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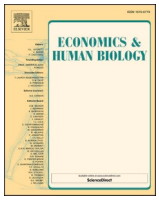

Parental nonemployment in childhood and children's health later in life

Mario Martínez-Jiménez [a, b, *]

[a] Centre for Health Economics and Policy Innovation, Imperial College Business School, Imperial College London, London, UK
[b] Department of Economics and Public Policy, Imperial College Business School, Imperial College London, London, UK

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ABSTRACT

While the effects of joblessness on the health of the non-employed are well-documented, its long-term spillover consequences on the health of their relatives, especially children, remain poorly understood. This research explores the long-term associations of parental nonemployment spells experienced during early, mid and late childhood on children's mental and physical health. The analysis exploits data drawn from the British Household Panel Survey (BHPS) and the UK Household Longitudinal Study (UKHLS), linking detailed parental socioeconomic information with their children between the years 1993 and 2013. This paper employs a Correlated Random Effects (CRE) probit model that allows accounting for unobserved heterogeneity as well as a non-linear Generalized Estimating Equations (GEE) random effects estimator accounting in addition for the dependency structure of the data. Results indicate that experiencing parental nonemployment during early and late childhood has a negative association on the children's likelihood of suffering from long-standing illnesses later in life, while experiencing parental nonemployment during middle childhood negatively affects the young adult's mental health. Moreover, experiencing parental nonemployment during late childhood increases the probability of both reporting poor or fair self-assessed health and the likelihood of consuming prescribed medicines in early adulthood. However, there seems to be a considerable effect heterogeneity by family socioeconomic status, parents' gender, and frequencies of parental nonemployment spells. Current adulthood circumstances, such as level of educational attainment, job situation and household demographics, are used to explore the potential mechanisms affecting results. These findings may help policymakers shape appropriate responses to mitigate the psychological and physical burden derived from parental nonemployment, especially among already disadvantaged households.

1. Introduction

In 2019 in the UK, around 27% of children lived in households where at least one adult did not work, and 14% of children lived in households where all adults were jobless.[1] Children are then likely to face parental nonemployment during childhood, especially during periods of recession.[2] An extensive body of research has focused on the negative health effects joblessness causes among the non-employed themselves (Sullivan and Von Wachter 2009; Bloemen et al., 2018; Gathmann et al., 2021) due to the direct negative effects nonemployment has on future employment and earnings (Couch and Placzek, 2010; Hilger, 2016). Jobless individuals are also more likely to suffer from negative health, and other effects, such as an increased likelihood of divorce (Eliason and Storrie, 2009 and 2012). Since these factors are likely to affect family environment, it is reasonable to expect that parental nonemployment may have spillover consequences on other household members, especially children (Henkel, 2011; Doiron and Mendolia, 2012). Though a large literature has documented the long-run effects of parental joblessness on children's education and labour outcomes in adulthood (Oreopoulos et al., 2008; Page et al., 2009; Currie et al., 2009; Eliason, 2012), less is known about whether growing up in families exposed to spells of parental nonemployment may have long-term consequences on children's health.

* Correspondence to: Centre for Health Economics & Policy Innovation, Department of Economics & Public Policy, Imperial College London – Business School, Exhibition Road, South Kensington, London SW7 2AZ, UK.
E-mail address: m.martinez-jimenez@imperial.ac.uk.

[1] Source from Annual Population Survey household datasets.

[2] See Figure A1 for the distribution (%) of children (0–14 years old) by the employment status of adults in the household, 1999–2015 in the UK. By region, the North East of England records 20.3% of workless households, while the South East has 10.2% (OECD, 2020).

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The main objective of this paper is to explore the longer-term health associations of experiencing parental nonemployment during different childhood stages (i.e., between 0 and 5, 6–10 and 11–15 years old).[3] Given that parental nonemployment causes changes in family income, parental time use, and the physical and mental wellbeing of the parents (Charles and James, 2005; Huttunen et al., 2011), it is likely to alter household dynamics in which children grow up. Understanding the role of parental nonemployment in shaping children's human capital and health is essential when considering the full societal cost of joblessness. Moreover, the severity of the recent economic shocks has generated renewed interest among researchers in the consequences of parental nonemployment spells on children's health (Sevilla et al., 2020). Using two decades of longitudinal data following parents and their children until their young adulthood, this paper contributes to the literature by exploring how living with jobless parents in separate stages of childhood may affect children's long-term health (when they are aged between 18 and 33 years old).

Few articles have studied the effects of parental joblessness on children's health in the UK, presenting conflicting results. For instance, Ermisch et al. (2004) use a sample of young adults from the British Household Panel Survey (BHPS) to examine whether less education and work inactivity in early adulthood are associated with living in a family with jobless parents during childhood. Findings show that experiencing parental joblessness during childhood increases the likelihood of suffering psychological distress later in life. Powdthavee and Vernoit (2013) use the BHPS's youth sample and estimate whether adolescents' overall happiness is related to parental unemployment. The authors conclude that parental unemployment has no or even a positive influence on children's overall happiness. While this previous literature identifies an effect of parental joblessness experienced as a child on health, underlying mechanisms influencing parental nonemployment with longer-term health outcomes have been relatively under-studied (Ruiz-Valenzuela, 2021).

Detailed data from the BHPS and the UK Household Longitudinal Study (UKHLS), covering the years between 1993 and 2013, are used here to examine the associations between experiencing parental nonemployment in childhood and children's future health (measured at ages between 18 and 33). The paper employs a correlated random effects probit model estimated via a pooled maximum-likelihood estimator and a non-linear generalized estimating equation (Wooldridge, 2019) to account for unobserved heterogeneity and the dependency structure of the data. The latter accounts in addition for higher-level structure of the data, such as family or region where a child lives during childhood. Findings show that experiencing parental nonemployment during middle (6−10) and late (11−15) childhood increases the likelihood of reporting poor or fair self-assessed health in adulthood. Moreover, results indicate that experiencing parental nonemployment during early (0−5) and late childhood has a negative effect on the children's likelihood of suffering from long-standing illnesses later in life, while experiencing parental nonemployment during middle childhood may affect their mental health in long-run.

This paper also explores heterogeneous effects by family socioeconomic status (highest parent's educational attainment), parents' and children's biological sex, as well as other previously unexplored dimensions, including frequencies of parental nonemployment spells and age at which the outcomes are measured in young adulthood. Results show that experiencing parental nonemployment in less-educated families has larger adverse consequences on children's health later in life. Studying the effect of maternal and paternal nonemployment spells separately shows that paternal nonemployment is more strongly negatively associated with children's future health than maternal joblessness. Results also indicate that those experiencing higher frequencies of parental nonemployment spells during childhood appear to be more largely affected, and its effects may last well into adulthood. Moreover, it appears that parental nonemployment is more negatively associated with health when children grow older (25−33) rather than when they are still young adults (18−24).

Further exploration of the possible mechanisms, results indicate that those young adults experiencing parental nonemployment at ages 0–5 have higher chances of being currently unemployed, with a household income below the poverty threshold and lower likelihood of having a degree. Those young adults experiencing parental nonemployment at ages 6–10 have higher probabilities of being unemployed, having a household income below the poverty threshold and still living with their parent/s. Finally, young adults experiencing parental nonemployment at ages 11–15 have higher probabilities of living in a household with an income below the poverty threshold. These results help to understand why children of different ages are affected in a different way by parental nonemployment spells.

This article offers several contributions. First, this study provides a comprehensive analysis of the long-term associations between parental nonemployment in childhood and children's future physical and mental health (measured in early adulthood). This paper aims to build on and complements earlier studies of the consequences of parental joblessness, typically focused on short-term health outcomes, by providing evidence on the relevance of parental nonemployment for shaping children's human capital formation. Second, this paper examines heterogeneity effects by parent's socioeconomic status, parental and child biological sex, and age in which the outcomes are measured, among other novel dimensions (e.g., frequencies of parental nonemployment spells). Finally, this research provides an extensive analysis of the potential mechanisms driving the relationship between parental nonemployment in childhood and young adults' health by exploring the role of their current educational attainment, job situation, and household demographics.

2. Previous literature

During the last decade, a large body of research has acknowledged the critical role of childhood experiences (such as parental joblessness) in shaping human development over the life cycle, presenting mixed results. Case et al. (2002), using data from the United States, find that children's health from families with lower income declines faster with age, and these children enter adulthood with lower socioeconomic status and poorer health. Kind and Haisken-DeNew (2012), using data from the German Socio-Economic Panel (SOEP), find that fathers' unemployment experienced during childhood decreases life satisfaction among their (male) children growing older (17−25). Bubonya et al. (2017) also find that parental unemployment worsens female children's mental health, using Australian data. By contrast, Mörk et al. (2020) use rich Swedish administrative data and find no effects of parental job loss on children's health, suggesting that welfare institutions successfully ensure families' disposable income.

Little is known about whether and how parental joblessness experienced at different stages of childhood may have longer-run health effects. Nikolova and Nikolaev (2021) employ data from the German SOEP and find that young adults who experienced parental unemployment during early and late childhood are more likely to report lower levels of life satisfaction. Previous studies have been limited in assessing heterogeneous effects due to insufficient longitudinal data across socioeconomic subgroups. As an exemption, Schaller and Zerpa (2019)[4] using survey data from the US, find that paternal job loss is harmful to children's health, particularly among those children in low-economic status families. In addition to that, this paper analyses whether the effect of parental nonemployment is concentrated on disadvantaged households (measured in terms of education), and it further assesses the role of

[3] Nonemployment is defined as the fact of not having paid work. Therefore, parental nonemployment includes those who are unemployed but actively looking for jobs and those who are out of the labour force.

[4] Schaller and Zerpa's (2019) measures of child health are reported by parents (usually the mother), and as such, changes in these measures may result from changes in the mother's own mental state rather than changes in the child's health.

young adults' currently education, job situation and household composition in explaining the results.

Few papers have explored the consequences of parental joblessness using data from the UK, and most previous evidence focuses on short-run effects (Joshi and Verropoulou, 2000). Ermisch et al. (2004), using a sample of British young adults with retrospective information on family characteristics, examine how parental joblessness during childhood affects a range of long-term outcomes (such as educational attainment and economic inactivity). The authors find that experiencing parental joblessness is negatively associated with lower educational attainment and a higher risk of economic inactivity as young adults. Powdthavee (2014) exploits the BHPS Youth Survey to examine how childhood experiences mediate the relationship between parental unemployment and life satisfaction for adults aged between 16 and 29. The author finds that father's unemployment during late childhood is related to a significant drop in life satisfaction later in life. Therefore, these previous articles appear to have either only used a small sample of children in their late childhood or they have not explored the longer-term health associations of parental joblessness on mental and physical health outcomes. This paper aims to add to this literature by exploiting variation in the time when parental nonemployment occurs.

3. Mechanisms

Previous studies has proposed a theoretical framework that helps to understand how parental joblessness may affect children's cognitive development and health formation through changes in intra-household resource allocation (Rosenweig and Schultz, 1983; Currie, 2009; Mörk et al., 2014; Chiappori and Meghir, 2014; and Yi et al., 2015).[5] This theoretical model explains how parents can undermine or enhance their children's health through several channels as consequences of an income shock, which consequences may persist well into adulthood.

The effect of parental nonemployment on overall children's human capital accumulation and longer-term health outcomes could be less clear, and it might mask important differences across subgroups of population. Parental nonemployment may affect children's future wellbeing, particularly through diminishing families' ability to invest in the resources needed to promote their achievements (e.g., high-quality education and physical exercise) (Kalil and Ziol-Guest, 2008). Moreover, parental nonemployment could be associated with social stigma affecting social interaction (Schneider et al., 2000) and ultimately increasing the risk of experiencing loneliness, anxiety, depression or self-blame (Rubin et al., 2009). Parental nonemployment may also be seen as a family "stressful" event potentially leading to a deterioration of parental (mental) health or an increase in the prevalence of risky parental behaviours, such as smoking (Gathmann et al., 2021). Hence, parental nonemployment may create a challenging family environment affecting children's cognitive and academic performance negatively (Oreopoulos et al., 2008; Pinger, 2016).

On the other hand, jobless parents could also potentially allocate more time to childcare tasks (Knabe et al., 2010), which might positively affect children's human capital development and health formation. For instance, jobless parents may spend more time on childcare, which may increase the amount of health care the child receives (e.g., doctor visits). Additionally, children might spend less time in preschool or afterschool activities, reducing their exposure to illness or their chances of incurring injuries (Schaller and Zerpa, 2019) – although day-care plays an essential part in developing social skills and human capital. Moreover, children of jobless parents may become more motivated to stay in school longer and do well to avoid their parents' misfortune. Finally, welfare institutions (such as the presence of unemployment insurance, schools and healthcare organizations, among others) may successfully protect families against negative income shocks caused by parental joblessness (Mörk et al., 2020). However, welfare institutions might be less able to protect low-income families when parental nonemployment occurs multiple times. This paper further analyses whether experiencing different frequencies of parental nonemployment spells during childhood may negatively influence children's health later in life.

Previous empirical studies also suggest that parental nonemployment might have different effects depending on the family's socioeconomic status (Schaller and Zerpa, 2019), as well as parental and children biological characteristics (Nikolova and Nikolaev, 2021). For instance, Forret et al. (2010) show that men with children perceive periods of nonemployment more negatively than women, while Bubonya et al. (2017) find that the negative effects of parental unemployment are concentrated among female adolescents. Nonetheless, little is known whether children from (disadvantaged) households with less educated parents are more affected by parental nonemployment using data from the UK. In this context, the need to test this empirically arises.

4. Data

This paper combines data from fifteen waves of the BHPS (Taylor, 2010) and one wave of the UKHLS (Fumagalli et al., 2017). Self-reported information on children's individual and family circumstances during their childhood is utilised in this study. This information is collected between 1993 and 2008, representing fifteen waves of the BHPS. Childhood information was matched to one wave of the UKHLS (2011–2013), obtaining health indicators for a sample of individuals in early adulthood (between 18 and 33 years of age).[6] The BHPS includes about 5500 households, and the UKHLS comprises 40,000 households. The BHPS ended in 2009 when participants were asked to join the UKHLS, representing a longitudinal survey following individuals over their entire childhood and early years of adulthood.[7] In both surveys, each adult member of the sampled households was interviewed. If they left the original household to form a new household, all adult members of this new household were also interviewed. Importantly, when a child in a household was aged 16 or over, the individual completed the main survey.

