detailed description of the method used, and Appendix Tables B1 and B2 for more details).[9] Tests of internal reliability (Cronbach's alpha scores) are also calculated in Appendix Table A2: these produce scores for these composite childhood variables that are mostly above 0.6.

One issue in using these cohort data is that there are many missing values for the variables we are interested in. When they are no observations on a right-hand side variable, we address this problem via mean imputation with missing indicator dummy variables (the so-called Missing Indicator method). To assess whether the data is missing at random and whether this could have affected the coefficient estimates in our model, we report the coefficients associated with the set of missing indicator dummies in the life satisfaction regressions in Appendix Table A3. Most of these dummies are not statistically significant (at the 10% level). In the BCS, individuals with missing values for father's education tend to report lower levels of satisfaction. In the NCDS, only the missing dummies for childhood conduct and childhood emotional health at age 11 are statistically significant. However, this is not a common pattern at all ages since the missing dummies for childhood conduct and childhood emotional health are not significant at ages 7 and 16.

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[8] Note that both BCS and NCDS face issues of attrition as their samples become older.

[9] In Layard *et al*. (2014) (Figure 3), skills during childhood are calculated as a weighted sum over three childhood periods (ages 5, 10 and 16). The family-background variables include family economic (father's social class, family income, family size, father's employment and parents' education) and family psycho-social conditions. Lekfuangfu and Lordan (2015) consider the effect of childhood on later cognitive skills, and group the childhood variables into five age categories instead of summing them from ages 0 to 16.

The second regression asks to what extent the direct effects of family and childhood on life satisfaction identified in equation (1) are mediated by other adult outcomes. We thus extend equation (1) to include seven contemporaneous adult outcomes (education, income, labour-force status, marital status, emotional health, physical health and good conduct). Appendix Table B.1 describes in more detail the definition of these adult outcomes. Note that emotional health and physical health are measured lagged by one survey wave. Equation (2) then describes the determinants of life satisfaction, as a function of both current adult achievements and childhood background. We again estimate this equation at a number of different ages, to see how this production technology changes at different respondent ages. The analysis of BCS data at age 34 in Layard *et al.* (2014) revealed adult emotional health to be the dominant factor: equation (2) will check whether this is the case at all adult ages.

$$LS_{i,t+s} = \alpha_2 + \gamma_F FAMILY_{it} + \gamma_C CHILD_{it} + \gamma_A ADULT_{i,t+s} + \epsilon_{i,t+s} \tag{2}$$

The specification of equation (2) assumes that current adult outcomes ($ADULT_{i,t+s}$) reflect all of the adult-life outcomes that matter. We may alternatively consider that some types of life-course transitions continue to matter in their own right, even conditional on the final adult outcomes at period $t+s$. In particular, Switek (2013) emphasises the importance of transitions between the ages of 16 and the 20s to early 30s in defining the later adult.

Our third regression then adds a set of life-transition variables up to a time *s'* after childhood to the mediated analysis in equation (2). Note that the definition of success during young adulthood may differ from that at other ages. Adults in their 40s are considered successful if they are married with children, but this is not necessarily the case for teens or those in their early 20s (Marini, 1984, Hogan and Aston, 1986, and Billari, 2001). Our young-adult success transitions ($TRAN_{i,t+s'}$) include that from school to work (the age left full-time education, and the characteristics of the first job), partnership (early marital breakdown), parenthood (early parenthood and lone parenthood), and independence (age left home).

$$LS_{i,t+s} = \alpha_3 + \delta_F FAMILY_{it} + \delta_C CHILD_{it} + \delta_A ADULT_{i,t+s} + \delta_R TRAN_{i,t+s'} + \tau_{i,t+s} \tag{3}$$

Last, to dig more deeply into the mechanisms through which childhood circumstances relate to adult life satisfaction, we run further mediation analysis estimations using structural equation modelling (Baron and Kenny, 1986, Hayes, 2009, and Powdthavee *et al.*, 2015). This method will allow us to gauge the indirect effects of childhood factors on life satisfaction via adult outcomes and younger-adult transition variables. The equations are as follows:

$$ADULT_{i,t+s} = \theta_A + \pi_F FAMILY_{it} + \pi_C CHILD_{it} + \upsilon_{i,t+s} \tag{4.1}$$

$$TRAN_{i,t+s'} = \theta_R + \rho_F FAMILY_{it} + \rho_C CHILD_{it} + \omega_{i,t+s'} \tag{4.2}$$

We here estimate equation (3) with equations (4.1) and (4.2) simultaneously, using SEM. In equation (3), δ_F and δ_C denote the direct effects of family and childhood background on adult life satisfaction, conditional on the adult outcomes and transitions. The indirect effects of these variables via adult outcomes are then $\delta_A * \pi_F$ and $\delta_A * \pi_C$; analogously, the indirect effects via the early-life transitions $TRAN_{i,t+s'}$ are $\delta_R * \rho_F$ and $\delta_R * \rho_C$. Therefore, the total effect of each childhood factor is the summation of its direct effect on life satisfaction, the indirect effect via each transitional variable and the indirect effect via each adult outcome.

The variables in all regressions are coded so that higher numbers represent more positive outcomes. All variables, including the composite variables (for family background and childhood), are standardised, with means of 0 and standard deviations of 1.

4. The impact of family background and childhood on adult life satisfaction

4.1. Baseline results

Table 2 shows the results from the estimation of equation (1) at a number of different ages, *t+s* (26, 30, 34 and 42 for the BCS in the top panel, and 33, 42 and 50 for the NCDS in the bottom panel). In the BCS, the childhood family economic, family psychosocial, emotional health, good conduct and intellectual performance variables are all significant predictors of adult life satisfaction at all four adult ages. The same holds in the NCDS, apart for childhood conduct.

The last column of Table 2 estimates the average adult life satisfaction score over all available years. Childhood emotional health is the strongest predictor of adult life satisfaction in both the BCS and the NCDS (at around 0.2 - 0.3 of a standard deviation). Childhood conduct is second in the BCS, followed by all of the other three background variables (family economic, family psychosocial and intellectual performance), which have similar effect sizes. In the NCDS, it is rather intellectual performance that is in second place, followed by family economic and family psychosocial tied in third place, with childhood conduct being insignificant. There has thus been a notable evolution in the role of child conduct between the two cohort sweeps. For the 1958 cohort, conduct was unimportant, with intellectual performance taking second place only to emotional health in determining adult well-being. Twelve years later, in the BCS cohort, good conduct as a child was just behind emotional health as a determinant of adult life satisfaction; intellectual performance remained significant but was now less important than child behaviour. These differences across cohorts are statistically significant. We systematically test whether the estimated coefficients on the explanatory variables at similar ages are different in the BCS and the NCDS via a t-test. The results of this test appear in Appendix Table A4.

We can also read Table 2 horizontally, instead of vertically, to see how these regression coefficients change at different adult ages; these estimated coefficients are depicted visually in Figures 2A and 2B for the BCS and the NCDS respectively. Overall, the results suggest that the link between childhood characteristics and adult wellbeing is remarkably stable, and we find no evidence that the influence of childhood experiences on adult life satisfaction fades away as the years go by. The p-values of the joint tests of whether the coefficients are different across all ages are all above 0.10.

Note that the R-squared statistics are around 4% in all of the BCS sweeps. Hence, without controlling for other adult outcomes, childhood and family characteristics account for 4% of the between-person variation in adult life satisfaction from ages 26 to 42. The explanatory power is smaller in the NCDS (at 3%).

Appendix Table A5 revisits the results shown in Table 2 by dropping from the estimation of equation (1) the variables that are not consistently measured in the BCS and NCDS. We might worry here that differences across cohorts in the way the childhood outcomes are measured will automatically bias the cross-cohort comparison of the estimated coefficients.[10] Appendix Table B3 shows the set of covariates used in our additional regressions for equation (1). Across all ages, we do not find significant changes in the sign and size of the estimated coefficients, both for the NCDS and the BCS. This provides some supportive evidence that our results on childhood influences on adult life satisfaction are not affected by the background measures being defined differently across cohorts.

Table 3 asks whether the effects of childhood and family background on adult life satisfaction differ by gender. In both the NDCS and the BCS, family psychosocial matters more for female than for male life satisfaction. On the contrary, the effect of child intellectual performance is larger for men than for women in the BCS. Overall, the gender differences here are not particularly striking.

4.2. Adding contemporaneous adult outcomes

We now add the proximal adult outcomes to the specification in Table 2 above. The coefficients γ_F and γ_C in equation (2) reveal the residual influence of the family and childhood variables respectively on adult life satisfaction, independent of any effect that they may have on the seven adult outcomes that we consider. Table 4 shows the results from the BCS (in columns 1-4) and the NCDS (columns 5-7). Adult emotional health (lagged by one survey wave) exhibits the strongest correlation with life satisfaction across all ages and in both cohorts (with an effect of around 0.2 to 0.3 standard deviations). Contemporaneous marital status and physical health (lagged one survey wave) are also

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[10] As an example, the age-16 measure of intellectual performance in the BCS is "whether any GCSE pass" while the analogous measure in the NCDS is "reading and math teacher's assessments". See Appendix Table B1.

consistently correlated with life satisfaction. The correlations with labour-force status and log income are almost as consistent but are smaller in size. Last, most of the correlations with contemporaneous education and conduct are insignificant.

Controlling for adult outcomes for the most part (unsurprisingly) reduces the estimated coefficients on the childhood variables: part of the effect of family and childhood works through the adult outcomes. The coefficients on child emotional health fall substantially in both the BCS and the NCDS (but remain significant), while those on intellectual performance are now small or zero. Childhood conduct remains an important determinant of adult life satisfaction in the BCS, even conditional on adult outcomes, but not in the NCDS. Note again, that the difference between the estimated childhood-conduct coefficient in the BCS and the NCDS is statistically significant (see Appendix Table A4).

4.3. Adding young adulthood life transitions

We here turn to a potentially independent role for life transitions in early adulthood, conditional on the final adult outcomes that are observed contemporaneously with life satisfaction: this is the specification in equation (3) above. The life transitions we consider here are early parenthood, lone parenthood, the age at which the individual left full-time education, the first job being full-time, early marital breakdown and the age at which the individual left home.

Table 5 shows the results when we include these young adult transition variables in addition to the adult outcomes and child and family background variables that already appeared in Table 4. A number of these transitions are significant predictors of adult life satisfaction, even controlling for contemporaneous adult outcomes. In particular, early lone parenthood and marital breakdown continue to cast a shadow on life satisfaction many years later in both datasets: the effect here is found for life satisfaction at younger adult ages. Perhaps more interestingly, the introduction of these transition variables has very little effect on the estimated coefficients on the childhood variables, which are very similar to those in Table 4.

