THE ECONOMIC COSTS OF CHILDHOOD SOCIO-ECONOMIC DISADVANTAGE IN EUROPEAN OECD COUNTRIES

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The release of this policy paper has been authorised by Romina Boarini, Director of the OECD Centre on Well-being, Inclusion, Sustainability and Equal Opportunity (WISE).

Child Well-being Policy Papers

This paper charts the well-being of children from socially and economically disadvantaged backgrounds. Built around the Child Well-being Measurement Framework set out in the 2021 report *Measuring What Matters for Child Well-being and Policies* (OECD[1]), and constructed using key comparative indicators from the forthcoming OECD Child Well-being Dashboard, it examines how the well-being of children from disadvantaged backgrounds compares both across OECD countries and relative to their more advantaged peers. Results highlight how growing up at the bottom end of the socio-economic ladder leads to poorer outcomes in almost all well-being areas, and how these well-being inequalities are rooted in the poorer environments that disadvantaged children face at home, in school, and in the community.

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Abstract

Growing up in socio-economic disadvantage has important and long-lasting effects on children's lives. Children from disadvantaged households often fall behind in many areas of well-being and development, with effects that continue to limit their opportunities and outcomes – including their health and labour market outcomes – long after they reach adulthood.

Drawing on Europe-wide survey data from 27 countries, this paper explores how childhood socio-economic disadvantage affects later adult labour market and health outcomes, and evaluates the country-level GDP-equivalent cost of childhood disadvantage due to lost employment, lost earnings, and lost health, as well as the costs of lost government revenue and benefit spending. Results point to large costs for societies from childhood socio-economic disadvantage, totalling on average the equivalent of 3.4% of GDP annually.

Résumé

Grandir dans un environnement socio-économique défavorisé a des effets importants et durables sur la vie des enfants. Les enfants issus de ménages défavorisés prennent souvent du retard dans de nombreux domaines du bien-être et du développement, avec des effets qui continuent de limiter leurs opportunités et leurs résultats – notamment en matière de santé et de marché du travail – longtemps après leur entrée dans l'âge adulte.

S'appuyant sur des données d'enquête provenant de 27 pays européens, ce document examine la manière dont le désavantage socio-économique de l'enfance affecte les résultats sur le marché du travail et la santé à l'âge adulte, et évalue le coût équivalent en pourcentage du PIB national du désavantage de l'enfance en raison de la perte d'emploi, de la perte de revenus, et de la perte de santé, ainsi que le coût de la perte de recettes publiques et de dépenses de prestations. Les résultats montrent que les désavantages socio-économiques de l'enfance coûtent cher à la société, soit au total l'équivalent de 3,4 % du PIB par an en moyenne.

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Introduction

Growing up in disadvantage has important and wide-ranging effects on children's lives (Clarke and Thévenon, 2022[2]). Children from socio-economically disadvantaged backgrounds often fall behind in education, for instance, scoring lower on cognitive skills tests in early childhood and often leaving education earlier than their better-off peers (Cooper and Stewart, 2013[3]; Duncan and Magnuson, 2013[4]; Feinstein et al., 2015[5]; Blanden, Doepke and Stuhler, 2022[6]). Children from disadvantaged backgrounds are also more likely to experience poor physical and mental health (Patton et al., 2016[7]; Clark et al., 2020[8]), more likely to develop emotional and behavioural difficulties (Donkin et al., 2014[9]), and more likely to report low overall life satisfaction and subjective well-being, among other disparities (Clarke and Thévenon, 2022[2]).

The effects of early disadvantage continue to shape children's opportunities and outcomes long after they reach adulthood (Vera-Toscano and Wilkins, 2020[10]). The literature on inter-generational mobility has long illustrated how adults' social and economic outcomes are often closely associated with the socio-economic status of their parents, to varying degrees across countries and over time (OECD, 2018[11]; Blanden, Doepke and Stuhler, 2022[6]). This "transmission of disadvantage" works through various channels with cascading effects that impact many areas of life (Masten et al., 2010[12]; Masten et al., 2005[13]). Family background plays an important role in shaping childhood health, for instance, which in turn is a strong determinant of not just adult health but also a range of other later life outcomes, including employment (Currie et al., 2010[14]; Flores and Kalwij, 2014[15]; Currie, 2016[16]; OECD, 2021[1]; Poulton et al., 2002[17]; Jackson, 2015[18]). Similarly, childhood disadvantage affects the pace and timing of the transition to adulthood, including the transition away from the parental home, into partnerships, and into parenthood (Vauhkonen et al., 2017[19]; Billari, Hiekel and Liefbroer, 2019[20]; Lesner, 2018[21]), all of which help further shape adult social and economic outcomes.