Several features make the BHPS and UKHLS suitable for this empirical analysis. First, due to the rich longitudinal information following parents and their children for about two decades, measures of parental and household characteristics over childhood can be observed. Second, all children aged between 11 and 15 years in the originally sampled households were interviewed first in the youth questionnaire and then transitioned to the main adult questionnaire when they reached 16 years of age. This provides a wide range of health variables spanning an individuals' life course. Further, all information regarding parents' socioeconomic situation comes from the parents' own responses rather than from the children's retrospective responses, and this may ease concerns about reporting errors. Similarly, longer-term measures of children's health are reported by survey respondents (rather than mothers/fathers), and as such it captures changes in the children's actual health instead of changes in the mothers/fathers (wellbeing) state.

[5] See more information about the theory models, including a proposed health production function and an intra-household resources allocation, using previous theory frameworks in the Supplementary Appendix.

[6] This analysis includes only one wave of the UKHLS, obtaining time-invariant health outcomes per each child in young adulthood. The reason for using time-invariant health outcomes is to obtain a relatively homogenous sample of individuals in their young adulthood, and therefore, in a similar stage of life. Including more waves of the UKHLS will increase the sample age range, creating a sample of individuals with very different ages and life experiences. The chosen wave of UKHLS (wave 3, 2011–2013) is particularly interesting since it includes health biomarker information collected by nurse visits and other variables such as young adults' personality traits.

[7] Please see further information on the harmonised version of the BHPS and UKHLS dataset used in the analysis in Supplementary Appendix SA.2.

Table 1
Percent of observations of children measured in adulthood that have experienced parental nonemployment across childhood stages.

Number of parental nonemployment spells	Children ages					
	Child's age 0–5		Child's age 6–10		Child's age 11–15	
	Absolute	*Percentage (%)*	*Absolute*	*Percentage (%)*	*Absolute*	*Percentage (%)*
0 - No parental nonemployment	2578	30.40	1339	31.62	864	29.37
1	1838	21.67	817	19.30	559	19.00
2	1330	15.68	562	13.27	408	13.87
3 or more	2734	32.25	1516	35.81	1111	37.76
Total	8480	100	4234	100	2942	100

Notes: Number (and percentage) of observations measured in adulthood that experienced parental nonemployment at one, two, three or more, or not at all across childhood stages. Parental nonemployment can be observed by the same children at different stages of childhood. Yet, having an unbalanced panel means that some children are not observed at all the time points.

To estimate the long-term health associations of parental nonemployment, mothers and fathers are first linked using the partner identifier in the BHPS. Then, each child is matched to their biological or adoptive/stepparents, interviewed in at least one wave, using the purposely built mother and father identifiers. Mothers and fathers can be cohabiting or married, but they need to be living in the same household. Then, parents' responses about family and work histories are used to determine the measures of parental occupational status and childhood characteristics. This ensures a sample of young adults that fulfil the following conditions: *(i)* they are born between 1978 and 1993; *(ii)* they do not have any long-standing severe disability at 16 years of age and onwards; *(iii)* they are living with their biological, adoptive or stepparents during their childhood (from 0 to 15); and *(iv)* they have paternal and maternal labour market information over the childhood period (i.e., both parents are present in the data). Parental ages range between 18 and 62 for mothers and 18–65 for fathers to capture the working-age population.[8]

The first condition ensures a relatively homogenous group of young people who went through a relatively similar educational system and allows for a sufficiently large number of birth cohorts. The second condition removes those parents whose labour market status depends on their children's health. The third condition ensures that information on the parents (e.g., age, education, health behaviours, labour market status) and family circumstances can be observed during childhood. The last condition allows full information on both the father's and mother's employment status (self-reported) that are working-age during their entire childhood, although by doing so, it excludes single-parents and same sex-parent families from the analysis.[9] Parental nonemployment at a given age (between birth and 15 years) is defined as either parent not being in paid work the week before (following Ermisch et al., 2004).[10] Hence, when both mothers and fathers have paid work (or mothers are continuously out of the workforce due to family care) are considered as employed parents (and these also include employees and self-employment).[11] Mothers out of the workforce due to family care reasons are considered as having paid work (following Nikolova and Nikolaev, 2021).[12] Being out of the labour force because of family care might affect children quite differently than parental employment, and therefore, non-employed women due to family care reasons are excluded from the analyses as a robustness check.[13] Three separate parental nonemployment groups are defined, depending on when (i.e., the specific period) the children experience parental nonemployment during their childhood, i.e., between 0–5, 6–10 and 11–15 years old. Note that either parent can experience nonemployment in these groups.

This results in an unbalanced panel of 15,656 observations (1675 children) in total, with information on both their mother's and father's occupational status observed at least in one BHPS wave and complete details of their young adult health UKHLS (wave 3, January 2011- July 2013). Therefore, childhood information within each child for at least one childhood stage (i.e., 0–5, 6–10, and 11–15 years old) is used to examine the associations between parental nonemployment in childhood and young adulthood outcomes. Table 1 shows the number of observations (and percentages) of children measured in adulthood that have experienced parental nonemployment across childhood stages. Since the resulted sample is unbalanced, it is not always possible to observe the exposure to parental nonemployment of the same child at different childhood stages. Yet, as shown in Table 1, parental nonemployment can be experienced at one, all or any observed time at each childhood stage, and this can vary within a child.

4.1. Health outcomes and key covariates

The primary health outcome variables are mental and physical health, including the number of prescribed medicines measured at one point in individuals' young adulthood (i.e., between 18 and 33 years old). For general health, a dichotomic self-assessed health variable is used. This variable takes the value of one if the respondent reports poor or fair health status, and zero if the respondent reports excellent, very good or good general health. For mental health, the General Health Questionnaire (GHQ-12) is a well-established, psychometrically validated and widely used screening tool for the detection of psychiatric disorders (psychiatric morbidity) in the general population (Goldberg,

[8] During the years when parental information was collected, the statutory pension age for women was 62 years old and 65 for men.

[9] The estimated results can be considered conservative compared to those for single-parent households.

[10] One could potentially use the "*Employment History*" files in the BHPS to construct the parental nonemployment variable using the "reason for stopping previous job" information. However, this variable has around 40% of missing observations across BHPS waves, and it would dramatically reduce the number of observations in the analysis.

[11] Mothers out of the workforce due to family care reasons are defined using the "current labour force status" variable information, where the respondents could define their work status among ten categories: Self-employed; Employed; Unemployed; Retired; Family care; FT student, school; LT sick, disabled; Government training scheme; and other. If the mother responds that her current labour force status is "Family care" they are considered out of the workforce for this reason.

[12] Mothers out of the labour force to care for a sick child or mothers staying at home taking care of (healthy) children can be considered as employed (Nikolova and Nikolaev, 2021). In the UK, carers can get £ 67.60 a week if they care for someone at least 35 h a week and get certain benefits. Moreover, individuals can get time off for family and dependent care (spouse, partner, child, grandchild, or someone who depends on you for care) and still get paid. Doing this also helps include more observations, although the incidence of maternal nonemployment considerably decreases.

[13] As a robustness check, fathers out of the workforce due to family care reasons are considered as having paid work and included in the control group, although they only represent 1.02% of the sample.

1988). The GHQ-12 questionnaire includes 12 questions aimed at detecting symptoms of anxiety, depression, or insomnia.[14] The GHQ score is then used with a cut-off of 4 and higher to create a binary variable coded as one, reflecting a clinically significant level of distress (psychiatric morbidity; Imo, 2017) and zero otherwise.

A long-standing illness or disability variable is included in the analysis as an outcome.[15] This variable takes the value one if the respondent reports having any long-standing physical or mental impairment, illness or disability that troubles them for at least 12 months (and zero otherwise). This variable can be considered either psychological or physical, and it is important to take it as an outcome as a more specific measure of general health. Finally, the number of prescribed medicines is utilised (coded as one if the individual consumed one or more prescribed medicines and zero otherwise) as an outcome variable. This variable includes any prescribed medicines, and the information is collected during a nurse health assessment, and therefore, it might be less prone to measurement errors.[16]

A range of children, parental and household characteristics are included in the analyses. This consists of the following variables: current child's age and current child's age squared; child's migration background; mother's and father's highest educational attainment, as well as parental age when the child was born. Additional variables measured at the household level, such as equivalised net household monthly income[17]; the number of siblings; household size; and frequencies of parental nonemployment spells during respective childhood ages, are used. Control variables for annual regional unemployment rates during childhood; year of birth dummies (which capture commonly shared experiences such as economic shocks and technological progress), as well as dummies identifying region of residence during childhood are also used. In the robustness checks, further controls on mothers' and fathers' smoking behaviour during childhood, parental and children personality traits, and a measure of children's health during late childhood are included.[18] Finally, to avoid bias from dropping observations due to missing data, an additional missing data indicator is used for each of the control variables included that have missing information, helping to preserve the number of observations.[19] A selection bias test is performed, confirming that missing values do not influence the estimates.[20]

4.2. Descriptive statistics

Tables A1-A3, jointly with Figs. A2-A4, show descriptive statistics of all variables employed in the analysis. Fig. A2 illustrates the mean distribution of household socioeconomic characteristics experienced during childhood by region (using the Government Office Regions, GOR). Figs. A3-A4 show the average probability of reporting poor or fair general health; suffering mental ill-health; and having long-standing illness across different parental occupational status and childhood stages (Fig. A3) and young adult ages (Fig. A4).

Fig. A2 demonstrates geographic disparities with respect to experiencing worse household income levels and unemployment rates during childhood. In particular, on average, children living in London and northern areas of England, Scotland and North Ireland have higher chances of living in a single- or non-earner family with a lower household income, experiencing higher regional levels of unemployment, and living in households below the poverty threshold during their childhood, on average. In Fig. A3, one can see that the average for reporting poor or fair health status and having long-standing illness varies considerably across different childhood stages. This gap is largest for those experiencing parental joblessness during adolescence (aged 11–15). This might suggest that experiencing parental nonemployment in late childhood lowers overall general health status or is associated with a higher risk of suffering from disabilities in young adulthood. In contrast, the risk of lowered mental ill-health is largest amongst adults who had experienced parental nonemployment between ages 6–10. Fig. A4 shows the association between parental nonemployment and different timings of long-term health effects. Here, the average gap between experiencing parental nonemployment and having both parents employed during childhood for the following health outcomes: level of general health, risk of suffering mental ill-problems, and long-standing disabilities is largest among adults at ages 25–33. This may suggest that the consequences of parental nonemployment might become apparent once individuals are older (i.e., between 25 and 33).

Tables A1-A3 show differences in socioeconomic characteristics between children whose both parents are employed versus those with at least one jobless parent during early (0–5 years), mid (6–10 years) and late (11–15 years) childhood. For instance, experiencing parental nonemployment at any stage of their childhood is associated with lower educational attainment levels later in life compared to those individuals whose parents were employed during childhood. There appear to be further differences particularly around household and regional characteristics. For instance, individuals who experience parental nonemployment during childhood report lower monthly household income and more people living in their household compared to their counterparts. Overall, children's sociodemographic characteristics observed at different stages of childhood do not seem to be largely varied.

5. Empirical strategy

In order to model the time-invariant nature of most of the variables used in the analysis, a Correlated Random Effects (CRE) probit is specified, which is estimated by a pooled maximum-likelihood estimator (Wooldridge, 2019). This allows the possibility of specifying correlated random effects in the absence of a panel data estimation, such a fixed effects (within-child) estimator. Therefore, CRE appears appropriate as it not only allows modelling of the binary nature of the dependent variables, but also accounts for individual-level time-invariant unobserved heterogeneity.

Specifically, it is assumed that the binary outcome variables are linked to the latent health status y^*_{ij} of respondent i belonging to family j, such that $y_{ij} = 1[y^*_{ij} > 0]$. The latent variable specification with unobserved heterogeneity is:

$$y^*_{ij} = \varnothing U^P_{ij} + \gamma X^{C,F,R}_{ij} + \alpha_i + u_{ij} \quad (1)$$

with $i = 1, \ldots, N$ and $j = 1, \ldots, J$. U^P_{ij} is a binary indicator for parental nonemployment (at ages 0–5, 6–10, 11–15), which takes the value 1 if at least one of the parents did not have a paid job during the previous week,

[14] This measure converts valid answers to 12 questions into a single scale measure by recoding 1 and 2 values on individual variables to 0, and 3 and 4 values to 1 and then summing, giving a scale running from 0 (the least distressed) to 12 (the most distressed).

[15] This is based on the following question: "*Do you have any long-standing physical or mental impairment, illness, or disability? By 'long-standing' I mean anything that has troubled you over a period of at least 12 months or that is likely to trouble you over a period of at least 12 months*".

[16] Generally, the nurse coded prescription medications while the respondent was resting before the blood pressure readings. The following question was asked: *"Are you taking any other medicines, pills, ointments, or injections prescribed for you by a doctor?"*. The nurse was instructed to ask to see the containers for the medicines.

[17] Household income includes labour, non-labour, pension, benefit (including child benefits or income support), transfer, and investment sources of income.

[18] Parental 'Big-5′ personality traits were collected during BHPS wave 15 (2005) and children 'Big-5′ personality traits were collected during wave 3 (2011–2013).

[19] Specifically, this category has been included just in the following control variables: adult child's migration background (856 observations – 5.47%); adult child's highest education achieved (139 obs. – 0.89%); and father's and mother's highest education achieved (397 (2.54%) and 161 (1.03%) missing observations, respectively).

[20] See more details regarding the selection bias test in Section 5.

Table 2
Estimates of the long-run associations of parental nonemployment on self-assessed poor/fair health status.