5. The indirect effects of childhood

5.1. Via contemporaneous adult outcomes

The estimated coefficients on the family and childhood variables in Table 2 were reduced in size by the introduction of contemporaneous adult outcomes into the life satisfaction regressions in Table 4 and of young adult transitions in Table 5. We thus suspect that the family and childhood variables themselves should help predict both the young adult transitions and the contemporaneous adult

outcomes. First, we check for this mediation via contemporaneous adult outcomes by estimating equation (4.1). The comparison of the BCS childhood determinants of well-being in Tables 2 and 4 reveals that almost all the effect of childhood intellectual performance works via adult outcomes, with analogous figures of over one half for childhood emotional health and one quarter to one half for childhood behaviour. The mediation in the NCDS is of similar size.

Figures 3A-3G and 4A-4G plot the effect of each of our five family and childhood composite variables on the seven contemporaneous adult outcomes in the BCS and the NCDS, respectively. The bars on the Y-axis depict the estimated coefficients at the different adult ages, with the associated 95% confidence intervals.

In the NCDS, childhood intellectual performance is an important predictor of practically all adult outcomes, and is the largest predictor of adult income, employment and education. Remarkably, it is also just as important as childhood emotional health in predicting adult physical and emotional health. Childhood behaviour also has quite consistent effects on adult outcomes, but with an effect size that is much smaller. Childhood emotional health predicts the "social" outcomes of adult marital status, and physical and mental health. Family psychosocial background is correlated with adult marital status and good conduct. Last, the effect of family economic background is much like that of childhood intellectual performance, but of smaller size.[11]

The results in the more recent BCS data are to some extent similar. However, although childhood intellectual performance continues to be an important predictor of practically all adult outcomes, its role in predicting adult physical and emotional health is now much reduced compared to that of childhood emotional health. Childhood behaviour in the BCS predicts every adult outcome, and with an effect size that is notably larger than that in the NCDS cohort twelve years earlier. Last, the effect of family economic background seems more pronounced in the BCS than in the NCDS cohort.

5.2. Through young adult transitions

We here consider mediation effects via the young adult transitions shown in Table 5. To do so, we run the specification in equation (4.2) with each of young adult transitions as outcome variables. The results are shown in Figures 5A and 5B for the BCS and NCDS respectively. Unsurprisingly, childhood intellectual performance is the best predictor of age left full-time education in both datasets and is in general a very consistent predictor of all young adult transitions. Childhood behaviour is also a consistent predictor of transitions, with an effect size that is notably larger in the (more recent) BCS than the NCDS. Childhood emotional health is not a strong predictor of transitions.

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[11] Apart from a striking negative correlation with adult marital status, at least in earlier adult years: this probably reflects later marriage by those with more advantaged backgrounds.

The comparison of the estimated coefficients on family and childhood background in Tables 4 and 5 does however reveal that the inclusion of these young adult transitions does not change our broad conclusions regarding the mediating effect of adult outcomes in Section 5.1 above.

5.3. Calculating mediation effects of childhood circumstances on adult life satisfaction using SEM

To concretely establish the size of indirect and direct effects of childhood circumstances on adult life satisfaction, we adopt a standard structural equation model (SEM) (Baron and Kenny 1986, and Powdthavee *et al.*, 2015). In this analysis, we allow family and childhood background at young ages to have indirect effects of life satisfaction through young adult transition outcomes as well as adult contemporaneous outcomes simultaneously.

Recall that δ_F and δ_C denote the direct effects of childhood circumstances on adult life satisfaction (section 3). The indirect effects of these variables via adult outcomes are $\delta_A * \pi_F$ and $\delta_A * \pi_C$, while the indirect effects via early-life transitions are $\delta_R * \rho_F$ and $\delta_R * \rho_C$. Therefore, using SEM with equations (3), (4.1) and (4.2) simultaneously allows us to calculate the total effects of childhood circumstances on adult life satisfaction. The results from this joint estimation appear in Table 6 for the BCS and NCDS.[12] In column 2 of Table 6, the direct effects of childhood are the same as those that appear in the childhood panel of Table 5, by the construction of the equation. Note, again, that these direct effects of childhood are significant for almost all childhood variables on both the BCS and the NCDS. The indirect effects are the modelled relationships between the childhood variables and both the young-adult transitions and the adult outcomes (which appear in equations 4.1 and 4.2). As was the case previously, about half of the effect of the childhood variables is indirect. More precisely, the comparison between the direct and indirect effects also reveal that over one half of the effect of emotional health works via adult outcomes and early-life transitions and almost all the effect of childhood intellectual performance is indirect. Finally, the results confirm that childhood emotional health has the largest total effect at most ages and in both datasets.

6. Conclusions

There is now increasing interest in not only the contemporaneous correlates of subjective well-being but also the distal correlates. We here use two UK birth cohorts, the 1958 NCDS and the 1970 BCS, to show how family background and childhood variables are related to life satisfaction measured at a variety of adult ages.

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[12] We also run the SEM for only equations (2) and (4.1) (ignoring the young adult transitions). See Table A6 in the Appendix for the estimation findings.

There are first a number of similar findings across the two cohorts. Perhaps the most important one is that there is little evidence that the distal determinants of adult well-being change over time: the childhood factors that predict life satisfaction in the 20s predict it just as well in the 40s and beyond. The effect of childhood and family does not then fade away over time. In both cohort datasets, it is childhood emotional health that is the strongest predictor of adult life satisfaction.

The predictors of adult life satisfaction are not entirely the same in the BCS and NCDS, however. In particular, the role of childhood intellectual performance is weaker in the later cohort, while the effect of childhood behaviour is stronger (childhood behaviour is not significantly correlated with adult life satisfaction in the NCDS).

When we add adult outcomes, we find that adult emotional health has the largest correlation with adult life satisfaction at all ages in both datasets, but there is little independent role for education. There are again some notable differences: family is more important in the NCDS than in the BCS (although the family effect is notably larger in the latter for respondents in their 30s). Physical health is less important in general in the NCDS, but its coefficient does increase sharply for the respondents at age 50.

The adult outcomes mediate the effect of childhood. Almost all of the effect of childhood intellectual performance works via these adult outcomes, and over half that of childhood emotional health. The figure for childhood behaviour is smaller.

Our results underline the importance of emotional health, both in adulthood and childhood, in determining adult life satisfaction. More broadly, they show that interventions that affect adult outcomes, given childhood and family background, can improve adult well-being, and so can interventions that target the childhood outcomes themselves. There is thus a role for policy all through the lifetime.

The correlations that we find here are similar for our two UK cohorts. But we still only know how to predict the life satisfaction of middle-aged British respondents. That the correlations are similar over adult ages is a useful finding, but one that we would like to extend to older ages. Equally, these results refer to only one country, and their replication elsewhere is part of a current broad international effort to use cohort datasets to inform policy about the causes of well-being throughout life.

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Figures

Figure 1A and 1B: The distribution of life satisfaction by age in the BCS and NCDS

Figure 1A: BCS at ages 26, 30, 34 and 42
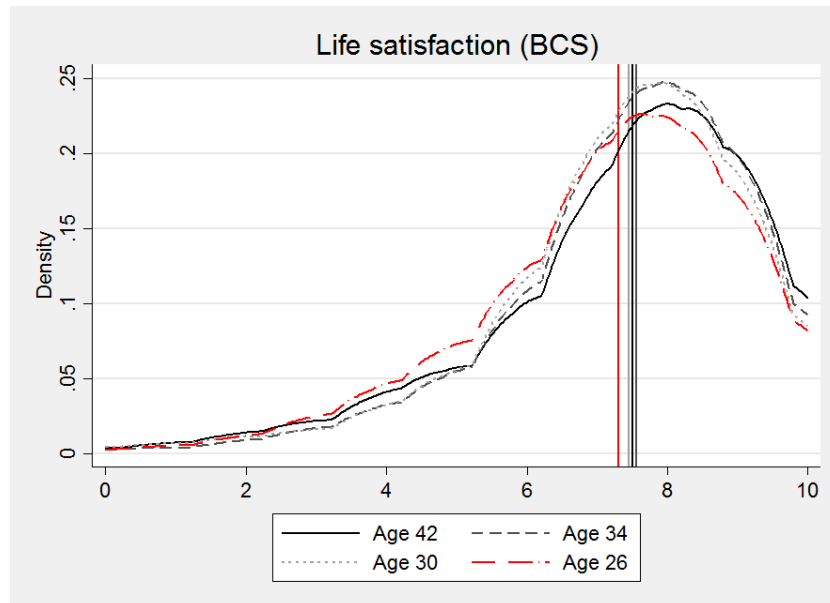
Figure 1B: NCDS at ages 33, 42 and 50
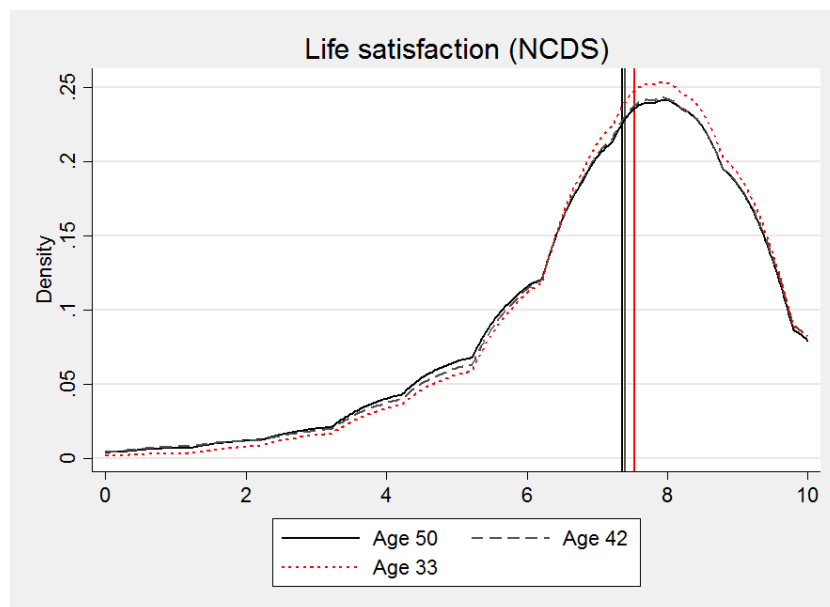
Note: The vertical lines refer to mean life satisfaction by age.