There are several reasons to worry about the unequal opportunities typically on offer to children from disadvantaged families. Ensuring all children, regardless of background, have full and equal opportunities in life is first and foremost a matter of equity and fairness. None of us control the conditions that we are born in to, and differences in outcomes that can be explained by circumstances beyond our control, like our family backgrounds, are widely seen as unjust by citizens in OECD countries (Ciani, 2022[22]).

But beyond fairness, there are also other reasons to be concerned. Social cohesion is one. Stagnant societies that offer little hope for progression can foster feelings of exclusion and discontent among disadvantaged groups (OECD, 2018[11]). Economic prosperity is another. Lower employment and earnings among adults from disadvantaged backgrounds represent wasted talent and lost potential output, while weaker health represents lost welfare (McLaughlin and Rank, 2018[23]; Duncan, 2019[24]; Blanden, Hansen and Machin, 2008[25]; Blanden, Hansen and Machin, 2010[26]). Public finances likely suffer too, as reduced output means governments may lose out on tax revenues, and lower incomes mean governments may have to pay out more in social benefits to support those affected.

This paper provides estimates of the Gross Domestic Product (GDP)-equivalent cost of childhood socio-economic disadvantage in European countries. Using retrospective data on socio-economic status at around age 14 from the 2019 round of the European Union Statistics on Income and Living Conditions (EU SILC 2019) survey, we first provide comparative estimates of associations between childhood socio-

economic disadvantage and later adult (25- to 59-year-old) employment and health outcomes. The key outcome variables include employment status, annual labour earnings, and self-assessed health and activity limitation. We then use these estimates as the basis for calculating the aggregate country-level cost of childhood disadvantage due to lost employment, lost earnings, and lost health. In a further step, for a selected number of countries, we use the EUROMOD microsimulation models to estimate how childhood disadvantage affects public finances through its impact on income tax revenue and benefit receipt.

This paper has similarities to papers on the cost of child poverty in the United States by Holzer et al. (2008[27]) and McLaughlin and Rank (2018[23]), and especially to Blanden, Hansen, and Machin's (2008[25]; 2010[26]) papers on the United Kingdom (**Box 1**). Using data from the British Cohort Study, Blanden, Hansen, and Machin estimate the impact of experiencing income poverty in childhood on later employment and earnings, and express these effects in terms of country-level GDP-equivalent losses. In terms of empirical strategy, this paper follows Blanden, Hansen, and Machin relatively closely. It builds on their studies by extending the analysis across a number of European countries, and by widening the definition of childhood disadvantage from income poverty to broader childhood socio-economic disadvantage. An additional innovation is that we use an estimation strategy that allows for the exploration of several potential pathways through which childhood disadvantage may influence adult outcomes – an issue of importance for decision-makers looking to design policies to mitigate the effects of childhood disadvantage.

The paper is organised as follows. Section 1 presents the data and empirical strategy used to assess associations between childhood socio-economic disadvantage and adult outcomes. Section 2 examines associations between childhood disadvantage and adult labour market outcomes, while Section 3 does the same for adult health. Section 4 provides estimates of the total GDP-equivalent monetary value of any labour market and health penalties associated with childhood disadvantage. Lastly, as a linked exercise, Section 5 examines the potential implications for government tax receipts and social benefit spending.

Our key findings are as follows:

- Growing up in socio-economic disadvantage is associated with reduced employment, lower earnings, and weaker health in later life. We estimate that on average across European OECD countries, working-age (25- to 59-year-old) adults who experienced disadvantaged childhoods are 3-6 percentage points less likely to be employed than those with more "average" childhoods, and once in work earn approximately 20-21% less per year. Adults who experienced childhood disadvantage also report worse health, equivalent on average to about a two-week per year reduction in time lived in full health without limitation.
- Much of the overall association between childhood socio-economic disadvantage and later outcomes is indirect and runs through mediating factors like education, health and work experience:
    - Education plays a particularly important mediating role, explaining on average between one-fifth and one-quarter of the overall association between childhood disadvantage and later earnings, and about one-sixth of the association with later health. Ensuring all children have full and equal opportunities in education (including access to high-quality early childhood education and care) is important for mitigating the impact of disadvantage.
    - Not surprisingly, work experience plays a strong role in explaining employment gaps, accounting for around one-third of the overall association between childhood disadvantage and employment. Tackling childhood disadvantage, and helping disadvantaged young people gain a foothold in the labour market, is important for preventing the accumulation of employment penalties over time.
    - Health is important in and of itself, but also contributes to weaker labour market outcomes for adults from disadvantaged backgrounds. We estimate that health can explain around one-third of the overall association between childhood disadvantage and employment, and

one-seventh of the overall association with earnings. Doing more to reduce disadvantage-driven gaps in health (including doing more to tackle health gaps in childhood) would pay a double dividend.