Average partial effects *Parental nonemployment*	N	Self-assessed poor/fair health status (1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE with additional covariates	(4) GEE random effects with additional covariates
Child's age 0–5	7797	0.034	0.032	0.020	0.020
		(0.026)	(0.025)	(0.014)	(0.014)
Child's age 6–10	3241	0.055***	0.058**	0.032**	0.044**
		(0.020)	(0.022)	(0.015)	(0.017)
Child's age 11–15	2880	0.065***	0.065***	0.035**	0.039**
		(0.019)	(0.021)	(0.017)	(0.018)
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*
Additional control variables		*No*	*No*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The table shows the coefficient estimates of three different regressions whereby the focal independent variables are parental nonemployment at the respective child's ages. The focal independent variables are coded as 1 if either parent is not in paid work and 0 if both parents are in paid work during respective ages. The dependent variable is a binary variable that takes 1 whether the individual reports fair or poor self-assessed health status and 0 otherwise. Models from columns 1 and 2 include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Models from columns 3 and 4 include addition controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages. * $p < 0.1$, **$p < 0.05$, *** $p < 0.01$.

and 0 otherwise (i.e., both mother and father have a paid job). X_{ij} is a vector including children (C), family (F) and regional (R) covariates, including fathers' and mothers' sociodemographic characteristics, as explained above. Eq. (1) also includes normally distributed time-constant individual (children) effects accounting for unobserved heterogeneity (α_i) and an idiosyncratic error term (u_{ij}). Both α_i and u_{ij} are assumed not to be correlated with the independent variables nor with each other.

Given that parental nonemployment occurred in childhood, while all outcome variables are measured in adulthood, reverse causality might not be a concern in this case. Indeed, the main identification issue is that the relationship between parental nonemployment in childhood and wellbeing later in life may be biased due to unobservable or unmeasurable factors (i.e., the unobserved heterogeneity (α_i) error term is correlated with experiencing parental nonemployment). Therefore, to enhance the specification of unobserved heterogeneity $\alpha_i$for a panel dataset, a specification strategy suggested by Wooldridge (2019) is used. The key assumptions are that all covariates are strictly exogenous conditional on α_i and selection bias does not arise. The CRE approach allows correlations between X_{it} and α_i via the average over the sample period of all time-varying explanatory variables ($\overline{X_i}$). This is effectively equivalent to the approach proposed by Mundlak's (1978) where the individual effect is specified as:

$$\alpha_i = \varphi + \xi\overline{X}_i + c_i \tag{2}$$

where c_i is purely random with $c_i|\overline{X_i} \sim N(0, \sigma_c^2)$. A pooled MLE is implemented to obtain average partial effects (APEs), which impose no restriction on the serial correlation of the idiosyncratic error. Plugging Eq. (2) into Eq. (1) leads to CRE model. If the conditional distribution of α_i is correctly specified, unobserved heterogeneity is captured by time averages and random elements, and all parameters can be consistently estimated:

$$y_{it}^* = \varnothing U_{it}^P + \gamma X_{it} + \xi\overline{X}_i + c_i + u_{it} \tag{3}$$

Standard errors are clustered at individual level for more precise inference. To test for selection bias, Eq. (3) has been estimated separately, including a selection indicator (s_{it}) that specifies the missing data for all the variables across time and individual (i.e., observing a data point in any time period cannot be systematically related to the idiosyncratic errors,u_{it}). If these parameter estimates ($\widehat{s_{it}}$) are not statistically significant, this would mean that selection bias does not occur in the main specification.

Pooled MLE of CRE probit restricts $D(c_i|X_i)$ but does not impose any assumption on the dependency structure of the data. However, one can argue that the long-term health effects of parental nonemployment on children can be clustered within further groups (e.g., families, regions), and ignoring the dependence structure of the data might have the potential to affect the estimates. Generalized estimating equations (GEE) random effects estimators (Liang and Zeger, 1986) are multivariate least squares estimators that are capable of accounting for serial correlation,[21] and thus, to potentially obtain more efficient estimates.[22] A non-linear GEE is estimated by a quasi-maximum likelihood estimation (QMLE) framework, and it is supposed to produce more efficient conditional mean parameters via a covariance matrix accounting for the dependency structure of the data (i.e., accounting for higher-levels structure of the data). Parameter estimates from GEE are consistent even when the variance and covariance structure is misspecified under mild regularity conditions.[23] A non-linear GEE with the probit response function that includes the time-averages of all time-varying explanatory variables ($\overline{X_i}$) is thus employed.

In practice, a non-linear GEE estimator is obtained by a two-step procedure, where the first step is to estimate the working correlation matrix of each group (g) using a partial QMLE, and the second-step specifies the following GEE estimator.

Precisely, the first-step estimation is the pooled Bernoulli quasi-MLE (QMLE), which is obtained by maximizing the pooled Probit log-likelihood. The log likelihood function for each observation is:

$$l_i(\beta) = y_i \log\Phi(x_i\beta) + (1 - y_i)\log[1 - \Phi(x_g\beta)] \tag{4}$$

Let $\widehat{u}_i = y_g - \Phi(x_g\widehat{\beta})$, $i = 1, 2, \ldots, n$ be the residuals from the partial QMLE estimation.

The second-step GEE estimator for β is as follows:

$$\widehat{\beta}_{GEE} = argmin_B \sum_g (y_g - \Phi(x_g\beta))^T \widehat{W}_g^{-1} (y_g - \Phi(x_g\beta)) \tag{5}$$

[21] Ignoring dependence in the estimation of parameters will result in wrong inferences if the variances are calculated in the way that independence is assumed.

[22] Mixed effect models or hierarchical models (Raudenbush and Bryk, 2002) are another way to handle for this. Estimates of this approach are available upon request.

[23] Mild regularity conditions are, for instance, the second or third derivative of the density function exists and is continuous, or derivative pass under integral sign, and information is positive.

Table 3
Estimates of the long-run associations of parental nonemployment on mental ill-health.

Average partial effects *Parental nonemployment*	N	Mental ill-health (GHQ-12) (1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE with additional covariates	(4) GEE random effects with additional covariates
Child's age 0–5	7140	0.015	0.016	0.013	0.016
		(0.025)	(0.026)	(0.023)	(0.024)
Child's age 6–10	3600	0.059**	0.049**	0.083***	0.074***
		(0.024)	(0.020)	(0.026)	(0.025)
Child's age 11–15	2448	-0.003	-0.022	-0.001	-0.024
		(0.031)	(0.033)	(0.023)	(0.031)
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*
Additional control variables		*No*	*No*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The table shows the coefficient estimates of three different regressions whereby the focal independent variables are parental nonemployment at the respective child's ages. The focal independent variables are coded as 1 if either parent is not in paid work and 0 if both parents are in paid work during respective ages. The dependent variable is the GHQ-12 index with a cut-off of 4 and higher reflecting psychiatric morbidity (binary). Models from columns 1 and 2 include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Models from columns 3 and 4 include addition controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages. * p < 0.1, * * p < 0.05, * ** p < 0.01.

Table 4
Estimates of the long-run associations of parental nonemployment on long-standing illness or disability.

Average partial effects *Parental nonemployment*	N	Long-standing illness or disability (1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE with additional covariates	(4) GEE random effects with additional covariates
Child's age 0–5	8143	0.059***	0.052***	0.044**	0.039**
		(0.018)	(0.018)	(0.018)	(0.017)
Child's age 6–10	4187	0.052	0.051	0.010	0.010
		(0.084)	(0.083)	(0.023)	(0.024)
Child's age 11–15	2941	0.083***	0.083***	0.080***	0.080***
		(0.027)	(0.028)	(0.027)	(0.029)
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*
Additional control variables		*No*	*No*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The table shows the coefficient estimates of three different regressions whereby the focal independent variables are parental nonemployment at the respective child's ages. The focal independent variables are coded as 1 if either parent is not in paid work and 0 if both parents are in paid work during respective ages. The dependent variable is coded as 1 if the adult child reports to have a long-standing illness or disability and 0 otherwise. Models from columns 1 and 2 include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Models from columns 3 and 4 include addition controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages. * p < 0.1, * * p < 0.05, * ** p < 0.01.

where $y_g - \Phi(x_g\beta)$ is the residuals from the partial QMLE estimation produced in the firs-step and $\widehat{W}_g$ is the specified correlation structure. Importantly, $\widehat{\beta}_{GEE}$ follows a normal distribution and is consistent even for a misspecified data correlation structure $(\widehat{W}_g)$.[24] Combined cross-sectional adult interview weight is used in all the regression, and robust standard errors are provided.

6. Results

6.1. Physical and mental health effects

Tables 2–5 present the average partial effects (APE) obtained from the CRE probit models estimated by pooled MLE and the non-linear GEE random effects estimators. In separate models, physical and mental health variables, as well as consumption of prescribed medicines at ages 18–33 are regressed on parental nonemployment spells experienced at different stages during childhood (i.e., when the child was between 0–5, 6–10, 11–15 years old). Columns (1) and (3) refer to the APE for Eq. (3), and columns (2) and (4) refer to the APE for Eq. (5). All models control for confounders, such as growing up during periods of economic recessions and characteristics of the families, parents, and children. Models whose estimates are reported in columns (3) and (4) further include family monthly income during childhood, the completed child's educational attainment, and several other household and regional characteristics such as household size, number of siblings and regional nonemployment rates. The estimates reported in columns (3) and (4) are obtained using the preferred specification from Eq. (3) and Eq. (5), which include the additional set of covariates.

Table 2 shows the results for the effect of experiencing parental nonemployment during childhood on reporting poor/fair general health status later in life. Specifically, experiencing parental nonemployment at ages 6–10 and 11–15 increases, on average, the likelihood of reporting poorest levels of general health by around 3.2–4.4 and 3.5-3.9 percentage points, respectively, compared to experienced parental employment at these ages. The estimated ranges depend on whether the correlation structure of the data is accounting for (i.e., estimates reported are from columns (3) and (4) using Eq. (3) and Eq. (5) that include the additional set of covariates). As a possible explanation for the negative consequences associated with experiencing parental nonemployment in middle and late childhood is that these children might be more aware of the consequences that nonemployment might have on the family's income. If so, they might feel more pressured to take responsibility (Arbeit, 2013). Similar findings are reported by

[24] The following Stata command has been used *xtgee* with *fam(binomial)*, *link (probit)* and *corr(independent)* to estimate the GEE random effects estimators.

Table 5
Estimates of the long-run associations of parental nonemployment on consumption of prescribed medicines.

Average partial effects *Parental nonemployment*	N	Prescribed medicines (1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE with additional covariates	(4) GEE random effects with additional covariates
Child's age 0–5	2791	0.009	0.009	0.011	0.010
		(0.034)	(0.036)	(0.030)	(0.033)
Child's age 6–10	1481	-0.008	-0.009	-0.011	-0.010
		(0.027)	(0.046)	(0.025)	(0.035)
Child's age 11–15	1383	0.109***	0.109**	0.049***	0.048** (0.021)
		(0.041)	(0.044)	(0.019)	
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*
Additional control variables		*No*	*No*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The table shows the coefficient estimates of three different regressions whereby the focal independent variables are parental nonemployment at the respective child's ages. The focal independent variables are coded as 1 if either parent is not in paid work and 0 if both parents are in paid work during respective ages. The dependent variable is coded as 1 if the adult child reports to consume 1 or more than 1 prescribed medicine, and 0 otherwise. Models from columns 1 and 2 include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Models from columns 3 and 4 include addition controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Ermisch et al. (2004) and Nikolova et al. (2021), suggesting that parental nonemployment at older childhood ages is negatively associated with overall wellbeing later in life.

The results from Table 3 show that parental nonemployment during middle childhood (6−10) may increase the on average risk of suffering mental ill-health later in life by around 7.4-8.3 percentage points. However, the estimates at ages 0–5 and 11–15 are not statistically significant. One might consider that children aged 6–10 are older enough to start developing abstract thinking (i.e., the ability to think about hypothetical situations), which can make them more aware of social stigma associated with parental nonemployment (Gauvain and Cole, 2005). Importantly, these findings are in line with those from Schaller and Zerpa (2019), showing that paternal nonemployment experienced at ages 6–12 (primary and middle school) increases the likelihood of reporting bad mental health outcomes later in life. Nonetheless, further analyses on the potential channels through which parental nonemployment experienced at ages 6–10 may affect adult mental ill-health are presented in Sections 6.3–6.4.

Table 4 reports that parental nonemployment during early and late childhood negatively affects adult physical health. Yet, experiencing parental nonemployment during middle childhood (6−10) does not seem to have long-term physical health consequences. Specifically, parental nonemployment experienced at ages 0–5 increases the likelihood of suffering from long-standing illnesses or disability by around 3.9-4.4 percentage points. Similarly, parental nonemployment experienced at ages 11–15 may be associated with a higher likelihood of suffering from long-standing illnesses in young adulthood by around 8 percentage points. A possible explanation for the negative consequences of parental nonemployment experienced at an early age (0−5) could be that stressful events at an early stage in life might provoke long-term (psychological) trauma via overall human capital accumulation (Nikolova and Nikolaev, 2021). The magnitudes of these estimates present evidence consistent with the perspective that the associations of parental nonemployment on children's health appear to be larger for those affected at older ages (Case et al., 2002).

Table 5 illustrates the APE for the consumption of prescribed medicines. Results suggest that parental nonemployment experienced in late childhood (11−15) increases the likelihood of consumption of prescribed medicines by around 4.8 percentage points later in life. Prescribed medicines can be considered a more objective health measure since one would take them only if a medical doctor diagnoses a health condition. However, it should be acknowledged that these diagnosed conditions might have little to do with that specific shock earlier in life, and thus, one needs to interpret this result with caution.

6.2. Heterogeneous effects

The associations identified previously may be masking important heterogeneity in the treatment effects along several dimensions.[25] Before proceeding, it should be noted that the heterogeneity analysis is conducted by interacting parental nonemployment across childhood stages separately with a set of family, parents, and children circumstances.[26]

First, Table 6 expands the baseline analyses to explore if the results reported previously depend on whether the mother or the father (or both) is the jobless parent. Findings from Panel (A) show that experiencing paternal nonemployment in childhood is negatively associated with long-term physical and mental health status. Specifically, paternal nonemployment spells experienced at ages 6–10 increase the likelihood of reporting mental ill-health in adulthood by around 4 percentage points. Importantly, comparing these estimates from those experiencing both maternal and paternal nonemployment at the same time (Panel (C)), the magnitudes are substantially larger. This association is significant even after multiple hypothesis testing (MHT) is performed. By contrast, experiencing maternal nonemployment is not statistically significant associated with worse longer-term mental and physical health – see results from Panel (B). The differential results between mothers' and fathers' nonemployment reported in Table 6 are perhaps not surprising considering the existing literature. Several studies have found that paternal nonemployment is associated with detrimental health outcomes for children (Schaller and Zerpa, 2019), whereas results studying the effects of jobless mothers on child health outcomes are mixed (Brand and Thomas, 2014; Bubonya et al., 2017).