Figures 2A and 2B: The predictors of adult life satisfaction at different ages. Balanced sample (BCS and NCDS)

Figure 2A: BCS
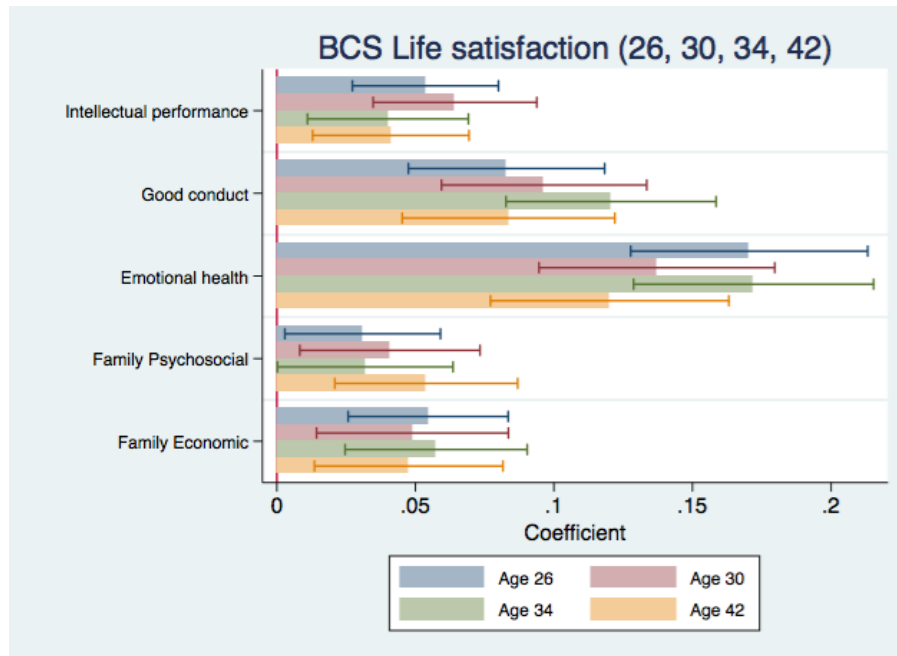
Figure 2B: NCDS
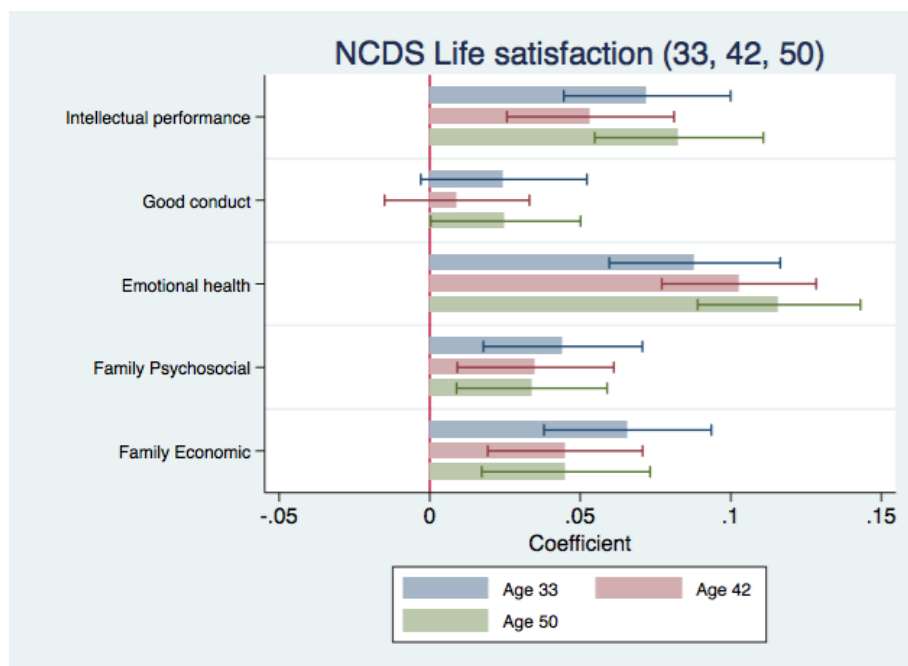
Note: The bars on the Y-axis depict the estimated coefficients from each of the life satisfaction equations at the different adult ages, with the associated 95% confidence intervals shown as the horizontal line.

Figure 3A-3D: Predictors of adult outcomes at different ages. (BCS - Balanced sample)

Fig 3A
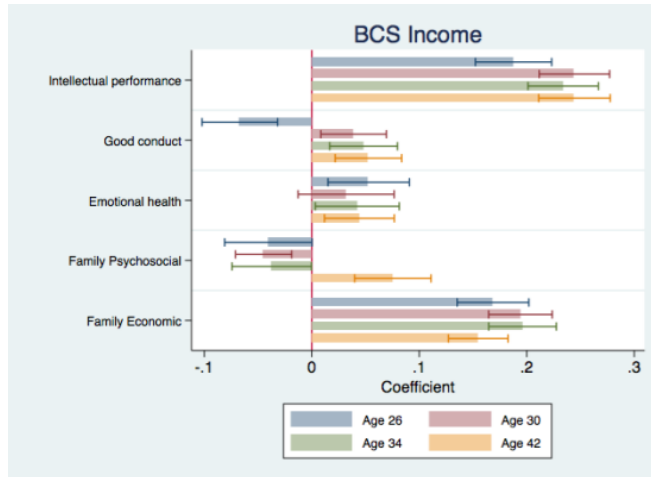
Fig 3B
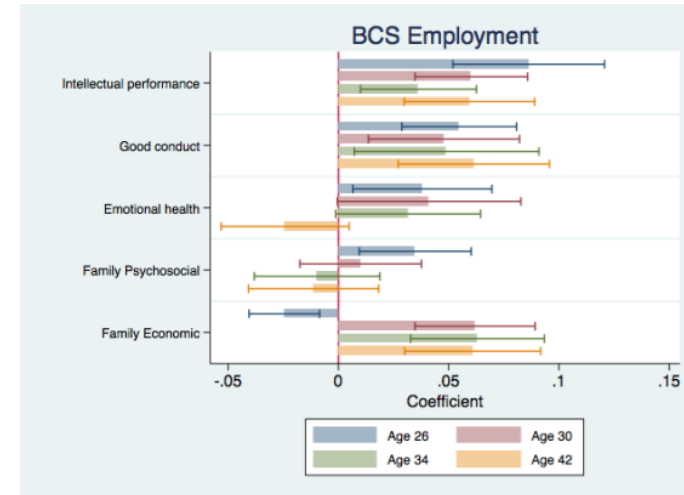
Fig 3C
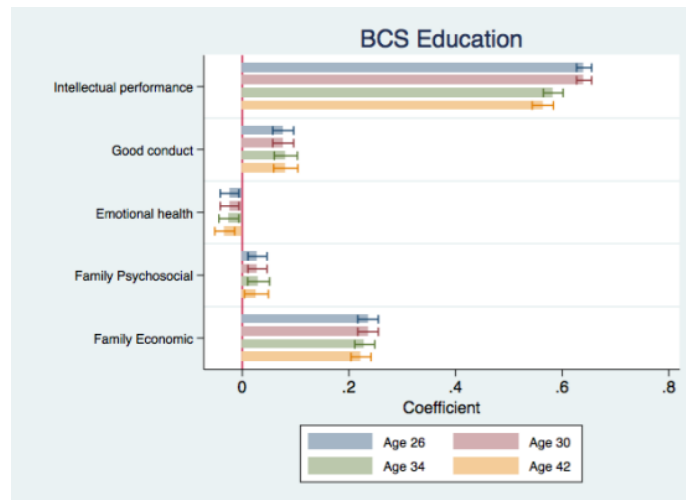
Fig 3D
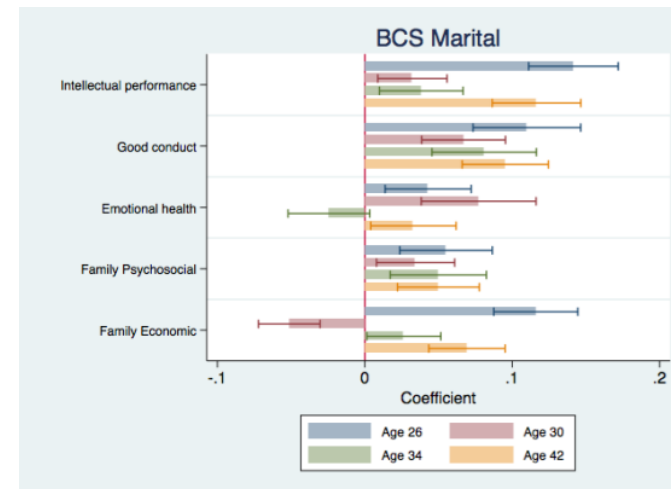
Figure 3E-3G: Predictors of adult outcomes at different ages. (BCS - Balanced sample)

Fig 3E
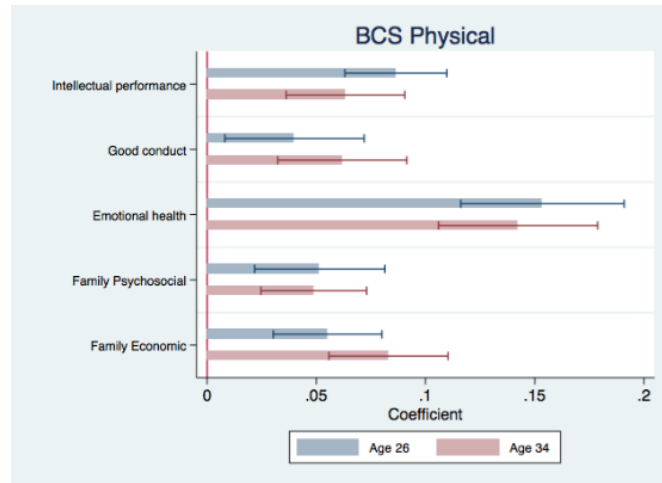
Fig 3F
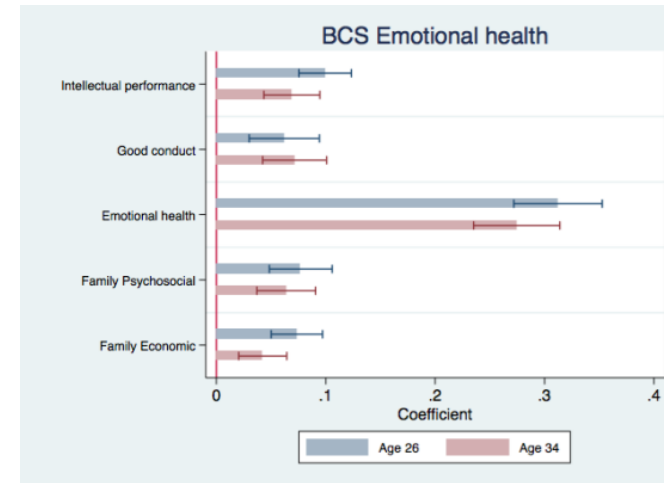
Fig 3G
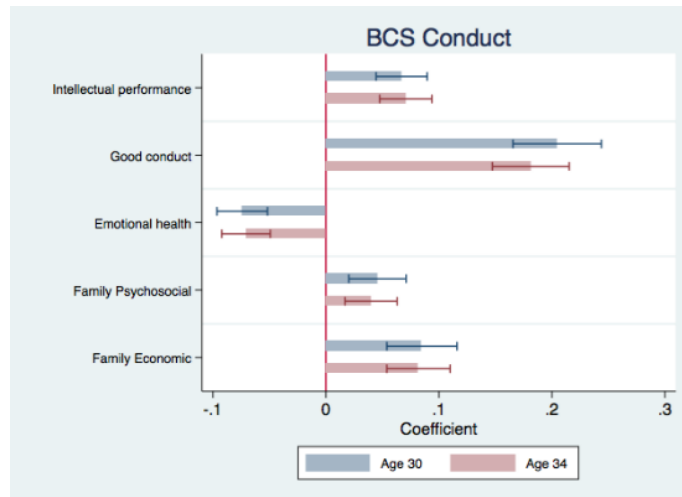
Notes: See Figure 2. Physical and Emotional Health are only measured at ages 26 and 34 in the BCS and Conduct only at ages 30 and 34.