Second, Table 7 tests whether family socioeconomic status (SES) could partly compensate for the negative association between parental nonemployment and children future health. This heterogeneity analysis aims to shed light on whether suffering parental nonemployment in already disadvantaged household may exacerbate their lack of opportunities across life (Oreopoulos et al., 2008; Page et al., 2009). Table 7

[25] Note that the effects of heterogeneity for prescribed medicines are not reported due to lack of data.

[26] Additionally, multiple hypothesis testing is performed on all regressions. As the number of hypothesis tests increases, the proportion of type I errors (false positives) may also increase. Thus, an adjustment for multiple comparisons using a conservative approach based on Bonferroni-Holm (Holm, 1979) is performed. Then, the p-values generated by individual hypotheses are compared with adjusted critical p-values.

Table 6
Long-term health associations of parental nonemployment during childhood by parent's gender.

Average partial effects		Self-assessed poor/fair health status		Mental ill-health (GHQ-12)		Long-standing illness or disability	
By parent's gender	N	(1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE	(4) GEE random effects	(5) CRE probit estimated by MLE	(6) GEE random effects
Panel (A): Non-employed father but mother still in paid work							
Child's age 0–5	6924	0.030	0.030	0.007	0.008	-0.033	-0.032
		(0.020)	(0.020)	(0.033)	(0.032)	(0.024)	(0.025)
Child's age 6–10	3367	0.051**	0.050**	0.041**	0.040**	-0.002	-0.002
		(0.022)	(0.024)	(0.015)	(0.016)	(0.027)	(0.029)
Child's age 11–15	2169	0.036	0.036	0.018	0.017	0.122***	0.121***
		(0.027)	(0.030)	(0.045)	(0.048)	(0.036)	(0.041)
Panel (B): Non-employed mother but father still in paid work							
Child's age 0–5	6924	-0.007	-0.006	0.012	0.011	0.022	0.022
		(0.014)	(0.016)	(0.029)	(0.031)	(0.022)	(0.023)
Child's age 6–10	3367	0.036	0.026	0.097	0.096	0.030	0.030
		(0.024)	(0.025)	(0.087)	(0.088)	(0.026)	(0.027)
Child's age 11–15	2169	0.003	0.002	-0.070*	-0.070*	0.013	0.012
		(0.022)	(0.016)	(0.037)	(0.041)	(0.030)	(0.031)
Panel (C): Both parents non-employed							
Child's age 0–5	6924	0.047*	0.046*	0.090	0.089	0.103***	0.102***
		(0.026)	(0.026)	(0.059)	(0.061)	(0.032)	(0.033)
Child's age 6–10	3367	0.027	0.027	0.122** (0.053)	0.121**	0.005	0.004
		(0.031)	(0.038)		(0.060)	(0.051)	(0.058)
Child's age 11–15	2169	0.055**	0.054**	0.058	0.057	0.077	0.076
		(0.018)	(0.019)	(0.057)	(0.059)	(0.056)	(0.058)
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Additional control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The focal independent variables are interaction terms between whether the mother, the father or both are non-employed and child's ages. The dependent health variables are reporting poor or fair self-assessed health; suffering from mental ill-health; and risk of reporting one or more than one long-standing illnesses or disabilities. All models include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Additional controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages. * $p < 0.1$, * * $p < 0.05$, * ** $p < 0.01$.

shows results on the long-term health associations of parental nonemployment may differ depending on the family's socioeconomic status, measured in terms highest parental educational status.[27] Findings from Panel (B) suggest that experiencing parental nonemployment in less-educated families has larger negative consequences on children future mental and physical health. By contrast, experiencing parental nonemployment in higher-educated families is not associated to poor or fair self-assessed general health or higher risk of disabilities later in life, and they may even experience a reduction in the likelihood of suffering mental health problems later in life when parental nonemployment occurs at ages 11–15 (see Panel (A), Columns (3−4)).

Table 8 explores whether boys or girls are differentially affected by parental nonemployment. Results from Panel (B) suggest that parental nonemployment at ages 0–5 and 11–15 increases the likelihood of suffering disabilities and lower general health levels, particularly among men. No statistically significant associations are found among women for their physical and general health outcomes. An explanation of these findings can be that boys, especially at an early age, tend to show lower levels of inhibition/control and regulatory abilities if compared to girls (Chang et al., 2011). A further notable result that emerges from Table 8, Panel (A) Columns (5−6), is that parental nonemployment experienced at ages 11–15 could also have negative consequences on the long-term physical health of women.

Table 9 tests whether experiencing higher frequencies of parental nonemployment spells during childhood is negatively associated with poor longer-term health. Results from Panel (A) show that experiencing more than two parental nonemployment spells during childhood is associated with worsen adult's physical and mental health. By contrast, Panel (B) Columns (5−6) suggests positive associations between experiencing parental nonemployment at ages 0–5 and adults' physical health when this occurs less than three times. These findings might suggest positive long-term health associations of lower frequencies of parental nonemployment spells, which may indirectly imply that parents might have more time for childcare tasks (Knabe et al., 2010).

[27] Parent's education attainment is defined as the highest education achievement among both parents. A college-educated family takes values one for the children whose highest-educated parents have attended college (and zero otherwise).

Table 7
Long-term health associations of parental nonemployment during childhood by family's socioeconomic status (highest family educational attainment).

Average partial effects		Self-assessed poor/fair health status		Mental ill-health (GHQ-12)		Long-standing illness or disability	
By highest family educational attainment	N	(1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE	(4) GEE random effects	(5) CRE probit estimated by MLE	(6) GEE random effects
Panel (A): Highest-educated parent has attended college							
Child's age 0–5	8174	0.015	0.014	0.035	0.034	0.015	0.015
		(0.023)	(0.024)	(0.038)	(0.039)	(0.027)	(0.027)
Child's age 6–10	3708	0.004	0.004	0.008	0.008	-0.003	-0.003
		(0.025)	(0.024)	(0.036)	(0.037)	(0.034)	(0.037)
Child's age 11–15	2848	0.033	0.033	-0.171***	-0.171***	0.028	0.027
		(0.023)	(0.025)	(0.046)	(0.052)	(0.048)	(0.052)
Panel (B): Highest-educated parent has NOT attended college							
Child's age 0–5	8174	0.023	0.022	0.006	0.006	0.047**	0.047**
		(0.018)	(0.018)	(0.029)	(0.030)	(0.022)	(0.021)
Child's age 6–10	3708	0.059***	0.058***	0.094***	0.094***	0.016	0.015
		(0.020)	(0.022)	(0.033)	(0.036)	(0.027)	(0.026)
Child's age 11–15	2848	0.024	0.024	0.024	0.023	0.097***	0.097***
		(0.024)	(0.027)	(0.035)	(0.036)	(0.033)	(0.033)
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Additional control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The focal independent variables are interaction terms between (any/both) parents have attended to college and child's ages parental nonemployment is experienced. The dependent health variables are reporting poor or fair self-assessed health; suffering from mental ill-health; and risk of reporting one or more than one long-standing illnesses or disabilities. All models include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Additional controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages. * $p < 0.1$, * * $p < 0.05$, * ** $p < 0.01$.

Finally, further examination of different range times when long-term health associations are likely to occur is performed. In particular, the analysis here focuses on the long-term health associations of experiencing parental nonemployment during childhood on different adulthood stages, such as young adults (ages 18–24) and emerging adults (ages 25–33). This follows previous literature considering different young adult stages (Arnett, 2010).[28] Findings in Table 10 show that the effects of experiencing parental nonemployment during childhood shows itself more clearly when children grow older (25−33) rather than when they are still young adults. Therefore, baseline results may seem to be driven by emerging adults aged 25–33, see Panel (B). These results are in line with previous literature showing that the adverse health effects of non-employed parents accumulate over children's lives (Case et al., 2002).

6.3. Potential mechanisms underlying effects

This section empirically tests to what extent the mechanisms discussed above account for the findings. Parental nonemployment may affect children's cognitive development and health formation through parental changes in intra-household resource allocation, influencing their achievements in the long run (e.g., level of completed education or job status). Therefore, a set of current adulthood circumstances are used to explore the potential mechanisms that help to understand why children of different ages are affected in a different way by parental nonemployment spells. This includes variables related to the level of education, job security and household demographics.

The first mechanism relates to the level of educational attainment achieved, aiming to understand whether those children experiencing parental nonemployment spells at different stages of childhood are associated with lower probabilities of having a degree or other higher education. This variable takes one whether the individual has a degree or any other higher qualification, and zero otherwise. Results from Table 11, Columns (1−2), show that experiencing parental nonemployment at ages 0–5 is associated with a lower probability of obtaining a degree. Second, the current economic activity status is used to explore whether the current job status is a potential mechanism driving the relationship between experiencing parental nonemployment in childhood and health in adulthood. To do that, a variable taking the value of one if the individual's current economic activity is unemployed and zero otherwise is created. Results from Columns (3−4) show that young adults experiencing parental nonemployment in their first stages of childhood are more likely to be unemployed than those whose parents were employed.

The third mechanism explored is whether the long-term associations are driven by income changes. To do that, information on the current equivalised net household income is used to create a binary variable that takes one if the individual's equivalised net household income lies below 60% of median household income (and zero otherwise).[29] In Columns (5−6), one can see that those children living with non-employed parents during childhood have higher chances of currently living in a household whose income lies below the poverty threshold. Finally, current

[28] The prolonged transition to adulthood experienced in developed countries requires different development stages across young adulthood.

[29] Family earnings are defined using the net household income. First, a cross-sectional weight is used to produce a population estimate of the median equivalised net household income (that includes income from child benefits, income support or other non-labour income sources) based on sample data. Then, a poverty variable is created, and it takes values one if the young adults' equivalised net household income lies below 60% of median household income, and zero otherwise.

Table 8
Long-term health associations of parental nonemployment during childhood by child's biological sex.

Average partial effects		Self-assessed poor/fair health status		Mental ill-health (GHQ-12)		Long-standing illness or disability	
By child's biological sex	N	(1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE	(4) GEE random effects	(5) CRE probit estimated by MLE	(6) GEE random effects
Panel (A): Female							
Child's age 0–5	8174	0.032	0.032	0.044	0.044	-0.002	-0.002
		(0.020)	(0.021)	(0.033)	(0.034)	(0.027)	(0.028)
Child's age 6–10	3708	-0.018	-0.017	0.011	0.011	-0.022	-0.022
		(0.025)	(0.028)	(0.029)	(0.030)	(0.028)	(0.029)
Child's age 11–15	2848	-0.036	-0.035	-0.008	-0.008	0.068*	0.067*
		(0.029)	(0.033)	(0.041)	(0.044)	(0.038)	(0.039)
Panel (B): Male							
Child's age 0–5	8174	0.002	0.002	0.004	0.003	0.064**	0.065**
		(0.021)	(0.022)	(0.032)	(0.035)	(0.025)	(0.026)
Child's age 6–10	3708	0.086***	0.086***	0.141***	0.141***	0.042	0.041
		(0.023)	(0.024)	(0.039)	(0.041)	(0.035)	(0.037)
Child's age 11–15	2848	0.088***	0.088***	-0.044	-0.044	0.079**	0.079*
		(0.026)	(0.028)	(0.044)	(0.045)	(0.040)	(0.045)
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Additional control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The focal independent variables are interaction terms between child's sex and child's ages parental nonemployment is experienced. The dependent health variables are reporting poor or fair self-assessed health; suffering from mental ill-health; and risk of reporting one or more than one long-standing illnesses or disabilities. All models include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Additional controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages. * $p < 0.1$, * * $p < 0.05$, * ** $p < 0.01$.

household characteristics are explored as a potential mechanism explaining the results. In this case, information on whether the young adult is still living at home with parent/s is used. Findings from Columns (7−8) show that those individuals whose parents were non-employed when they were aged between 6 and 10 years old have higher probabilities of still living with their parents.

Welfare institutions may help to avoid the long-term negative consequences of parental nonemployment using state social transfers (such as child or income benefits). In our sample, around 85% of the children live in a household where either the father or the mother received income from child benefits, making it difficult to explore whether welfare institutions help to avoid the negative consequences of parental nonemployment.[30]

7. Robutness checks and limitations

This section directly and indirectly checks the robustness of this paper's baseline identification strategy. The direct check consists of estimating Eqs. (3) and (5) using a slightly different definition of parental nonemployment. In the baseline specification, mothers out of the workforce due to family care reasons are considered as employed. Nonetheless, one can argue that mothers out of the labour force might affect children differently than mothers actively looking for a job. Therefore, a new treatment variable is defined, excluding from the sample those mothers whose labour force status is a family carer.[31] Results from Table 12, Panel (A), are very similar to those from the baseline definition of parental nonemployment, and for the sake of maintaining high numbers of observations, family carer's mothers are included in the analysis.

As a second check, fathers out of the workforce due to family care reasons are considered as employed. Therefore, both mothers and fathers out of the workforce due to family care reasons are treated equal and included in the control group. It is worth noticing that those fathers out of the workforce due to family care reasons only represent 1.02% of the total sample. A sensitivity analysis is performed, including fathers who are out of the workforce due to family care reasons in the comparison group. Results from this robustness check can be seen in Table 12, Panel (B), which does not vary significantly from those of the baseline analysis.[32]

Third, control variables for maternal and paternal smoking behaviour are added. Dummy variables taking the value one if the father/mother is a smoker (and 0 otherwise) are created during different childhood stages. Results in Table 12, Panel (C), are very similar to those reported in Tables 2–5, and therefore, not including parental smoking behaviours measured during the childhood does not seem to bias the results of the main analysis. The statistically significant associations between parental nonemployment in childhood and a child's long-term health are still present, and therefore, further understanding of the role

[30] In England, parents are qualified for child benefits if they are responsible for a child under 16 (or under 20 if they stay in approved education or training) and live in the UK, except parents earning more than £ 60,000 that lose all of the benefits through tax.

[31] This consists of 3809 (24.34%) observations erased from those mothers whose labour force status is "family care".

[32] As an additional test, fathers out of the workforce are excluded from the baseline analysis. Results are available upon request and do not vary from the baseline analysis.

Table 9
Long-term health associations of parental nonemployment during childhood by number of parental nonemployment spells.

Average partial effects		Self-assessed poor/fair health status		Mental ill-health (GHQ-12)		Long-standing illness or disability	
By frequencies of nonemployment spells	N	(1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE	(4) GEE random effects	(5) CRE probit estimated by MLE	(6) GEE random effects
Panel (A): Number of parental nonemployment spells higher than 2							
Child's age 0–5	8174	0.031*	0.031*	0.030	0.031	0.059**	0.059**
		(0.018)	(0.018)	(0.031)	(0.032)	(0.023)	(0.019)
Child's age 6–10	3708	0.059***	0.058***	0.099***	0.099**	0.002	0.001
		(0.020)	(0.022)	(0.033)	(0.035)	(0.029)	(0.031)
Child's age 11–15	2848	0.048**	0.048*	-0.024	-0.024	0.100***	0.100**
		(0.023)	(0.026)	(0.040)	(0.041)	(0.035)	(0.039)
Panel (B): Number of parental nonemployment spells less or equal than 2							
Child's age 0–5	8174	-0.020	-0.020	-0.028	-0.027	-0.032*	-0.032*
		(0.016)	(0.017)	(0.021)	(0.021)	(0.017)	(0.018)
Child's age 6–10	3708	-0.023	-0.022	-0.028	-0.028	0.030	0.030
		(0.026)	(0.028)	(0.028)	(0.031)	(0.024)	(0.026)
Child's age 11–15	2848	-0.036	-0.036	-0.014	-0.014	-0.003	-0.002
		(0.026)	(0.031)	(0.032)	(0.034)	(0.029)	(0.031)
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Additional control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The focal independent variables are interaction terms between frequencies of parental nonemployment spells (equal or higher than 2) and child's ages parental nonemployment is experienced. The dependent health variables are reporting poor or fair self-assessed health; suffering from mental ill-health; and risk of reporting one or more than one long-standing illnesses or disabilities. All models include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Additional controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

of unhealthy parental behaviours is needed.

Fourth, a control variable for health indicators in childhood is added. In BHPS, a child in a household starts completing the main survey when they are 16 or over. Children aged 10–15 complete a youth questionnaire with self-reported variables indicating their health status. Therefore, a variable measuring the general health status of children aged 10–15 is included as a confounder to test whether more robust coefficients could be obtained. In particular, a binary variable taking the value one if the individual defined their general health status as not good at all during their late childhood (and zero otherwise) is added in the regressions. Table 12, Panel (D), shows that neither the estimates' statistical significance nor their magnitude does not seem substantially different from the baseline model.

Fifth, a test for the sensitivity of the findings by controlling for the *'Big 5'* parental personality traits is performed. There is general agreement among psychologists that five broad traits dimensions can describe the range of possible personalities (Wiggins, 1996). Control variables for mothers' and fathers' personality traits (including their level of extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience) reported during childhood are included.[33] Note that these questions are only asked during wave 15 (year 2005) of the BHPS, and thus, parental personality traits are assumed to remain constant across childhood stages (Schofield et al., 2012). Results from Table 12, Panel (E), which include the 'Big-5′ parental personality traits, are not substantially different from the main baseline analysis.

Similarly, control variables for the child's own 'Big-5′ personality traits when they grow up, in addition to the parental personality traits, are also included in the baseline regressions. Nonetheless, the results should be viewed with caution as it is unclear whether the child's personality traits when they become adults are themselves affected by parental nonemployment, meaning the results would be biased due to selection. The sample size using children and parental 'Big-5′ personality trait checks reported in Table 12, Panel (F), is reduced due to missing observations amid these variables. Findings are very similar to those obtained using the main specification. As final checks, results from the selection bias test suggest that missing values do not influence the estimates. A multiple hypothesis testing correction (Bonferroni correction) test is performed in all the regressions to check whether statistically significant results are false positive due to the fact of performing multiple hypotheses, confirming these findings.

This paper has several shortcomings. The analysis relies on econometric specifications accounting for unobserved heterogeneity, selection bias and the possible dependency structure of the data while controlling for a wide range of confounding factors. Several studies have tried to overcome the endogeneity of parental nonemployment by comparing children whose parents suffered involuntary nonemployment coming from factory closures with children whose parents continued to be employed in stable factories. However, neither the BHPS nor UKHLS datasets contain relievable information on nonemployment status due to

[33] Extraversion refers to individual differences in sociability, gregariousness, level of activity, and the experience of positive affect. Agreeableness refers to individual differences in altruistic behaviour, trust, warmth, and kindness. Conscientiousness refers to individual differences in self-control, task-orientation, and rule-abiding. Neuroticism refers to individual differences in susceptibility to distress and the experience of negative emotions such as anxiety, anger, and depression. Finally, openness to experience refers to individual differences in the propensity for originality, creativity, and the acceptance of new ideas.

Table 10
Long-term health associations of parental nonemployment during childhood by adult child's age.

Average partial effects		Self-assessed poor/fair health status		Mental ill-health (GHQ-12)		Long-standing illness or disability	
By current young adult's age	N	(1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE	(4) GEE random effects	(5) CRE probit estimated by MLE	(6) GEE random effects
Panel (A): Ages 18–24 (Young adults)							
Child's age 0–5	8174	0.021	0.020	0.017	0.016	0.034	0.034
		(0.014)	(0.014)	(0.023)	(0.024)	(0.024)	(0.026)
Child's age 6–10	3708	0.027	0.027	0.059	0.059	-0.039	-0.039
		(0.018)	(0.020)	(0.055)	(0.058)	(0.046)	(0.049)
Child's age 11–15	2848	0.024	0.024	0.054	0.054	0.014	0.014
		(0.034)	(0.035)	(0.052)	(0.053)	(0.013)	(0.015)
Panel (B): Ages 25 and older (Emerging adults)							
Child's age 0–5	8174	0.018	0.017	0.026	0.026	0.039**	0.039**
		(0.018)	(0.017)	(0.024)	(0.025)	(0.018)	(0.018)
Child's age 6–10	3708	0.083**	0.083**	0.075***	0.075**	0.027	0.027
		(0.036)	(0.037)	(0.028)	(0.029)	(0.025)	(0.026)
Child's age 11–15	2848	0.027	0.028	-0.024	-0.024	0.081**	0.080**
		(0.019)	(0.022)	(0.029)	(0.031)	(0.027)	(0.029)
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Additional control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The focal independent variables are interaction terms between adult child's ages (young adults (18–24) or emerging adults (25–33) and child's ages parental nonemployment is experienced. The dependent health variables are reporting poor or fair self-assessed health; suffering from mental ill-health; and risk of reporting one or more than one long-standing illnesses or disabilities. All models include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Additional controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 11
Mechanisms.

Average partial effects		Educational attainment: degree or other higher		Current economic activity: unemployed		Household income: below poverty threshold		Living at home with parent/s	
Mechanisms	N	(1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE	(4) GEE random effects	(5) CRE probit estimated by MLE	(6) GEE random effects	(7) CRE probit estimated by MLE	(8) GEE random effects
Child's age 0–5	8100	-0.038*	-0.038*	0.029**	0.029*	0.040**	0.040** (0.018)	-0.006	-0.006
		(0.019)	(0.021)	(0.0144)	(0.015)	(0.017)		(0.022)	(0.023)
Child's age 6–10	4107	-0.041	-0.041	0.037**	0.037**	0.029*	0.029* (0.017)	0.051*	0.051*
		(0.030)	(0.032)	(0.015)	(0.016)	(0.016)		(0.029)	(0.030)
Child's age 11–15	2888	0.058	0.058	0.010	0.010	0.025**	0.025** (0.009)	-0.033	-0.033
		(0.043)	(0.044)	(0.019)	(0.021)	(0.009)		(0.028)	(0.030)
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Additional control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The outcome variables are all binary: educational attainment takes one whether the individual has a degree or any other higher qualification, and zero otherwise; unemployed takes one whether the individual's current economic activity is unemployed and zero otherwise; below poverty threshold variable takes one whether the individual's equivalised net household income lies below 60% median household income and zero otherwise; and living at home with parent/s takes one whether the individuals still live with parents and zero otherwise. All models include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Additional controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 12
Robustness checks.

Average partial effects		Self-assessed poor/fair health status		Mental ill-health(GHQ-12)		Long-standing illness or disability		Prescribed medicines	
Robustness checks	N	(1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE	(4) GEE random effects	(5) CRE probit estimated by MLE	(6) GEE random effects	(7) CRE probit estimated by MLE	(8) GEE random effects
Panel (A): Exclude mothers who report that their current labour force status is family care									
Child's age 0–5	6019	0.020	0.020	0.025	0.025	0.050***	0.050***	0.003	0.004
		(0.013)	(0.014)	(0.025)	(0.026)	(0.018)	(0.019)	(0.026)	(0.031)
Child's age 6–10	2929	0.030**	0.030**	0.101***	0.101***	0.009	0.009	-0.041	-0.044
		(0.014)	(0.013)	(0.024)	(0.026)	(0.023)	(0.024)	(0.031)	(0.033)
Child's age 11–15	2305	0.026**	0.025**	-0.049	-0.049	0.051**	0.051*	0.033**	0.034**
		(0.011)	(0.011)	(0.033)	(0.035)	(0.025)	(0.028)	(0.017)	(0.016)
Panel (B): Fathers out of the work force due to family care reason are considered as employed									
Child's age 0–5	7797	0.017	0.017	0.007	0.007	0.037**	0.037**	0.012	0.014
		(0.014)	(0.014)	(0.023)	(0.022)	(0.017)	(0.018)	(0.016)	(0.011)
Child's age 6–10	3241	0.031**	0.031*	0.085***	0.085***	0.012	0.011	-0.037	-0.037
		(0.015)	(0.016)	(0.024)	(0.025)	(0.022)	(0.023)	(0.041)	(0.043)
Child's age 11–15	2880	0.030	0.030	-0.035	-0.035	0.068**	0.068**	0.066***	0.066***
		(0.018)	(0.020)	(0.029)	(0.030)	(0.027)	(0.029)	(0.014)	(0.015)
Panel (C): Control for parental health behaviours (smoking)									
Child's age 0–5	7669	0.019	0.019	0.018	0.018	0.043**	0.042**	0.006	0.007
		(0.014)	(0.014)	(0.023)	(0.023)	(0.018)	(0.018)	(0.028)	(0.032)
Child's age 6–10	3708	0.043***	0.043**	0.073***	0.073***	0.008	0.007	-0.017	-0.016
		(0.015)	(0.017)	(0.024)	(0.026)	(0.023)	(0.022)	(0.015)	(0.017)
Child's age 11–15	2848	0.033*	0.033*	-0.022	-0.021	0.037**	0.038*	0.079***	0.078**
		(0.018)	(0.019)	(0.029)	(0.030)	(0.025)	(0.027)	(0.024)	(0.035)
Panel (D): Control for health status in late childhood (whether health is not good at all)									
Child's age 0–5	7096	0.023	0.023	0.024	0.024	0.033*	0.033*	0.012	0.012
		(0.015)	(0.015)	(0.024)	(0.024)	(0.018)	(0.019)	(0.013)	(0.013)
Child's age 6–10	3087	0.038**	0.038**	0.074***	0.074***	0.017	0.017	-0.025	-0.026
		(0.015)	(0.016)	(0.027)	(0.028)	(0.024)	(0.026)	(0.022)	(0.023)
Child's age 11–15	1804	0.032***	0.032***	-0.042	-0.042	0.041**	0.041**	0.045**	0.045**
		(0.012)	(0.012)	(0.030)	(0.033)	(0.012)	(0.015)	(0.018)	(0.019)
Panel (E): Control for parental personality traits (BIG-5)									
Child's age 0–5	6920	0.031**	0.031**	0.017	0.017	0.045**	0.045**	0.005	0.005
		(0.013)	(0.014)	(0.024)	(0.025)	(0.020)	(0.021)	(0.041)	(0.043)
Child's age 6–10	3221	0.050***	0.050**	0.082***	0.082***	0.013	0.012	-0.022	-0.021
		(0.014)	(0.015)	(0.024)	(0.025)	(0.023)	(0.025)	(0.023)	(0.025)
Child's age 11–15	2317	0.038**	0.035*	-0.052	-0.052	0.069 **	0.069**	0.041**	0.040**
		(0.014)	(0.019)	(0.033)	(0.038)	(0.027)	(0.031)	(0.015)	(0.014)
Panel (F): Control for young adult's personality traits (BIG-5)									
Child's age 0–5	7016	0.021	0.021	0.026	0.025	0.053***	0.053***	0.005	0.006
		(0.015)	(0.016)	(0.023)	(0.025)	(0.019)	(0.020)	(0.026)	(0.028)
Child's age 6–10	3301	0.045**	0.045**	0.068***	0.068***	0.018	0.019	-0.014	-0.015
		(0.017)	(0.019)	(0.019)	(0.020)	(0.022)	(0.021)	(0.011)	(0.013)
Child's age 11–15	2408	0.011	0.010	-0.032	-0.032	0.058**	0.058**	0.074***	0.073**
		(0.018)	(0.021)	(0.027)	(0.031)	(0.026)	(0.029)	(0.030)	(0.031)
Exogenous control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Socio-economic control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

(*continued on next page*)

Table 12 (*continued*)

Average partial effects		Self-assessed poor/fair health status		Mental ill-health(GHQ-12)		Long-standing illness or disability		Prescribed medicines	
Robustness checks	N	(1) CRE probit estimated by MLE	(2) GEE random effects	(3) CRE probit estimated by MLE	(4) GEE random effects	(5) CRE probit estimated by MLE	(6) GEE random effects	(7) CRE probit estimated by MLE	(8) GEE random effects
Additional control variables		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Notes: CRE= Correlated Random Effects; GEE= Generalized Estimating Equation. Robust standard errors in parentheses, clustered at the child's level. The dependent health variables are reporting poor or fair self-assessed health; suffering from mental ill-health; and risk of reporting one or more than one long-standing illnesses or disabilities; and consuming one or more prescribed medicines. All models include controls for the annual cumulative regional unemployment rate at the respective ages, year of birth, adult child age, gender, child's migration background, the region of birth, mother's and father's education, mother's and father's age at which the child is born, survey year and region of residence. Additional controls for household income at the respective childhood ages, household size at the respective childhood ages, the number of siblings during respective childhood ages, and the size of home during respective childhood ages. The sample sizes are different for prescribed medicines regressions. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

business closures or dismissals. Still, the estimates reported in this paper are in line with the previous ones using different definitions of parental nonemployment based on plant closings and dismissals.[34] This paper has opted to rely on a different methodology that controls for time-invariant unobserved characteristics using Mundlak's (individual fixed effects) approach. Moreover, an important issue with subjective health outcomes, in general, is how to interpret the relative nature of subjective responses. For instance, categorical variables such as self-assessed poor or fair health status transformed into dichotomous variables might be a source of bias.[35] Finally, the exact number of parental nonemployment spells experienced in childhood is unknown using unbalanced panel data, and this paper uses only those spells that are observed in the data. Therefore, heterogeneous results using the frequencies of parental nonemployment spells need to be interpreted with caution due to their likelihood of mismeasurement. Future studies using information capturing the accumulative household income, duration of parental nonemployment, and single-parent families may constitute important line of research.