Figure 4A-4G: Predictors of adult outcomes at different ages. (NCDS - Balanced sample)

Fig 4A
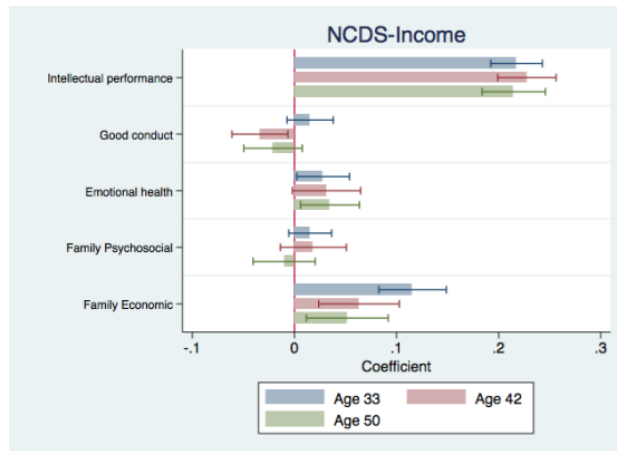
Fig 4B
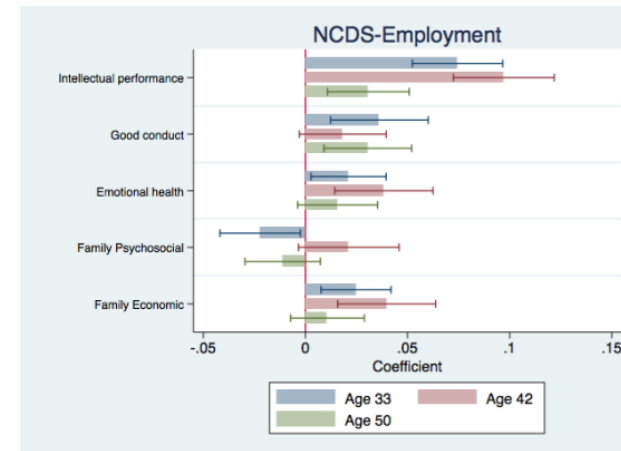
Fig 4C
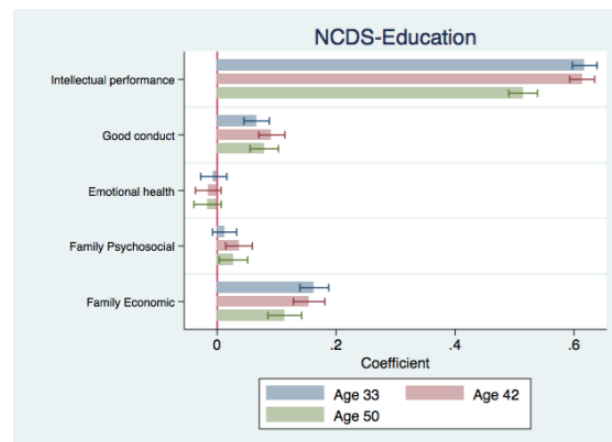
Fig 4D
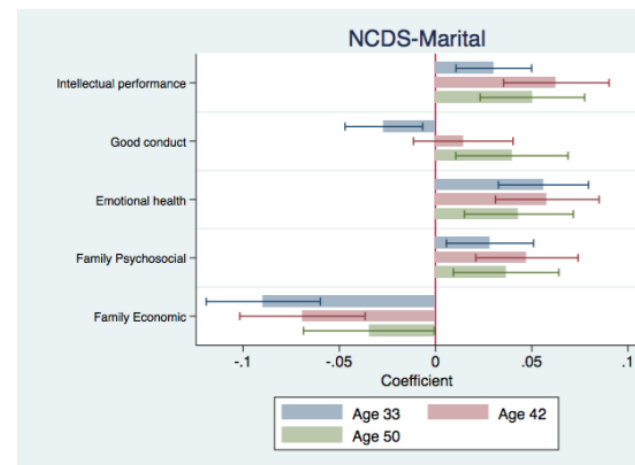
Fig 4E
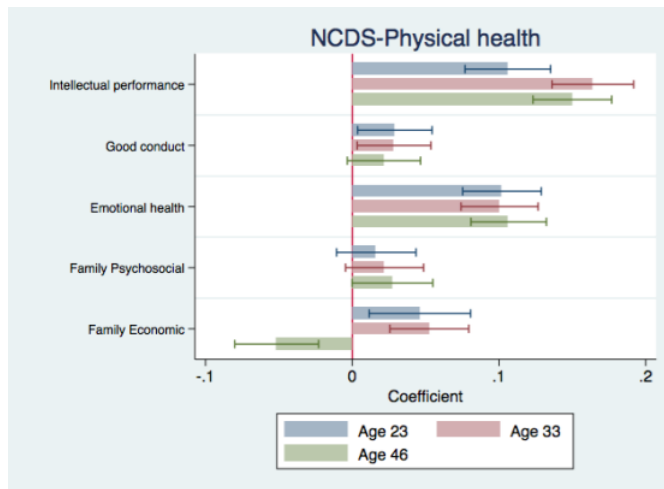
Fig 4F
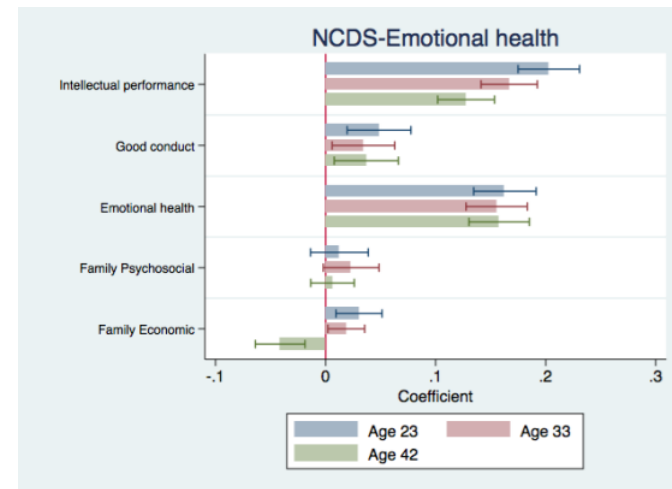
Fig 4G
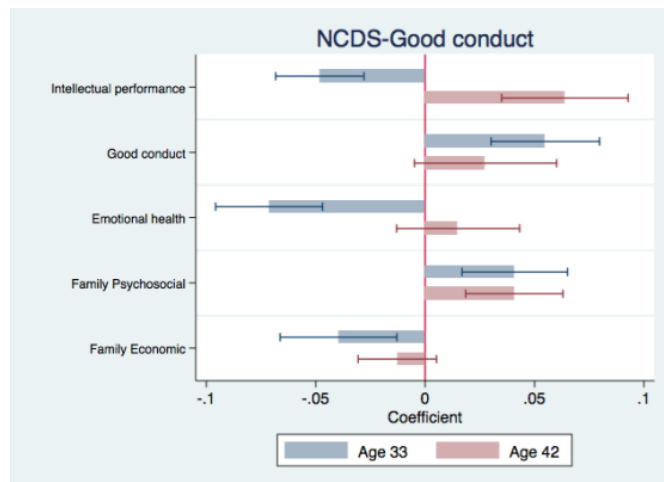
Note: See Figure 2. Conduct is only measured at ages 33 and 42 in the NCDS.

Figure 5: Predictors of young adult transitions (BCS and NCDS)