8. Discussion and conclusions

This paper uses two longitudinal studies from the UK to examine associations between experiencing spells of parental nonemployment during different stages of childhood and multiple health indicators measured in early adulthood (between 18 and 33 years). It also uses current young adulthood circumstances to explore potential mechanisms driving the results, and it analyses effects of heterogeneity by parents' socioeconomic status, parental and child biological sex, and age in which the outcomes are measured. This study shows that experiencing parental nonemployment (especially of fathers) increases the chances of reporting worse physical and mental health, as well as to increase the consumption of prescribed medication in early adulthood.

Findings show that experiencing parental nonemployment during early (0−5) and late (11−15) childhood increases the likelihood of reporting long-standing illnesses in early adulthood (18−33). These results support findings from previous studies, such as Ermisch's et al. (2004), who show that parental nonemployment experienced at an early age is associated with lowering educational attainment, economic inactivity, and unhealthy behaviour later on in life. As a potential explanation is that early shocks in children's lives may cause further subsequent disruptions in the social and family environment with potentially long-lasting effects (Nikolova and Nikolaev, 2021). In addition, experiencing parental nonemployment between 11 and 15 years old is associated with a deterioration of their general health status in young adulthood as children may feel more pressure to take responsibility at home after their parents become jobless (Arbeit, 2013). Larger associations are found in later years of childhood/adolescence, which is in line with Case's et al. (2002) results showing that the negative effects of low income on children's health become more pronounced as children grow up. Results also reveal that experiencing parental nonemployment during middle childhood (6−10) increases the probability of suffering mental ill-health later in life. This result corroborates evidence from Schaller and Zerpa (2019), finding that paternal nonemployment experienced at ages 6–12 (primary and middle school) increases the likelihood of reporting worse mental health during young adulthood. Moreover, results suggest that parental nonemployment experienced in late childhood (11−15) increases the probability of consuming prescribed medicines during young adulthood.

Findings from the heterogeneity analyses clearly indicate that the negative associations of parental nonemployment on children's health depend on the socioeconomic status of the family of origin (measured by parental educational attainment). Among families whose parents are less educated, experiencing parental nonemployment is associated with larger negative associations on children's mental and physical health later in life. These findings align with those reported by Oreopoulos et al. (2008) and Page et al. (2009), suggesting that the strongest effects of parental nonemployment on children's labour market and educational outcomes in adulthood are found at the bottom of the income distribution. This may reflect the fact that the consequences of the income loss induced by parental joblessness are more severe among already disadvantaged families (Huttunen and Riukula, 2019).

This paper also shows differential results based on the gender of the parent who was jobless in childhood. While paternal nonemployment is associated with detrimental child's long-term health outcomes, maternal nonemployment does not appear to be correlated with long-term detriments in children's physical or mental health. A possible explanation is that the income losses induced by paternal jobless might be larger as a potential primary breadwinner (Charles and James, 2005), and this is associated with worse consequences in children's long-term health compared with maternal nonemployment (Pieters and Rawlings, 2020). Different results are also found by child's sex-based biological characteristics. Findings suggest that parental nonemployment at ages 0–5 and 11–15 increases the likelihood of suffering from disabilities and worse general health levels among adult men. This perhaps suggests that sex-based biological characteristics may lead to differences in inhibitory control or regulatory abilities (Chang et al., 2011). Unlike previous studies, this paper expands the heterogeneous analysis by using the number of parental nonemployment spells experienced in each childhood stage, as well as the age at which the outcomes are measured in young adulthood. Results show that multiple spells of parental nonemployment are strongly associated with worse long-term health outcomes for children. It also appears that negative associations of

[34] The "Employment History" survey contains this information but with a considerable amount of missing data. Nevertheless, this paper's scope is to analyse the effect of living in a household where either the mother or the father (or both) is a non-earner during childhood on children's health later in life.

[35] This paper addressed this by testing for different definitions of "poorest" self-assessed health, reporting no differentials in overall results.

experiencing parental nonemployment during childhood manifest themselves when children grow older (25−33) rather than when they are young adults (18−24). This may be because societal expectations for success may arise at older ages, awakening childhood experiences (Nikolova and Nikolaev, 2021).

This study also contributes to previous literature by exploring the potential mechanisms that could help to understand why children of different ages are affected in a different way by parental nonemployment spells. Specifically, current adulthood circumstances (including the level of education, job security and household demographics) are used to test whether parental nonemployment in childhood may affect children's health formation by diminishing their achievements and human capital formation in the long run, which may, in turn, influence their current health status. Results show that those young adults experiencing parental nonemployment at ages 0–5 have higher probabilities of being unemployed, having a household income below the poverty threshold and a lower likelihood of obtaining a degree. Moreover, those young adults experiencing parental nonemployment at ages 6–10 have higher probabilities of being currently unemployed, having a household income below the poverty threshold and living with their parent/s. Finally, young adults experiencing parental nonemployment at ages 11–15 are associated with living in a household whose income lies below the poverty threshold.

This paper has potentially useful implications for the design of public policies. Results suggest that policies targeted at containing joblessness, especially among families with children, might also help reduce the incidence of mental ill-health among young adults. Joblessness is potentially associated with permanent decreases in earnings and an increased likelihood of future nonemployment spells, affecting children's health later in life. Therefore, policy interventions targeting children and adolescents living in jobless households may provide lifelong health benefits, leading to significant savings in public finances (Almond et al., 2018). Overall, understanding the relationship between parental nonemployment in childhood and long-term children's health may help shape appropriate policy responses to tackle widening inequalities derived from job loss, especially among economically disadvantaged households.

Data Availability

The authors do not have permission to share data.

Acknowledgments

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Appendix A

See Appendix Tables A1, A2, A3.
See Appendix Figs A1, A2, A3, A4.

Table A1
Summary statistics, selected variables, parental nonemployment at ages 0–5 sample.

	Overall, N = 8480		No parental nonemployment, N = 6598		Parental nonemployment, N = 1882	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	20.37	1.704	20.39	1.781	20.34	1.75
Female	0.519	0.499	0.513	0.499	0.504	0.504
Year of birth						
1988	0.143	0.351	0.141	0.348	0.154	0.360
1989	0.141	0.348	0.142	0.349	0.128	0.346
1990	0.154	0.361	0.161	0.367	0.142	0.337
1991	0.195	0.396	0.193	0.395	0.203	0.402
1992	0.187	0.389	0.183	0.387	0.198	0.399
1993	0.177	0.381	0.178	0.382	0.173	0.378
Education						
Degree	0.072	0.259	0.081	0.273	0.044	0.205
Other higher	0.066	0.248	0.071	0.258	0.047	0.211
A level etc	0.534	0.498	0.543	0.498	0.506	0.500
GCSE etc	0.248	0.432	0.236	0.425	0.290	0.454
Other qualification	0.038	0.193	0.036	0.186	0.047	0.213
No qualification	0.031	0.173	0.023	0.150	0.058	0.234
Migration background						
White British	0.841	0.365	0.857	0.349	0.785	0.410
No white British	0.068	0.252	0.058	0.233	0.105	0.306
Government Office Region						
North East	0.028	0.165	0.027	0.164	0.029	0.169
North West	0.078	0.269	0.081	0.273	0.069	0.254
Yorkshire and the Humber	0.063	0.242	0.064	0.245	0.058	0.234
East Midlands	0.077	0.266	0.075	0.264	0.082	0.275
West Midlands	0.061	0.240	0.067	0.250	0.041	0.199
East of England	0.046	0.211	0.044	0.205	0.055	0.229
London	0.037	0.188	0.035	0.186	0.040	0.198
South East	0.121	0.326	0.130	0.337	0.089	0.285
South West	0.068	0.252	0.069	0.255	0.063	0.243
Wales	0.156	0.363	0.152	0.359	0.169	0.374
Scotland	0.142	0.350	0.143	0.351	0.139	0.346

(continued on next page)

Table A1 (*continued*)

	Overall, N = 8480		No parental nonemployment, N = 6598		Parental nonemployment, N = 1882	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Northern Ireland	0.114	0.319	0.101	0.302	0.160	0.367
Father: age when child born						
20 and younger	0.054	0.227	0.055	0.228	0.051	0.221
21–25	0.121	0.326	0.110	0.313	0.158	0.365
26–30	0.288	0.452	0.302	0.459	0.239	0.426
31–35	0.290	0.454	0.307	0.461	0.234	0.423
36–40	0.142	0.349	0.141	0.348	0.147	0.354
41 and older	0.076	0.265	0.061	0.239	0.129	0.335
Father: Education						
Degree	0.162	0.368	0.178	0.383	0.105	0.307
Other higher	0.071	0.257	0.083	0.275	0.031	0.174
A level etc	0.249	0.432	0.266	0.442	0.187	0.390
GCSE etc	0.247	0.431	0.248	0.432	0.242	0.428
Other qualification	0.106	0.308	0.100	0.300	0.129	0.335
No qualification	0.137	0.344	0.099	0.299	0.269	0.443
Father: Smoking						
No	0.639	0.480	0.671	0.469	0.530	0.499
Yes	0.262	0.439	0.234	0.423	0.357	0.479
Mother: age when child born						
20 and younger	0.074	0.262	0.067	0.250	0.098	0.298
21–25	0.210	0.407	0.207	0.405	0.222	0.415
26–30	0.370	0.483	0.378	0.485	0.343	0.475
31–35	0.222	0.416	0.233	0.423	0.184	0.387
36–40	0.076	0.266	0.073	0.261	0.087	0.282
41 and older	0.018	0.134	0.016	0.128	0.024	0.153
Mother: Education						
Degree	0.139	0.346	0.159	0.365	0.071	0.257
Other higher	0.089	0.285	0.093	0.291	0.076	0.266
A level etc	0.159	0.365	0.163	0.369	0.145	0.352
GCSE etc	0.326	0.468	0.332	0.471	0.304	0.460
Other qualification	0.145	0.353	0.144	0.351	0.151	0.358
No qualification	0.130	0.337	0.105	0.307	0.217	0.412
Mother: Smoking						
No	0.711	0.453	0.740	0.438	0.609	0.488
Yes	0.221	0.415	0.195	0.396	0.309	0.462
Household grow-up characteristics						
Equivalise monthly household income	1401.97	1051.18	1498.08	1037.06	1071.06	1032.36
Number of persons in Household [3–14]	4.499	1.160	4.427	1.023	4.74	1.51
Number of nat/step/adopt siblings in household [0–8]	1.006	1.17	0.961	1.062	1.16	1.48
Unemployment rate	6.18	1.98	6.01	1.83	6.45	2.14

Table A2
Summary statistics, selected variables, parental nonemployment at ages 6–10 sample.

	Overall, N = 4234		No parental nonemployment, N = 3268		Parental nonemployment, N = 966	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	25.39	1.56	25.38	1.55	25.42	1.609
Female	0.519	0.500	0.530	0.500	0.527	0.499
Year of birth						
1983	0.201	0.401	0.221	0.415	0.195	0.396
1984	0.177	0.382	0.172	0.377	0.194	0.396
1985	0.174	0.379	0.179	0.384	0.156	0.363
1986	0.183	0.386	0.183	0.387	0.183	0.386
1987	0.263	0.440	0.268	0.443	0.244	0.429
Education						
Degree	0.315	0.464	0.340	0.474	0.228	0.419
Other higher	0.051	0.221	0.050	0.219	0.055	0.228
A level etc	0.339	0.473	0.338	0.473	0.341	0.474
GCSE etc	0.186	0.389	0.177	0.382	0.216	0.412
Other qualification	0.072	0.258	0.065	0.248	0.093	0.291
No qualification	0.022	0.146	0.017	0.132	0.036	0.187
Migration background						
White British	0.904	0.293	0.914	0.279	0.871	0.335
No white British	0.086	0.281	0.075	0.264	0.122	0.327
Government Office Region						
North East	0.032	0.177	0.039	0.193	0.009	0.098
North West	0.105	0.306	0.103	0.304	0.112	0.315
Yorkshire and the Humber	0.083	0.276	0.087	0.282	0.068	0.253
East Midlands	0.086	0.281	0.094	0.292	0.062	0.241
West Midlands	0.055	0.228	0.055	0.228	0.055	0.228
East of England	0.078	0.268	0.073	0.261	0.092	0.289

(*continued on next page*)

Table A2 (*continued*)

	Overall, N = 4234		No parental nonemployment, N = 3268		Parental nonemployment, N = 966	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
London	0.041	0.199	0.037	0.189	0.055	0.228
South East	0.131	0.338	0.146	0.354	0.081	0.274
South West	0.067	0.250	0.065	0.248	0.071	0.258
Wales	0.131	0.337	0.120	0.325	0.166	0.372
Scotland	0.086	0.280	0.078	0.268	0.112	0.315
Northern Ireland	0.101	0.301	0.097	0.297	0.112	0.315
Father: age when child born						
20 and younger	0.063	0.243	0.063	0.244	0.062	0.243
21–25	0.151	0.358	0.154	0.361	0.138	0.345
26–30	0.316	0.465	0.327	0.469	0.282	0.450
31–35	0.262	0.440	0.264	0.440	0.256	0.437
36–40	0.116	0.320	0.115	0.319	0.120	0.325
41 and older	0.040	0.197	0.027	0.162	0.085	0.279
Father: Education						
Degree	0.143	0.351	0.155	0.362	0.105	0.307
Other higher	0.110	0.313	0.123	0.328	0.065	0.248
A level etc	0.224	0.417	0.230	0.421	0.206	0.405
GCSE etc	0.230	0.421	0.236	0.424	0.211	0.408
Other qualification	0.101	0.302	0.087	0.282	0.149	0.356
No qualification	0.170	0.376	0.150	0.358	0.237	0.425
Father: Smoking						
No	0.643	0.478	0.677	0.467	0.532	0.499
Yes	0.253	0.435	0.226	0.418	0.345	0.475
Mother: age when child born						
20 and younger	0.066	0.249	0.063	0.244	0.074	0.263
21–25	0.294	0.455	0.295	0.456	0.293	0.455
26–30	0.325	0.468	0.338	0.473	0.279	0.448
31–35	0.187	0.390	0.183	0.387	0.201	0.401
36–40	0.066	0.249	0.062	0.241	0.082	0.275
41 and older	0.009	0.099	0.008	0.091	0.014	0.120
Mother: Education						
Degree	0.127	0.333	0.141	0.348	0.082	0.275
Other higher	0.115	0.319	0.127	0.333	0.074	0.263
A level etc	0.150	0.357	0.147	0.354	0.163	0.369
GCSE etc	0.306	0.460	0.315	0.464	0.275	0.447
Other qualification	0.132	0.338	0.128	0.334	0.144	0.351
No qualification	0.152	0.359	0.132	0.339	0.217	0.412
Mother: Smoking						
No	0.720	0.448	0.738	0.439	0.658	0.474
Yes	0.204	0.403	0.192	0.394	0.247	0.431
Household grow-up characteristics						
Equivalise monthly household income	1380.04	809.97	1465.11	807.16	1094.18	752.19
Number of persons in Household [3–14]	4.55	1.17	4.44	0.959	4.94	1.64
Number of nat/step/adopt siblings in household [0–7]	0.428	0.908	0.365	0.739	0.641	1.305
Unemployment rate	6.31	2.08	6.19	1.97	6.51	2.25

Table A3
Summary statistics, selected variables, parental nonemployment at ages 11–15 sample.

	Overall, N = 2942		No parental nonemployment, N = 2084		Parental nonemployment, N = 858	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	29.31	1.53	29.31	1.53	29.31	1.54
Female	0.457	0.498	0.442	0.496	0.496	0.500
Year of birth						
1978	0.169	0.375	0.162	0.369	0.186	0.389
1979	0.153	0.360	0.164	0.370	0.125	0.331
1980	0.244	0.429	0.241	0.427	0.253	0.434
1981	0.167	0.373	0.160	0.366	0.186	0.389
1982	0.265	0.441	0.272	0.445	0.247	0.431
Education						
Degree	0.294	0.455	0.305	0.460	0.267	0.442
Other higher	0.084	0.278	0.079	0.270	0.099	0.299
A level etc	0.294	0.455	0.317	0.465	0.238	0.426
GCSE etc	0.220	0.414	0.219	0.414	0.222	0.415
Other qualification	0.065	0.247	0.056	0.230	0.089	0.285
No qualification	0.032	0.177	0.015	0.125	0.074	0.261
Migration background						
White British	0.916	0.276	0.927	0.259	0.889	0.313
No white British	0.073	0.261	0.064	0.245	0.097	0.296
Government Office Region						
North East	0.048	0.214	0.045	0.207	0.056	0.230

(*continued on next page*)

Table A3 (*continued*)

	Overall, N = 2942		No parental nonemployment, N = 2084		Parental nonemployment, N = 858	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
North West	0.127	0.333	0.109	0.312	0.173	0.378
Yorkshire and the Humber	0.082	0.274	0.084	0.277	0.077	0.267
East Midlands	0.077	0.267	0.081	0.273	0.068	0.252
West Midlands	0.053	0.225	0.062	0.242	0.030	0.173
East of England	0.103	0.304	0.103	0.304	0.102	0.303
London	0.074	0.262	0.070	0.256	0.083	0.277
South East	0.126	0.331	0.141	0.348	0.087	0.282
South West	0.050	0.219	0.061	0.239	0.025	0.157
Wales	0.083	0.276	0.082	0.275	0.086	0.280
Scotland	0.100	0.301	0.093	0.290	0.119	0.324
Northern Ireland	0.071	0.257	0.064	0.245	0.088	0.284
Father: age when child born						
20 and younger	0.070	0.256	.060	0.237	0.097	0.296
21–25	0.183	0.387	0.182	0.386	0.185	0.389
26–30	0.313	0.463	0.346	0.475	0.229	0.420
31–35	0.234	0.423	0.230	0.421	0.243	0.429
36–40	0.114	0.317	0.093	0.291	0.164	0.371
41 and older	0.011	0.104	0.006	0.081	0.022	0.147
Father: Education						
Degree	0.121	0.326	0.130	0.336	0.100	0.300
Other higher	0.077	0.266	0.085	0.280	0.055	0.228
A level etc	0.299	0.458	0.291	0.454	0.318	0.466
GCSE etc	0.180	0.384	0.193	0.394	0.149	0.356
Other qualification	0.112	0.316	0.103	0.305	0.134	0.341
No qualification	0.174	0.379	0.160	0.367	0.206	0.405
Father: Smoking						
No	0.689	0.462	0.719	0.449	0.614	0.487
Yes	0.198	0.399	0.170	0.375	0.270	0.444
Mother: age when child born						
20 and younger	0.098	0.298	0.094	0.292	0.109	0.312
21–25	0.253	0.434	0.247	0.431	0.268	0.443
26–30	0.326	0.469	0.356	0.478	0.253	0.434
31–35	0.206	0.405	0.190	0.392	0.247	0.431
36–40	0.040	0.196	0.031	0.174	0.062	0.243
41 and older	0.001	0.017			0.001	0.033
Mother: Education						
Degree	0.066	0.248	0.076	0.265	0.041	0.200
Other higher	0.124	0.329	0.130	0.337	0.107	0.309
A level etc	0.162	0.369	0.172	0.378	0.138	0.345
GCSE etc	0.293	0.455	0.307	0.461	0.258	0.438
Other qualification	0.137	0.344	0.124	0.329	0.170	0.375
No qualification	0.204	0.403	0.179	0.383	0.267	0.442
Mother: Smoking						
No	0.710	0.453	0.748	0.434	0.614	0.487
Yes	0.207	0.405	0.169	0.375	0.301	0.459
Household grow-up characteristics						
Equivalise monthly household income	1489.61	906.25	1597.91	876.77	1219.3	922.51
Number of persons in Household [3–14]	4.26	1.04	4.15	0.837	4.53	1.41
Number of nat/step/adopt siblings in household [0–4]	0.158	0.530	0.125	0.388	0.239	0.775
Unemployment rate	7.03	2.34	6.95	1.90	7.05	2.25

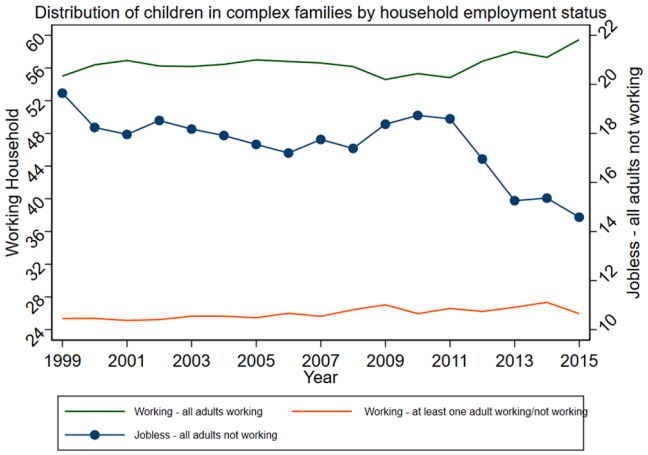


Fig. A1. Distribution (%) of children (aged 0–14) by the employment status of adults in the household, 1999–2015 in UK. *Note:* Distribution of children by household employment status.
Source: Eurostat. https://ec.europa.eu/eurostat/web/microdata/european-union-labour-force-survey.

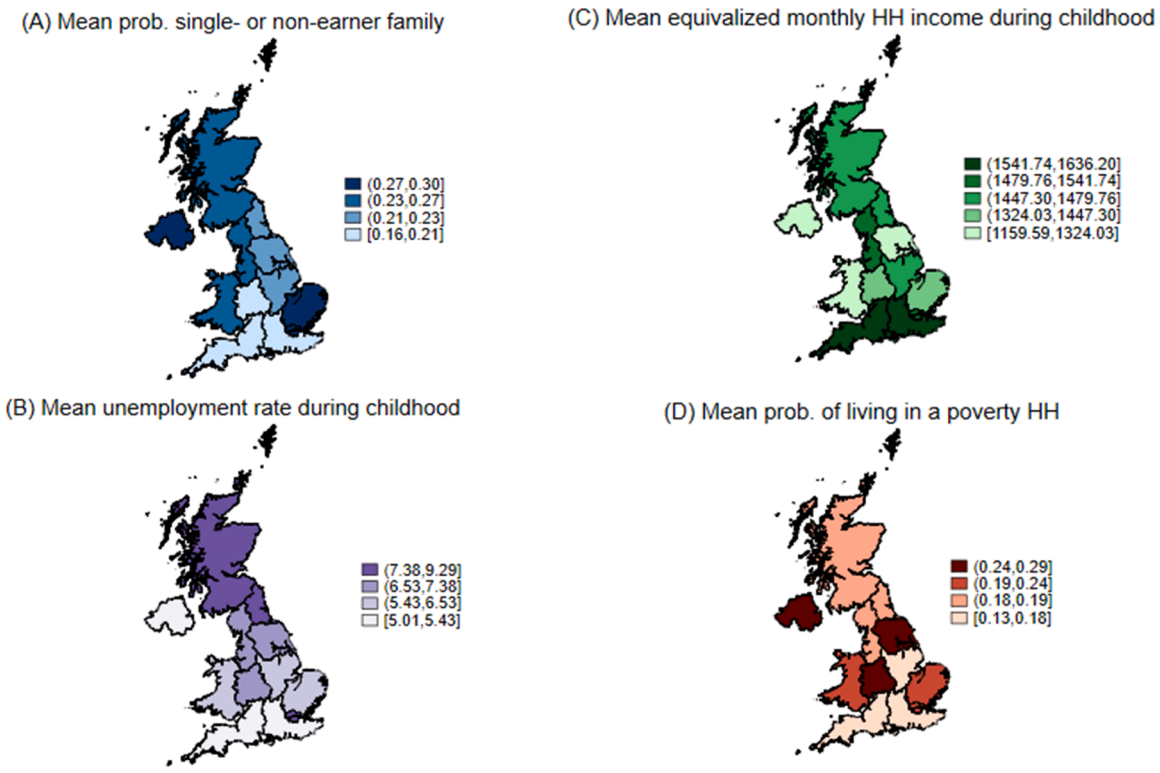


Fig. A2. Mean of household socioeconomic characteristics experienced during childhood by regions (GOR). *Notes*: Panel (A) shows the mean probability of living in a single- or non-earner family during childhood by regions; Panel (B) shows the mean of unemployment rate experienced during childhood by regions; Panel (C) shows the mean equivalized monthly household during childhood; Panel (D) mean of the probability of living in a household which income is under the poverty threshold. GOR= Government Office Regions; HH= household; childhood compress the following years 1993–2008; own maps based on drawn and combined data from BHPS and UKHLS.