Figure 5A: BCS (Balanced)
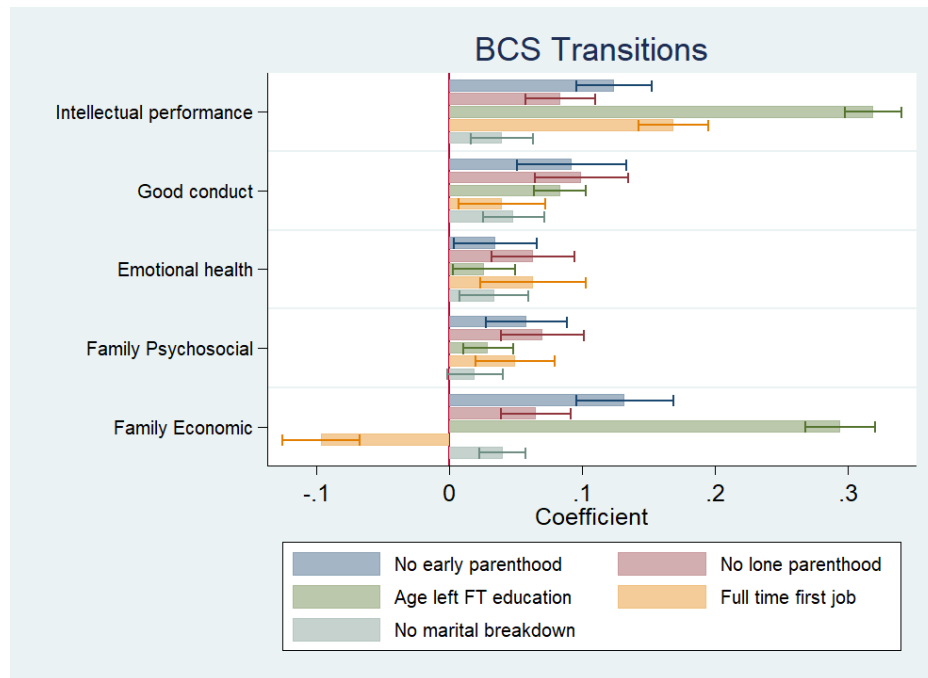
Figure 5B: NCDS (Balanced)
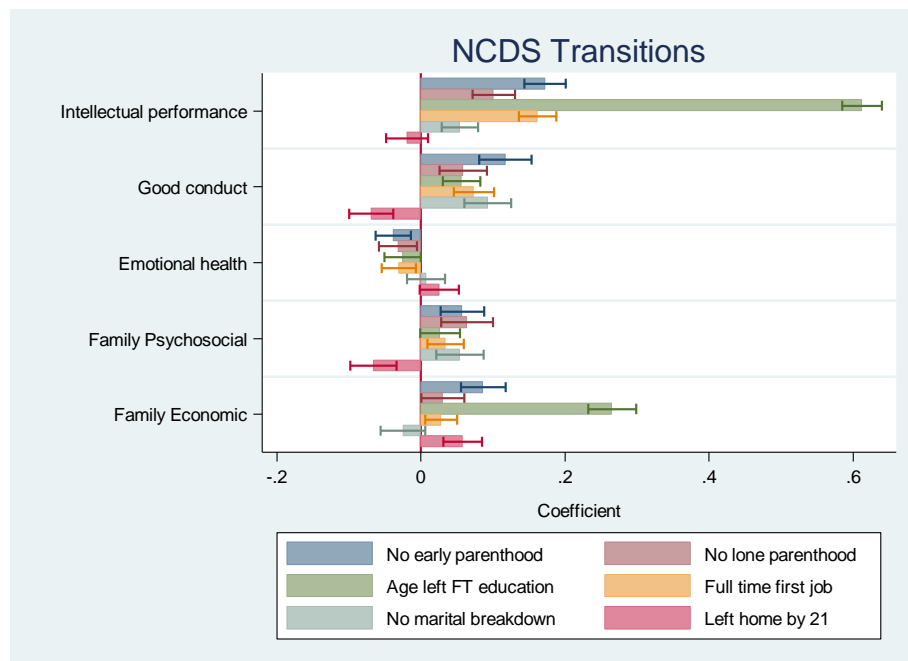
<u>Note</u>: See Figure 2

Tables

Table 1: Descriptive statistics for life satisfaction and the childhood variables (balanced sample with full information on life satisfaction)

	BCS			NCDS		
	Obs	Mean	SD	Obs	Mean	SD
Life satisfaction at 26 (BCS)	5,046	7.301	1.83	*NA*	*NA*	*NA*
Life satisfaction at 30 (BCS)	5,046	7.4	1.7	*NA*	*NA*	*NA*
Life satisfaction at 33 (BCS), 33 (NCDS)	5,046	7.55	1.7	6,875	7.53	1.63
Life satisfaction at 42 (BCS), 42 (NCDS)	5,046	7.51	1.89	6,875	7.40	1.79
Life satisfaction at 50 (NCDS)	*NA*	*NA*	*NA*	6,875	7.36	1.79
Social class of the father (% top 2 classes)	4,176	36.75	48.22	4,297	37.93	48.53
Log of Family weekly income	4,178	4.81	0.5	2,410	4.82	1.05
Total number of siblings	4,798	1.63	1.13	6,549	2.15	1.39
Average employment rate of father	3,717	0.97	0.12	6,639	0.83	0.33
Age mother left full-time education	5,041	15.8	2.07	6,019	15.78	0.43
Age father left full-time education	5,000	15.95	2.36	6,355	16.39	1.60
Mother's average mental health	4,033	0.81	0.12	*NA*	*NA*	*NA*
Post-marital conception	4,972	0.93	0.26	6,875	0.97	0.16
Both natural parents live in household	3,468	0.87	0.33	6,875	0.73	0.23
Emotional health at 5 (BCS), 7 (NCDS)	4,434	0.63	0.13	6,114	0.82	0.12
Emotional health at 10 (BCS), 11 (NCDS)	4,550	0.6	0.12	5,978	0.82	0.13
Emotional health at 16	2,097	0.75	0.11	6,282	0.92	0.09
Good conduct at 5 (BCS), 7 (NCDS)	4,415	0.81	0.14	6,103	0.77	0.17
Good conduct at 10 (BCS), 11 (NCDS)	4,524	0.86	0.12	5,976	0.78	0.17
Good conduct at 16	3,444	0.93	0.13	5,281	0.92	0.11
Intellect at 5 (BCS), 7 (NCDS)	4,419	0.64	0.24	6,214	0.61	0.13
Intellect at 10 (BCS), 11 (NCDS)	4,093	0.63	0.11	6,030	0.56	0.15
Intellect at 16	5,046	0.76	0.43	5,536	0.57	0.23

Table 2: The family and childhood predictors of adult life satisfaction at different ages (Balanced sample)

	Life Satisfaction at Age:				
BCS	26	30	34	42	Average
Intellectual Performance [5 10 16]	0.054***	0.064***	0.040***	0.041***	0.092***
	[0.013]	[0.015]	[0.015]	[0.014]	[0.021]
Good Conduct [5 10 16]	0.083***	0.096***	0.121***	0.084***	0.190***
	[0.018]	[0.019]	[0.019]	[0.020]	[0.028]
Emotional Health [5 10 16]	0.170***	0.137***	0.172***	0.120***	0.298***
	[0.022]	[0.022]	[0.022]	[0.022]	[0.032]
Family Psychosocial [5 10 16]	0.031**	0.041**	0.032**	0.054***	0.074***
	[0.014]	[0.017]	[0.016]	[0.017]	[0.024]
Family Economic [5 10 16]	0.055***	0.049***	0.058***	0.048***	0.098***
	[0.015]	[0.018]	[0.017]	[0.017]	[0.025]
Observations	5,046	5,046	5,046	5,046	5,046
Adj. R-squared	0.039	0.035	0.040	0.028	0.061
NCDS		33	42	50	Average
Intellectual Performance [7 11 16]		0.072***	0.053***	0.083***	0.124***
		[0.014]	[0.014]	[0.014]	[0.020]
Good Conduct [7 11 16]		0.025*	0.009	0.025**	0.028
		[0.014]	[0.012]	[0.013]	[0.020]
Emotional Health [7 11 16]		0.088***	0.103***	0.116***	0.182***
		[0.014]	[0.013]	[0.014]	[0.020]
Family Psychosocial [7 11 16]		0.044***	0.035***	0.034***	0.067***
		[0.013]	[0.013]	[0.013]	[0.018]
Family Economic [7 11 16]		0.066***	0.045***	0.045***	0.080***
		[0.014]	[0.013]	[0.014]	[0.019]
Observations		6,875	6,875	6,875	6,875
Adj. R-squared		0.019	0.018	0.024	0.033

Notes: Robust standard errors in parentheses. *** 1%, ** 5%, * 10%. All columns include a female dummy. For the BCS, childhood ages are 5, 10 and 16; for the NCDS they are 7, 11 and 16. All continuous variables are standardised. In the last column, average life satisfaction is calculated as the sample mean of life satisfaction across all ages for each cohort.

Table 3: BCS and NCDS results by gender

	BCS at Age:				NCDS at Age:		
	26	30	34	42	33	42	50
Panel A: Female							
Intellectual Performance	0.040**	0.042*	0.014	0.023	0.079***	0.035*	0.080***
	[0.019]	[0.023]	[0.020]	[0.022]	[0.019]	[0.021]	[0.020]
Good Conduct	0.089***	0.125***	0.144***	0.123***	0.027	0.011	0.028
	[0.027]	[0.029]	[0.033]	[0.031]	[0.019]	[0.018]	[0.018]
Emotional Health	0.171***	0.169***	0.165***	0.138***	0.085***	0.109***	0.131***
	[0.028]	[0.027]	[0.027]	[0.029]	[0.018]	[0.019]	[0.019]
Family Psychosocial	0.044**	0.050**	0.057**	0.065***	0.053***	0.040**	0.040**
	[0.020]	[0.023]	[0.023]	[0.023]	[0.019]	[0.019]	[0.017]
Family Economic	0.056***	0.049*	0.062***	0.049*	0.085***	0.056***	0.052***
	[0.018]	[0.026]	[0.021]	[0.026]	[0.021]	[0.018]	[0.017]
Observations	2,886	2,886	2,886	2,886	3,643	3,643	3,643
Adj. R-squared	0.034	0.04	0.041	0.04	0.022	0.018	0.026
Panel B: Male							
Intellectual Performance	0.077***	0.092***	0.080***	0.072***	0.073***	0.073***	0.088***
	[0.020]	[0.023]	[0.021]	[0.021]	[0.019]	[0.018]	[0.019]
Good Conduct	0.076**	0.072***	0.100***	0.041	0.027	0.019	0.040**
	[0.030]	[0.025]	[0.027]	[0.025]	[0.019]	[0.017]	[0.019]
Emotional Health	0.195***	0.083*	0.191***	0.096**	0.099***	0.100***	0.109***
	[0.042]	[0.045]	[0.041]	[0.041]	[0.021]	[0.018]	[0.020]
Family Psychosocial	0.028	0.043	-0.024	0.036	0.029	0.027	0.03
	[0.023]	[0.028]	[0.029]	[0.027]	[0.019]	[0.018]	[0.021]
Family Economic	-0.094***	0.056**	0.070***	0.062***	0.055***	-0.045**	-0.038
	[0.024]	[0.025]	[0.024]	[0.022]	[0.020]	[0.021]	[0.027]
Observations	2,160	2,160	2,160	2,160	3,232	3,232	3,232
Adj. R-squared	0.045	0.035	0.044	0.019	0.019	0.019	0.026

Notes: Robust standard errors are in parentheses. *** 1%, ** 5%, * 10%. All columns include a female dummy.. For the BCS, childhood ages are 5, 10 and 16. For the NCDS, the ages are 7, 11 and 16. All continuous variables are standardised.

Table 4: The proximate and distal predictors of adult life satisfaction

	BCS at Age:				NCDS at Age:		
Life Satisfaction	(26)	(30)	(34)	(42)	(33)	(42)	(50)
Contemporaneous:							
Emotional Health (lagged)	0.274***	0.184***	0.183***	0.226***	0.173***	0.200***	0.266***
	[0.016]	[0.015]	[0.017]	[0.016]	[0.017]	[0.015]	[0.015]
Good Conduct	0.051**	0.027	0.053*	0.01	-0.005	-0.005	0.040**
	[0.025]	[0.025]	[0.028]	[0.030]	[0.013]	[0.019]	[0.018]
Educational Level	-0.015	0.029**	0.021	0.013	0.015	-0.011	0.015
	[0.013]	[0.014]	[0.014]	[0.015]	[0.013]	[0.014]	[0.012]
Income (log)	0.077***	0.087***	0.037**	0.078***	0.027	0.060***	0.092***
	[0.015]	[0.014]	[0.017]	[0.018]	[0.017]	[0.014]	[0.012]
Employed	0.073***	0.070***	0.097***	0.025	0.083***	0.086***	0.059***
	[0.014]	[0.020]	[0.017]	[0.020]	[0.019]	[0.018]	[0.017]
Marital status	0.047***	0.220***	0.159***	0.066***	0.216***	0.208***	0.185***
	[0.018]	[0.014]	[0.017]	[0.016]	[0.015]	[0.013]	[0.012]
Physical Health (lagged)	0.156***	0.099***	0.078***	0.084***	0.088***	0.080***	0.131***
	[0.015]	[0.014]	[0.015]	[0.015]	[0.014]	[0.013]	[0.013]
Childhood:							
Intellectual Performance	-0.041***	0.020	0.018	-0.042***	0.023**	-0.019	-0.017
	[0.013]	[0.013]	[0.014]	[0.015]	[0.011]	[0.015]	[0.012]
Good Conduct	0.051***	0.069***	0.089***	0.047**	0.018	-0.006	-0.016
	[0.018]	[0.017]	[0.021]	[0.019]	[0.012]	[0.012]	[0.011]
Emotional Health	0.045**	0.051***	0.103***	0.035**	0.041***	0.050***	0.048***
	[0.022]	[0.018]	[0.022]	[0.018]	[0.014]	[0.013]	[0.013]
Family Psychosocial	-0.022	0.021	-0.013	0.034**	0.040***	0.017	0.025**
	[0.014]	[0.016]	[0.018]	[0.016]	[0.013]	[0.013]	[0.011]
Family Economic	-0.022*	0.025	0.034*	-0.027*	0.053***	0.036***	0.035***
	[0.012]	[0.018]	[0.018]	[0.015]	[0.014]	[0.012]	[0.013]
Observations	5,046	5,046	5,046	5,046	6,875	6,875	6,875
Adj. R-squared	0.179	0.147	0.121	0.172	0.1	0.126	0.185

Notes: Robust standard errors in parentheses. *** 1%, ** 5%, * 10%. All columns include a female dummy. Adult emotional health and adult physical health are measured lagged by one survey wave. For the BCS, the childhood ages are 5, 10 and 16; for the NCDS, they are 7, 11 and 16. All continuous variables are standardised.

Table 5: The proximate and distal predictors of adult life satisfaction, including young adult transitions

Life Satisfaction	BCS: at				NCDS: at		
	(26)	(30)	(34)	(42)	(33)	(42)	(50)
Contemporaneous:							
Emotional Health (lagged)	0.272***	0.179***	0.181***	0.226***	0.158***	0.197***	0.266***
	[0.014]	[0.015]	[0.017]	[0.016]	[0.017]	[0.015]	[0.015]
Good Conduct	0.048**	0.027	0.053*	0.007	-0.010	-0.005	0.038**
	[0.022]	[0.025]	[0.028]	[0.030]	[0.013]	[0.019]	[0.018]
Educational Level	0.015	0.016	0.027	0.014	0.003	-0.019	0.017
	[0.019]	[0.019]	[0.019]	[0.019]	[0.015]	[0.016]	[0.014]
Income [log]	0.084***	0.083***	0.041**	0.074***	0.032*	0.058***	0.090***
	[0.015]	[0.014]	[0.018]	[0.018]	[0.017]	[0.014]	[0.012]
Employed	0.077***	0.071***	0.096***	0.025	0.080***	0.086***	0.060***
	[0.011]	[0.020]	[0.018]	[0.019]	[0.020]	[0.018]	[0.017]
Marital Status	0.055***	0.212***	0.152***	0.070***	0.178***	0.203***	0.181***
	[0.018]	[0.015]	[0.019]	[0.016]	[0.016]	[0.013]	[0.012]
Physical Health (lagged)	0.158***	0.097***	0.077***	0.084***	0.082***	0.080***	0.130***
	[0.013]	[0.014]	[0.015]	[0.015]	[0.013]	[0.013]	[0.013]
Transition:							
No early parenthood	-0.01	0.033*	0.024	-0.014	0.000	-0.021	0.007
	[0.016]	[0.020]	[0.018]	[0.018]	[0.015]	[0.015]	[0.014]
No lone parenthood	0.042***	0.046***	-0.002	-0.004	0.111***	0.006	-0.007
	[0.016]	[0.017]	[0.018]	[0.016]	[0.017]	[0.013]	[0.013]
Age left full-time education	-0.025	0.000	-0.018	-0.004	0.004	0.024*	-0.012
	[0.017]	[0.016]	[0.015]	[0.016]	[0.013]	[0.013]	[0.012]
Full-time first job	-0.069***	0.028	-0.004	0.034**	-0.012	0.008	0.019
	[0.015]	[0.021]	[0.018]	[0.014]	[0.016]	[0.015]	[0.014]
No marital breakdown	-0.014	0.040***	0.022*	-0.017	0.100***	0.027**	0.025**
	[0.012]	[0.013]	[0.013]	[0.012]	[0.012]	[0.011]	[0.011]
Left home by aged 21					-0.013	-0.010	0.023**
					[0.011]	[0.011]	[0.011]
Childhood:							
Intellectual Performance	-0.039***	0.022	0.018	-0.041***	0.016	-0.025	-0.015
	[0.013]	[0.014]	[0.013]	[0.015]	[0.011]	[0.016]	[0.012]
Good Conduct	0.047***	0.062***	0.086***	0.049**	-0.013	-0.007	-0.016
	[0.016]	[0.017]	[0.021]	[0.019]	[0.011]	[0.012]	[0.011]
Emotional Health	0.048**	0.049***	0.102***	0.035**	0.049***	0.050***	0.049***
	[0.020]	[0.018]	[0.022]	[0.017]	[0.013]	[0.013]	[0.013]
Family Psychosocial	-0.027*	0.020	-0.012	0.036**	0.030**	0.016	0.024**
	[0.014]	[0.016]	[0.018]	[0.016]	[0.013]	[0.013]	[0.011]
Family Economic	0.024*	0.023	0.032*	-0.025	0.057***	0.039***	0.034***
	[0.013]	[0.017]	[0.017]	[0.015]	[0.014]	[0.013]	[0.013]
Observations	5,046	5,046	5,046	5,046	6,875	6,875	6,875
Adj. R-squared	0.193	0.152	0.122	0.173	0.130	0.127	0.185

Notes: Robust standard errors in parentheses. *** 1%, ** 5%, * 10%. All columns include a female dummy. Adult emotional health and adult physical health are lagged by one survey wave. In the BCS the childhood ages are 5, 10 and 16; in the NCDS, they are 7, 11 and 16. The dummy transition variables are "no early parenthood" for the individual not having children at age 21, "no lone parenthood" for not being single parent at age 21, "Full-time first job" for the first job being full-time, "no marital breakdown" for not being separated or divorced at age 21, and "Left home by 21" for the individual living on his/her own at age 21. All continuous variables are standardised.

Table 6: Structural modelling estimation: Direct and indirect effects of childhood on adult life satisfaction.

BCS:		(26)			(30)			(34)			(42)	
	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect
Intellectual Performance	-0.033**	-0.039***	0.006	0.059***	0.022	0.036***	0.008	0.018	-0.010**	-0.001	-0.041***	0.041***
	[0.014]	[0.013]	[0.006]	[0.014]	[0.014]	[0.006]	[0.014]	[0.013]	[0.005]	[0.015]	[0.015]	[0.008]
Good conduct	0.110***	0.047***	0.062***	0.140***	0.062***	0.078***	0.152***	0.086***	0.065***	0.096***	0.049***	0.047***
	[0.017]	[0.016]	[0.008]	[0.017]	[0.017]	[0.007]	[0.018]	[0.021]	[0.007]	[0.018]	[0.019]	[0.007]
Emotional health	0.165***	0.048**	0.118***	0.102***	0.049***	0.053***	0.164***	0.102***	0.063***	0.075***	0.035**	0.041***
	[0.021]	[0.020]	[0.009]	[0.018]	[0.018]	[0.006]	[0.021]	[0.022]	[0.008]	[0.018]	[0.017]	[0.006]
Family Psychosocial	-0.015	-0.027*	0.011**	0.042**	0.020	0.021***	-0.029*	-0.012	-0.017***	0.072***	0.036**	0.036***
	[0.014]	[0.014]	[0.006]	[0.017]	[0.016]	[0.006]	[0.016]	[0.018]	[0.005]	[0.016]	[0.016]	[0.005]
Family Economic	0.049***	0.024*	0.025***	0.016	0.023	-0.007	0.060***	0.032*	0.028***	-0.030**	-0.025	-0.005
	[0.013]	[0.013]	[0.005]	[0.016]	[0.017]	[0.005]	[0.016]	[0.017]	[0.005]	[0.015]	[0.015]	[0.005]
Observations		5,046			5,046			5,046			5,046	

Life satisfaction at Age:

NCDS:		(33)			(42)			(50)	
	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect
Intellectual performance	0.04***	0.016	0.024***	0.052***	-0.024	0.075***	0.021*	-0.015	0.037***
	[0.01]	[0.010]	[0.004]	[0.013]	[0.015]	[0.01]	[0.012]	[0.011]	[0.004]
Good conduct	-0.004	-0.013	0.008**	-0.016	-0.007	-0.008**	-0.015	-0.016	0.001
	[0.011]	[0.011]	[0.003]	[0.013]	[0.012]	[0.004]	[0.012]	[0.011]	[0.004]
Emotional health	0.097***	0.049***	0.048***	0.104***	0.050***	0.055***	0.127***	0.049***	0.078***
	[0.013]	[0.012]	[0.004]	[0.013]	[0.012]	[0.004]	[0.013]	[0.012]	[0.004]
Family Psychosocial	0.052***	0.030**	0.023***	0.038***	0.017	0.022***	0.041***	0.024**	0.016***
	[0.013]	[0.012]	[0.003]	[0.012]	[0.012]	[0.004]	[0.012]	[0.011]	[0.004]
Family Economic	0.056***	0.057***	-0.001	0.04***	0.039***	0.0008	0.025**	0.035***	-0.01***
	[0.014]	[0.014]	[0.004]	[0.013]	[0.013]	[0.004]	[0.013]	[0.013]	[0.004]
Observations		6875			6875			6875	