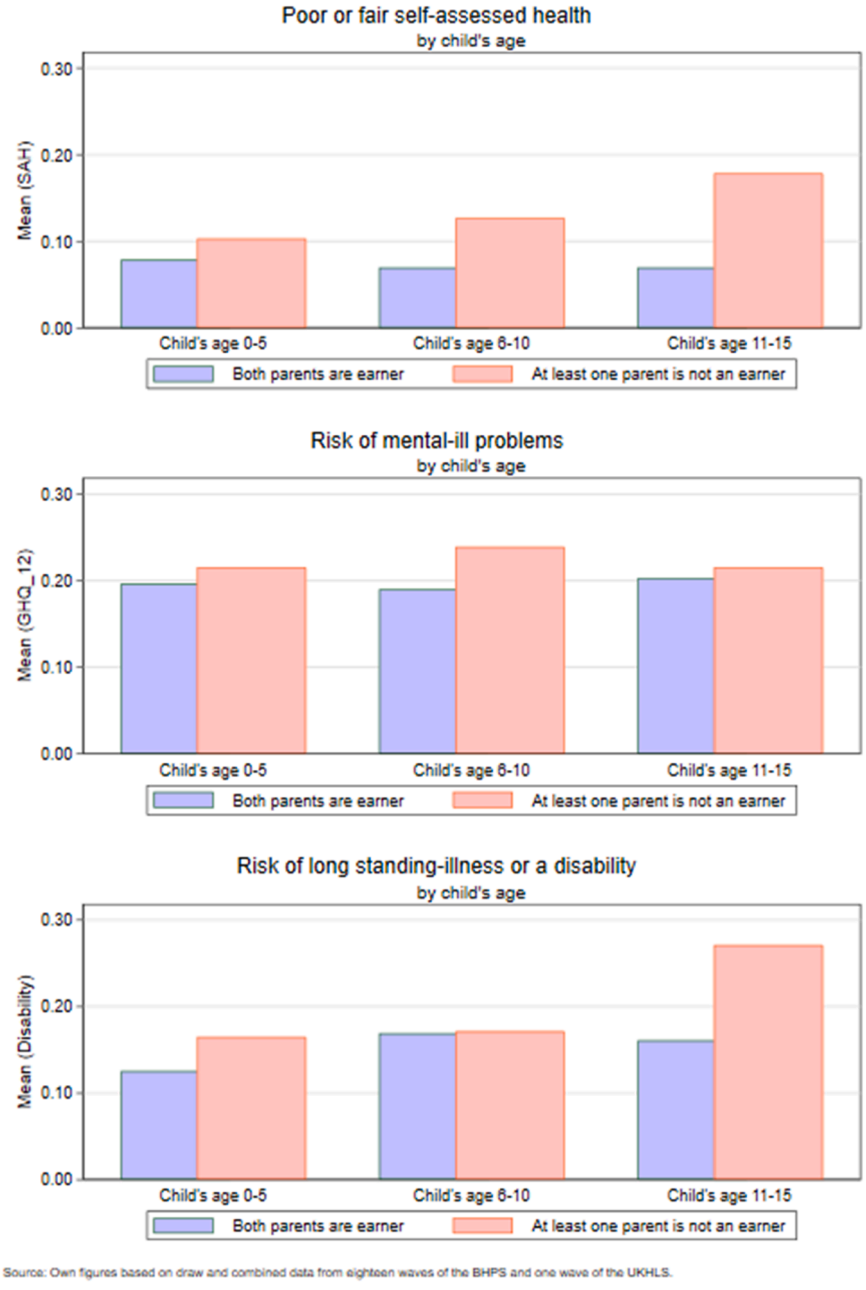
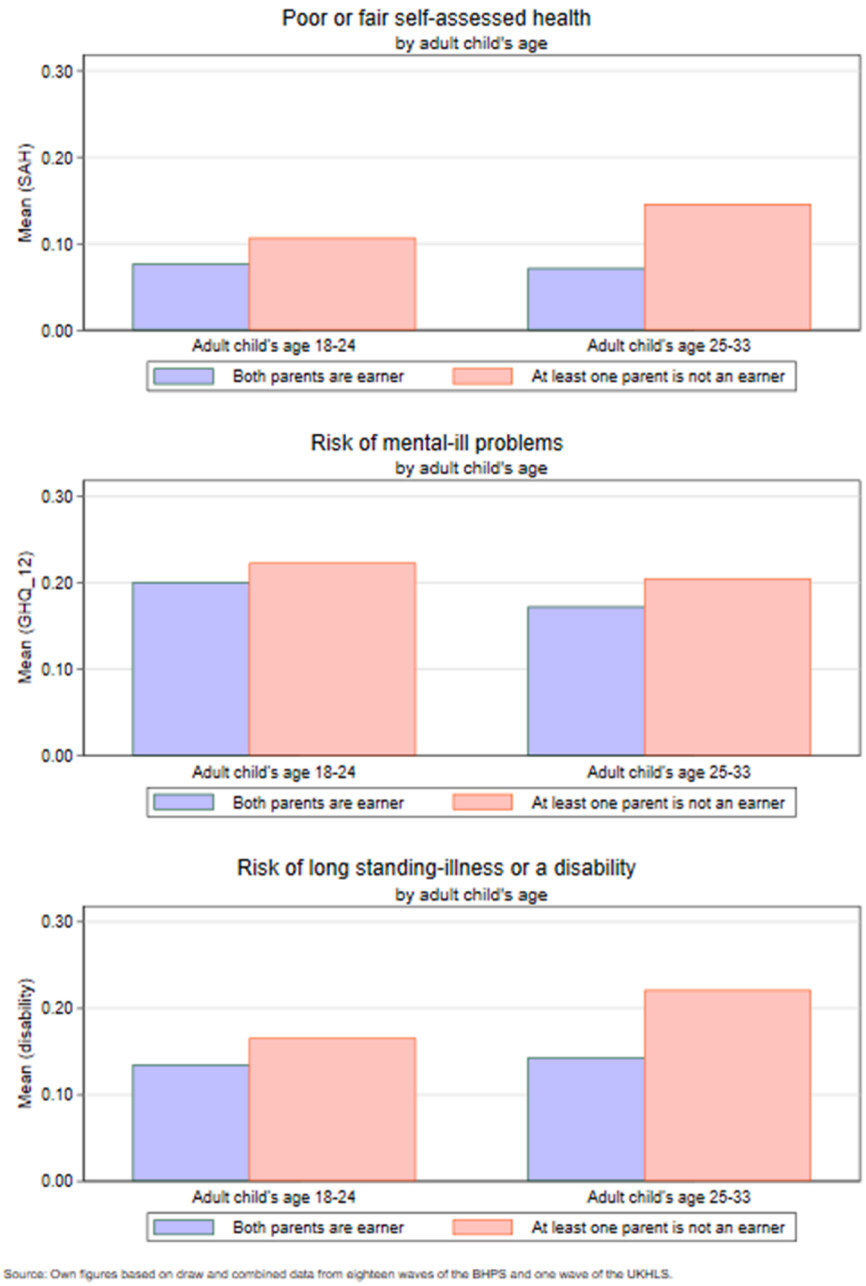


Fig. A3. Average young adult's overall risk of mental-ill problems and long-standing illness across different parental employment status and child's ages.



Source: Own figures based on draw and combined data from eighteen waves of the BHPS and one wave of the UKHLS.

Fig. A4. Average young adult's overall risk of mental-ill problems and long-standing illness across different parental employment status and young adult's ages.

Appendix B. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ehb.2023.101241.

References

Almond, D., Currie, J., Duque, V., 2018. Childhood circumstances and adult outcomes: act II. J. Econ. Lit. 56 (4), 1360–1446.
Arbeit, C.A. (2013). Is timing everything? Parental unemployment and children's educational attainment (Vol. 12). MInnesota Population Center Working Paper No.
Arnett, J.J., 2010. Emerging adulthood (s). Bridging cultural and developmental approaches to psychology: new syntheses in theory. Res., Policy 255–275.
Bloemen, H., Hochguertel, S., Zweerink, J., 2018. Job loss, firm-level heterogeneity and mortality: Evidence from administrative data. J. Health Econ. 59, 78–90.
Brand, J.E., Thomas, J.S., 2014. Job displacement among single mothers: Effects on children's outcomes in young adulthood. Am. J. Sociol. 119 (4), 955–1001.
Bubonya, M., Cobb-Clark, D.A., Wooden, M., 2017. Job loss and the mental health of spouses and adolescent children. IZA J. Labor Econ. 6 (1), 6. https://doi.org/10.1186/s40172-017-0056-1.
Case, A., Lubotsky, D., Paxson, C., 2002. Economic status and health in childhood: The origins of the gradient. Am. Econ. Rev. 92 (5), 1308–1334.
Chang, H., Olson, S.L., Sameroff, A.J., Sexton, H.R., 2011. Child effortful control as a mediator of parenting practices on externalizing behavior: Evidence for a sex-differentiated pathway across the transition from preschool to school. J. Abnorm. Child Psychol. 39 (1), 71–81.
Charles, N., James, E., 2005. 'He earns the bread and butter and I earn the cream' job insecurity and the male breadwinner family in South Wales. Work Employ. Soc. 19 (3), 481–502.
Chiappori, P.A., & Meghir, C. (2014). Intra-household welfare (No. w20189). National Bureau of Economic Research. Clark, A.E., Frijters, P., & Shields, M.A. (2008). Relative income, happiness, and utility: An explanation for the Easterlin paradox and other puzzles. Journal of Economic Literature, 46(1), 95–144.
Couch, K.A., Placzek, D.W., 2010. Earnings losses of displaced workers revisited. Am. Econ. Rev. 100 (1), 572–589.
Currie, J., 2009. Healthy, wealthy, and wise: socioeconomic status, poor health in childhood, and human capital development. J. Econ. Lit. 47 (1), 87–122.
Doiron, D., Mendolia, S., 2012. The impact of job loss on family dissolution. J. Popul. Econ. 25 (1), 367–398.
Eliason, M., 2012. Lost jobs, broken marriages. J. Popul. Econ. 25 (4), 1365–1397.
Eliason, M., Storrie, D., 2009. Does job loss shorten life? J. Hum. Resour. 44 (2), 277–302.

Ermisch, J., Francesconi, M., Pevalin, D.J., 2004. Parental partnership and joblessness in childhood and their influence on young people's outcomes. J. R. Stat. Soc.: Ser. A Stat. Soc. 167 (1), 69–101.
Forret, M.L., Sullivan, S.E., Mainiero, L.A., 2010. Gender role differences in reactions to unemployment: exploring psychological mobility and boundaryless careers. J. Organ. Behav. 31 (5), 647–666.
Fumagalli, L., Knies, G., & Buck, N. (2017). Understanding Society, The UK Household Longitudinal Study, Harmonised British Household Panel Survey (BHPS) User Guide.
Gathmann, C., Huttunen, K., Jernström, L., Sääksvuori, L., & Stitzing, R. (2021). In sickness and in health: job displacement and health spillovers in couples.
Gauvain, M., Cole, M. (Eds.), 2005. Readings on the development of children. Macmillan.
Goldberg, D.P. (1988). User's guide to the General Health Questionnaire. Windsor.
Henkel, D., 2011. Unemployment and substance use: a review of the literature (1990-2010). Curr. Drug Abus. Rev. 4 (1), 4–27.
Hilger, N.G., 2016. Parental job loss and children's long-term outcomes: evidence from 7 million fathers' layoffs. Am. Econ. J.: Appl. Econ. 8 (3), 247–283.
Holm, S., 1979. A simple sequentially rejective multiple test procedure. Scand. J. Stat. 65–70.
Huttunen, K., & Riukula, K. (2019). Parental job loss and children's careers [IZA DP No. 12788].
Huttunen, K., Møen, J., Salvanes, K.G., 2011. How destructive is creative destruction? Effects of job loss on job mobility, withdrawal and income. J. Eur. Econ. Assoc. 9 (5), 840–870.
Imo, U.O., 2017. Burnout and psychiatric morbidity among doctors in the UK: a systematic literature review of prevalence and associated factors. BJPsych Bull. 41 (4), 197–204.
Joshi, H., & Verropoulou, G. (2000). Maternal employment and child outcomes: Analysis of two birth cohort studies. Smith Institute.
Kalil, A., Ziol-Guest, K.M., 2008. Parental employment circumstances and children's academic progress. Soc. Sci. Res. 37 (2), 500–515.
Kind, Michael, & Haisken-DeNew, John P. (2012). Unexpected Victims: How Parents' Unemployment Affects Their Children's Life Satisfaction. Melbourne Institute Working Paper No. 21/12, 1–16.
Knabe, A., Rätzel, S., Schöb, R., Weimann, J., 2010. Dissatisfied with life but having a good day: time-use and well-being of the unemployed. Econ. J. 120 (547), 867–889.
Liang, K.Y., Zeger, S.L., 1986. Longitudinal data analysis using generalized linear models. Biometrika 73 (1), 13–22.
Mörk, E., Sjögren, A., Svaleryd, H., 2014. Parental unemployment and child health. CESifo Econ. Stud. 60 (2), 366–401.
Mörk, E., Sjögren, A., Svaleryd, H., 2020. Consequences of parental job loss on the family environment and on human capital formation-evidence from workplace closures. Labour Econ. 67, 101911.
Mundlak, Y., 1978. On the pooling of time series and cross section data. Econ. J. Econ. Soc. 69–85.
Nikolova, M., & Nikolaev, B.N. (2021). Family matters: The effects of parental unemployment in early childhood and adolescence on subjective well-being later in life. Journal of Economic Behavior & Organization.
OECD (2020). Family database: The labour market position of families. http://www.oecd.org/els/family/database.htm.
Oreopoulos, P., Page, M., Stevens, A.H., 2008. The intergenerational effects of worker displacement. J. Labor Econ. 26, 455–483.
Oreopoulos, P., Stabile, M., Walld, R., Roos, L.L., 2008. Short-, medium-, and long-term consequences of poor infant health an analysis using siblings and twins. J. Hum. Resour. 43 (1), 88–138.
Page, M., Stevens, A.H., Lindo, J., 2009. Parental income shocks and outcomes of disadvantaged youth in the United States. The Problems of Disadvantaged Youth. University of Chicago Press, pp. 213–236.
Pieters, J., Rawlings, S., 2020. Parental unemployment and child health in China. Rev. Econ. Househ. 18 (1), 207–237.
Pinger, Pia R. (2016). Understanding the mechanisms behind intergenerational effects of economic distress. University of Bonn Working Paper.
Powdthavee, N., 2014. What childhood characteristics predict psychological resilience to economic shocks in adulthood? J. Econ. Psychol. 45, 84–101.
Powdthavee, N., Vernoit, J., 2013. Parental unemployment and children's happiness: a longitudinal study of young people's well-being in unemployed households. Labour Econ. 24, 253–263.
Raudenbush, S.W., & Bryk, A.S. (2002). Hierarchical linear models: Applications and data analysis methods (Vol. 1). sage.
Rubin, K.H., Coplan, R.J., Bowker, J.C., 2009. Social withdrawal in childhood. Annu. Rev. Psychol. 60 (1), 141–171.
Ruiz-Valenzuela, J. (2021). The effects of parental job loss on children's outcomes. In Oxford Research Encyclopedia of Economics and Finance.
Schaller, J., Zerpa, M., 2019. Short-run effects of parental job loss on child health. Am. J. Health Econ. 5 (1), 8–41.
Schneider, B.H., Richard, J.F., Younger, A.J., Freeman, P., 2000. A longitudinal exploration of the continuity of children's social participation and social withdrawal across socioeconomic status levels and social settings. Eur. J. Soc. Psychol. 30 (4), 497–519.
Schofield, T.J., Conger, R.D., Donnellan, M.B., Jochem, R., Widaman, K.F., Conger, K.J., 2012. Parent personality and positive parenting as predictors of positive adolescent personality development over time. Merrill-Palmer Q. 58 (2), 255.
Sevilla, A., Phimister, A., Krutikova, S., Kraftman, L., Farquharson, C., Costa Dias, M., Andrew, A., 2020. How are Mothers and Fathers Balancing Work and Family under Lockdown. Institute for Fiscal Studies, London. ⟨https://doi.org/10.1920/BN.IFS⟩.
Sullivan, D., Von Wachter, T., 2009. Job displacement and mortality: An analysis using administrative data. The Q. J. Econ. 124 (3), 1265–1306.
Taylor, M.F. (2010). British Household Panel Survey User Manual Volume A: Introduction, technical report and appendices. Colchester, University of Essex.
, 1996Wiggins, J.S. (Ed.). (1996). The five-factor model of personality: Theoretical perspectives. Guilford Press.
Wooldridge, J.M., 2019. Correlated random effects models with unbalanced panels. J. Econ. 211 (1), 137–150.
Yi, J., Heckman, J.J., Zhang, J., Conti, G., 2015. Early health shocks, intra-household resource allocation and child outcomes. Econ. J. 125 (588), F347–F371.