Notes: The SEM regressions include contemporaneous and transition variables. The indirect effects of the contemporaneous variables are the same as those found in Table 5.
Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Appendix A

Table A1. Summary statistics (full sample)

	BCS			NCDS		
Variables	No. obs	Mean	SD	No. obs	Mean	SD
Life satisfaction at 26 (BCS)	8,250	7.16	1.958	*NA*	*NA*	*NA*
Life satisfaction at 30 (BCS)	10,251	7.29	1.84	*NA*	*NA*	*NA*
Life satisfaction at 33 (BCS), 33 (NCDS)	8,869	7.41	1.79	10,629	7.42	1.72
Life satisfaction at 42 (BCS), 42 (NCDS)	8,943	7.36	1.99	11,269	7.29	1.92
Life satisfaction at 50 (NCDS)	NA	NA	NA	9,632	7.29	1.85
Social class of the father (% top 2 classes)	11,390	30.07	45.86	9,323	33.29	47.13
Log of family weekly income	11,676	4.74	0.52	7,376	1.60	1.83
Total number of siblings	16,362	1.75	1.36	17,415	4.89	0.99
Average employment rate of father	9,760	0.95	0.14	17,825	0.69	0.42
Age mother left full-time education	17,128	15.55	2.11	16,114	15.82	0.41
Age father left full-time education	16,669	15.74	2.31	15,424	16.34	1.52
Mother's average mental health	10,873	0.78	0.13	*NA*	*NA*	*NA*
Post-marital conception	16,827	0.91	0.27	18,558	0.96	0.19
Both natural parents live in household	8,398	0.84	0.36	18,558	0.66	0.26
Emotional health at 5 (BCS), 7 (NCDS)	12,743	0.62	0.13	14,632	0.82	0.12
Emotional health at 10 (BCS), 11 (NCDS)	12,681	0.6	0.12	13,819	0.81	0.13
Emotional health at 16	4,101	0.74	0.11	14,653	0.92	0.09
Good conduct at 5 (BCS), 7 (NCDS)	12,654	0.79	0.16	14,608	0.75	0.18
Good conduct at 10 (BCS), 11 (NCDS)	12,581	0.79	0.13	13,805	0.76	0.18
Good conduct at 16	8,172	0.91	0.16	11,653	0.90	0.13
Intellect at 5 (BCS), 7 (NCDS)	12,641	0.58	0.24	15,028	0.58	0.15
Intellect at 10 (BCS), 11 (NCDS)	11,551	0.59	0.12	14,134	0.53	0.16
Intellect at 16	8,303	0.71	0.45	12,705	0.51	0.25

Table A2. Cronbach's alpha scores

Cronbach's alpha for	**BCS**	**NCDS**
Intellectual performance	0.634	0.820
Emotional health	0.503	0.545
Good conduct	0.652	0.628
Family Psychosocial	0.156	0.573
Family Economic	0.661	0.489

Table A3. Estimated coefficients of the missing indicators in equation 2

	Life satisfaction at Age :				
BCS	26	30	34	42	Average
Missing Indicators:					
Social class of the father	-0.015	-0.076	-0.106*	-0.113*	-0.155*
	[0.055]	[0.060]	[0.058]	[0.065]	[0.085]
Log of family weekly income	0.049	-0.026	0.067	0.038	0.065
	[0.046]	[0.050]	[0.044]	[0.050]	[0.066]
Average employment rate of father	0.004	-0.005	0.042	0.069	0.056
	[0.053]	[0.058]	[0.057]	[0.059]	[0.082]
Age mother left full-time education	-1.056**	0.346	0.429***	0.068	-0.139
	[0.427]	[0.292]	[0.155]	[0.623]	[0.597]
Age father left full-time education	-0.277*	-0.160	-0.331**	-0.489**	-0.636***
	[0.144]	[0.149]	[0.147]	[0.192]	[0.226]
Mother's mental health	-0.007	-0.147	-0.100	0.002	-0.122
	[0.095]	[0.098]	[0.101]	[0.105]	[0.151]
Post-marital conception	-0.282**	-0.181	-0.182	-0.160	-0.405**
	[0.120]	[0.112]	[0.129]	[0.129]	[0.196]
Both natural parents live in household	-0.086*	-0.104**	-0.068	-0.005	-0.130*
	[0.047]	[0.050]	[0.053]	[0.049]	[0.069]
Number of siblings	0.000	0.157***	0.083	0.041	0.137
	[0.057]	[0.055]	[0.056]	[0.057]	[0.084]
Emotional health (aged 5)	-0.109	-0.177	0.679**	-0.249	0.047
	[0.221]	[0.251]	[0.312]	[0.274]	[0.430]
Emotional health (aged 10)	-0.231	0.204	-0.091	0.394*	0.144
	[0.207]	[0.211]	[0.166]	[0.231]	[0.275]
Emotional health (aged 16)	0.006	0.027	-0.026	0.008	0.009
	[0.033]	[0.033]	[0.033]	[0.034]	[0.048]
Good conduct (aged 5)	0.096	0.110	-0.373	-0.183	-0.170
	[0.176]	[0.197]	[0.275]	[0.245]	[0.359]
Good conduct (aged 10)	0.266	0.097	0.234*	-0.313	0.131
	[0.185]	[0.177]	[0.134]	[0.206]	[0.231]
Good conduct (aged 16)	-0.013	0.037	0.078	-0.009	0.044
	[0.050]	[0.053]	[0.057]	[0.053]	[0.075]
Intellect (aged 5)	-0.005	0.187	-0.190	0.378*	0.198
	[0.194]	[0.195]	[0.236]	[0.199]	[0.342]
Intellect (aged 10)	0.011	0.004	-0.015	0.034	0.018
	[0.036]	[0.037]	[0.037]	[0.037]	[0.053]
Intellect (aged 16)	Dropped	Dropped	Dropped	Dropped	Dropped
Observations	5.046	5.046	5.046	5.046	5.046

Notes: Robust standard errors in parentheses. *** 1%, ** 5%, * 10%. All columns include the following variables: female, family economic, family psychosocial, emotional health, good conduct and intellectual performance, measured during childhood. Adult emotional health and adult physical health are measured lagged by one survey wave. For the BCS, the childhood ages are 5, 10 and 16; for the NCDS, they are 7, 11 and 16. All continuous variables are standardised.

Table A3. (Continued)

| NCDS | Life satisfaction at Age : | | | |
	33	42	50	Average
Missing Indicators:				
Social class of the father	0.028	0.007	0.053	0.053
	[0.036]	[0.034]	[0.035]	[0.049]
Log of family weekly income	-0.042	-0.054*	0.050*	-0.027
	[0.033]	[0.028]	[0.030]	[0.039]
Average employment rate of father	-0.106	-0.186**	-0.121	-0.247**
	[0.073]	[0.076]	[0.075]	[0.104]
Age mother left full-time education	0.048	-0.004	0.034	0.047
	[0.035]	[0.035]	[0.035]	[0.048]
Age father left full-time education	0.033	0.018	-0.047	0.002
	[0.115]	[0.113]	[0.100]	[0.148]
Both natural parents live in household	Dropped	Dropped	Dropped	Dropped
Emotional health (aged 7)	-0.015	-0.075	-0.507***	-0.357
	[0.231]	[0.187]	[0.192]	[0.241]
Emotional health (aged 11)	0.660**	-0.767***	-0.230***	-0.202**
	[0.270]	[0.296]	[0.058]	[0.083]
Emotional health (aged 16)	0.084	0.066	0.251***	0.240**
	[0.070]	[0.067]	[0.076]	[0.097]
Good conduct (aged 7)	-0.115	0.03	0.467**	0.228
	[0.223]	[0.177]	[0.184]	[0.227]
Good conduct (aged 11)	-0.567**	0.850***	0.297***	0.346***
	[0.267]	[0.293]	[0.043]	[0.062]
Good conduct (aged 16)	-0.041	0.019	-0.049	-0.042
	[0.049]	[0.045]	[0.048]	[0.065]
Intellect (aged 7)	0.04	0.001	0.028	0.041
	[0.090]	[0.085]	[0.071]	[0.113]
Intellect (aged 11)	-0.051	-0.054	-0.011	-0.069
	[0.043]	[0.042]	[0.043]	[0.059]
Intellect (aged 16)	-0.005	-0.027	-0.026	-0.034
	[0.037]	[0.038]	[0.037]	[0.051]
Observations	6,875	6,875	6,875	6,875

Notes: Robust standard errors in parentheses. *** 1%, ** 5%, * 10%. All columns include the following variables: female, family economic, family psychosocial, emotional health, good conduct and intellectual performance, measured during childhood. Adult emotional health and adult physical health are measured lagged by one survey wave. For the BCS, the childhood ages are 5, 10 and 16; for the NCDS, they are 7, 11 and 16. All continuous variables are standardised.

Table A4. T-statistics of significant differences across birth cohorts

t-statistics	Model: Equation 1	
	BCS (34) vs. NCDS (33)	BCS (42) vs. NCDS (42)
Intellectual performance	1.56	0.61
Good conduct	4.07***	3.22***
Emotional health	3.22***	0.67
Family Psychosocial	0.58	0.89
Family Economic	0.36	0.14

Notes: *** 1%, ** 5%, * 10%.

t-statistics	Model: Equation 2	
	BCS (34) vs. NCDS (33)	BCS (42) vs. NCDS (42)
Contemporaneous:		
Emotional health (lagged)	0.416	1.185
Good Conduct	1.911*	0.422
Educational level	0.314	1.17
Log income	0.416	0.833
Employed	0.549	2.23**
Family	2.514**	6.84***
Physical health (lagged)	0.487	0.202
Childhood:		
Intellectual performance	0.281	1.131
Good conduct	2.935***	2.358**
Emotional health	2.378**	0.631
Family Psychosocial	2.387**	0.825
Family Economic	0.833	3.332***

Notes: *** 1%, ** 5%, * 10%.

Table A4. (Continued)

t-statistics	Model: Equation 3	
	BCS (34) vs. NCDS (33)	BCS (42) vs. NCDS (42)
Contemporaneous:		
Emotional health (lagged)	0.998	1.277
Good Conduct	2.138**	0.338
Educational level	0.991	1.329
Income [log]	0.364	0.745
Employed	0.611	2.292**
Family	1.087	6.451***
Physical health (lagged)	0.252	0.202
Transition:		
No early parenthood	0.982	0.299
No lone parenthood	4.564***	0.485
Age left FT education	1.159	1.31
FT first job	0.332	1.218
No marital breakdown	4.409***	2.641**
Childhood:		
Intellectual performance	0.117	0.73
Good conduct	4.176***	2.492**
Emotional health	2.074**	0.701
Family Psychosocial	1.892	0.97
Family Economic	1.135	3.224***

Notes: *** 1%, ** 5%, * 10%.

Table A5. Robustness checks (specifications with consistent variables in equation 2)

	BCS: at				NCDS: at		
Life Satisfaction	(26)	(30)	(34)	(42)	(33)	(42)	(50)
Contemporaneous:							
Emotional health (lagged)	0.273***	0.185***	0.183***	0.227***	0.184***	0.197***	0.266***
	[0.016]	[0.015]	[0.017]	[0.016]	[0.019]	[0.016]	[0.016]
Good Conduct	0.052**	0.027	0.053*	0.010	0.002	-0.012	0.041**
	[0.025]	[0.025]	[0.028]	[0.030]	[0.014]	[0.021]	[0.020]
Educational level	-0.013	0.032**	0.014	0.009	0.025*	-0.005	0.006
	[0.014]	[0.013]	[0.014]	[0.015]	[0.015]	[0.015]	[0.013]
Log income	0.077***	0.087***	0.037**	0.078***	0.024	0.055***	0.105***
	[0.015]	[0.014]	[0.017]	[0.018]	[0.019]	[0.016]	[0.014]
Employed	0.073***	0.070***	0.097***	0.025	0.075***	0.086***	0.056***
	[0.014]	[0.020]	[0.018]	[0.020]	[0.021]	[0.020]	[0.018]
Family	0.048***	0.220***	0.159***	0.066***	0.216***	0.205***	0.180***
	[0.018]	[0.014]	[0.017]	[0.016]	[0.017]	[0.014]	[0.013]
Physical health (lagged)	0.156***	0.099***	0.078***	0.084***	0.088***	0.092***	0.123***
	[0.015]	[0.014]	[0.015]	[0.015]	[0.015]	[0.014]	[0.014]
Childhood:							
Intellectual performance	-0.042***	0.019	0.015	-0.039***	-0.021	-0.026*	-0.013
	[0.014]	[0.012]	[0.013]	[0.015]	[0.015]	[0.015]	[0.012]
Good conduct	0.049***	0.073***	0.089***	0.051***	0.017	-0.01	-0.005
	[0.017]	[0.017]	[0.021]	[0.019]	[0.014]	[0.013]	[0.012]
Emotional health	0.045**	0.049***	0.103***	0.034*	0.041***	0.049***	0.052***
	[0.022]	[0.019]	[0.022]	[0.019]	[0.014]	[0.013]	[0.013]
Family Psychosocial	0.006	0.012	0.012	0.003	0.016	0.02	0.014
	[0.018]	[0.018]	[0.020]	[0.019]	[0.020]	[0.018]	[0.018]
Family Economic	0.020*	0.027	0.034*	-0.029*	0.050***	0.036***	0.042***
	[0.012]	[0.018]	[0.018]	[0.016]	[0.015]	[0.013]	[0.014]
Observations	5.046	5.046	5.046	5.046	6,875	6,875	6,875
Adj. R-squared	0.178	0.146	0.121	0.171	0.1	0.123	0.182

Table A6: Structural modelling estimation: Direct and indirect effects of childhood on adult life satisfaction.

	Life satisfaction at Age:											
BCS:	(26)			(30)			(34)			(42)		
	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect
Intellectual Performance	-0.032**	-0.041***	0.008	0.052***	0.020	0.031***	0.005	0.018	-0.013***	-0.001	-0.042***	0.041***
	[0.013]	[0.013]	[0.006]	[0.014]	[0.013]	[0.005]	[0.014]	[0.014]	[0.004]	[0.015]	[0.015]	[0.008]
Good conduct	0.117***	0.051***	0.067***	0.136***	0.069***	0.067***	0.155***	0.089***	0.066***	0.092***	0.047***	0.045***
	[0.017]	[0.018]	[0.008]	[0.017]	[0.017]	[0.007]	[0.018]	[0.021]	[0.007]	[0.018]	[0.019]	[0.006]
Emotional health	0.167***	0.045**	0.123***	0.101***	0.051***	0.050***	0.164***	0.103***	0.062***	0.076***	0.035**	0.040***
	[0.021]	[0.020]	[0.009]	[0.017]	[0.018]	[0.006]	[0.021]	[0.022]	[0.007]	[0.018]	[0.018]	[0.006]
Family Psychosocial	-0.0163	-0.022	0.006	0.047***	0.021	0.027***	-0.029*	-0.013	-0.016***	0.073***	0.034**	0.039***
	[0.015]	[0.014]	[0.005]	[0.016]	[0.016]	[0.005]	[0.017]	[0.018]	[0.004]	[0.016]	[0.016]	[0.004]
Family Economic	-0.034**	-0.022*	-0.017***	0.028*	0.025	0.003	0.059***	0.034**	0.026***	-0.028*	-0.027*	-0.001
	[0.013]	[0.012]	[0.005]	[0.016]	[0.018]	[0.005]	[0.016]	[0.018]	[0.005]	[0.015]	[0.015]	[0.004]
Observations	5,046			5,046			5,046			5,046		

	Life satisfaction at Age:									
NCDS:	(33)			(42)			(50)			
	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	
Intellectual performance	0.038***	0.016***	0.023**	0.046***	-0,018	0.065***	0.031***	-0,017	0.051***	
	[0.01]	[0.004]	[0.011]	[0.013]	[0.014]	[0.008]	[0.012]	[0.012]	[0.006]	
Good conduct	0.03***	0.012***	0,018	-0.014	-0,006	-0.008**	-0,018	-0,016	-0.003	
	[0.012]	[0.003]	[0.012]	[0.012]	[0.012]	[0.004]	[0.012]	[0.011]	[0.004]	
Emotional health	0.086***	0.05***	0.041***	0.104***	0.050***	0.055***	0.126***	0.048***	0.077***	
	[0.013]	[0.004]	[0.013]	[0.013]	[0.012]	[0.004]	[0.013]	[0.012]	[0.005]	
Family Psychosocial	0.053***	0.013***	0.040***	0.038***	0,017	0.021**	0.038***	0.025**	0.013***	
	[0.013]	[0.003]	[0.012]	[0.012]	[0.012]	[0.004]	[0.012]	[0.011]	[0.004]	
Family Economic	0.059***	0.005	0.053***	0.038***	0.037***	0.002	0.027**	0.036***	-0.008**	
	[0.014]	[0.004]	[0.014]	[0.013]	[0.013]	[0.004]	[0.013]	[0.013]	[0.004]	
Observations	6875			6875			6875			

Notes: The SEM regressions include contemporaneous and transition variables. The indirect effects of the contemporaneous variables are the same as those in Table 4.
Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Appendix B

Table B1. Data description (outcome variables)

	BCS (age)	NCDS (age)
Adult Outcomes		
Life satisfaction (0-10)	26, 30, 34, 42	33, 42, 50
Log household income (equivalised)	26, 30, 34, 42	33, 42, 50
Educational achievement	26, 30, 34, 42	33, 42, 50
Employed (*not* unemployed)	26, 30, 34, 42	33, 42, 50
Good conduct (minus total times found guilty by a criminal court or formally cautioned at police station)	26, 30, 34 total	33, 42, 50
Has a partner	26, 30, 34, 42	33, 42, 50
Emotional health (reversed sum of Malaise score)	26, 30, 34	33, 42
Physical health (total score of self-rating items)	26, 30, 34	33, 46
Childhood Outcomes		
Intellectual performance	5, 10, 16 average	7, 11, 16 average
	(Age 5- Copying-Design)	(Age 7- Southgate reading, Copying-Design; Draw-a-Man, Problem Arithmetic)
	(Age 10- British Ability Scales score)	(Age 11- Reading, Math, General, Copying-Design)
	(Age 16- Whether any GCSE pass)	(Age 16- Reading, Math, Teacher's assessments)
Good conduct (externalising behaviour)	5, 10, 16 average	7, 11, 16 average
	(Rutter Behaviour Scale: Conduct and Hyperactivity)	(Rutter Behaviour Scale: Conduct and Hyperactivity)
Emotional health (internalising behaviour)	5, 10, 16 average	7, 11, 16 average
	(Rutter Behaviour sub-scale: Emotional and Peer Problem)	(Rutter Behaviour sub-scale: Emotional and Peer Problem)

Table B2. Data description (childhood and transitional year variables)

	BCS (age)	NCDS (age)
Childhood: Family Economic		
Father's socio-economic group	10	16
Log of family weekly income	10	16
Total number of siblings	10	16
Average employment rate of father	0, 5, 10, 16 average	11, 16 average
Mother's and father's age on leaving full-time education	Highest age among the responses throughout childhood ages	Highest age among the responses throughout childhood ages
Childhood: Family Psychosocial		
Mother average mental health	0, 5, 10, 16 average	NA
Whether post-marital conception	0	NA
Whether both natural parents live in household	16	7, 11, 16 average
Transition years		
Whether early motherhood (pregnancy before 21)	26,30,34 (any)	23, 33 (any)
Whether have any period of lone parenthood	26,30,34 (any)	23, 33 (any)
Any marital breakdown (separated, divorced or widow) from 26 to 34	26,30,34 (any)	23, 33 (any)
Age left full-time education	Responded at age 30	Responded at age 33
Whether left home by age 21 (no longer live at parents' home)	Responded at age 26	Responded at age 33
First job is full-time	Responded at age 30	Responded at age 23, 33

Table B3: Variable lists for the robustness check (consistent measures across BCS and NCDS)

	BCS (age)	NCDS (age)
Childhood outcomes		
Intellectual performance	**Drop age 16**	**Drop age 16**
Good conduct (externalising behaviour)	As before	As before
Emotional health (internalising behaviour)	As before	As before
Family economic		
Father's socio-economic group	As before	As before
Log of family weekly income	As before	As before
Total number of siblings	As before	As before
Average employment rate of father	**Use age 10 only**	**Use age 11 only**
Mother's and father's age on leaving full-time education	As before	As before
Family psychosocial		
Mother's average mental health when child is born and at age 5 and 10	**Drop**	NA
Whether post-marital conception	**Drop**	NA
Whether both natural parents live in household	As before (age 10)	Use age 11 only
Transition years variables	All as before	All as before