- Taken together, the health and labour market penalties attached to childhood disadvantage are large and costly. We estimate that the labour market penalties for working-age adults are worth, on average, the equivalent of 1.6% of GDP each year, and the health penalties the annual equivalent of 1.9% of GDP, producing an average total cost from childhood disadvantage that stands at the equivalent of 3.4% of GDP, annually. Note that these estimates cover outcomes for current working-age adults (25- to 59-year-olds) only; results that also include older populations would likely produce larger estimated costs.
- These penalties include costs for government finances. Leaving aside the potential costs for health systems, we estimate that in a sub-set of European OECD countries, reduced employment and weaker earnings among adults who grew up in disadvantage result in losses in the worst affected countries of up to 7% in direct government tax revenues from working-age households, and increases of up to 6% in government non-pension benefit spending. The GDP-equivalent cost for government budgets stands at 0.7% of GDP, on average.
- The impact of childhood disadvantage differs across countries. With respect to associations with employment and earnings, we show that the penalties linked to disadvantage are often smaller in countries with lower absolute levels of childhood disadvantage, with lower inequality in childhood social and economic resources, with highly-skilled jobs markets, and with higher levels of social spending, among other things. While not causal evidence, these associations suggest much of the impact of childhood disadvantage can be mitigated with the right environment and policy set up.

Taken all together, the findings in this paper underline the importance of reinforcing policy efforts to tackle childhood social and economic disadvantage. While not the main focus of this paper specifically, work by the OECD and others has shown that addressing childhood disadvantage requires policy action to both prevent its occurrence and to mitigate its consequences throughout the life course (OECD, 2018[11]; OECD, 2019[28]). Helping families meet children's basic needs from birth onwards is crucial. This includes ensuring housing and financial security, as well as combating the deprivation that too many children continue to experience with respect to food or nutrition, learning environments, and social and leisure opportunities (OECD, 2019[28]; OECD, 2021[1]). Making sure that parents have the time and resources they need to provide care and support to their children is also essential, as are investments in education and schooling – including in early childhood programs (OECD, 2017[29]; Duncan et al., 2022[30]; Blanden, Doepke and Stuhler, 2022[6]). Health policies – including for children – and employment policies are also important elements for preventing childhood socio-economic disadvantages turning into health and employment penalties across the life span (OECD, 2018[11]; OECD, 2017[31]).

Tackling childhood disadvantage can be expensive. Public expenditure on children and families has risen in many countries in recent decades, with OECD countries now spending, on average, more than 3% of GDP on children's education, and 2.3% on supporting families (OECD, 2022[32]; OECD, 2022[33]). However, not all of this spending finds its way to the children who need it most, and even when it does, not all is effective in tackling (the effects of) childhood disadvantage. Countries should re-examine what and where they are spending on children if they are to minimise childhood disadvantage and avoid the economic costs that follow as disadvantaged children move into adulthood.

Box 1. How much does childhood disadvantage cost to the economy? A review of the existing evidence

Three studies conducted in the United States and the United Kingdom have sought to estimate the macroeconomic cost associated with the evidence that a child growing up in an economically poor family on average experiences worse outcomes than a child from a wealthier family in virtually every dimension, from physical and mental health to educational attainment and labour market success, to risky behaviours and delinquency. These outcomes are considered to be costly to the economy because the overall volume of economic activity is lower than it would have been in the absence of poverty experienced in childhood.

For the United States, Holzer et al. (2008[27]) based their cost estimates on the correlations between childhood poverty (or low family income) and outcomes across the life course, such as adult output (measured by their earnings), poor health and participation in crime. Their estimates represent the average decrease in earnings, the costs associated with poor health (additional expenditures on health care and the value of lost quantity and quality of life associated with early mortality and morbidity), and the costs associated with participation in crime (e.g. property loss, injuries, and the justice system) among adults who grew up in poverty. A number of conservative assumptions were made to provide credible estimates of the penalty experienced by income poor children in these three domains. In particular, the penalty is measured by the differences in adult outcome between children who grew up in a family with disposable income at the average income for poor families and those in families with income at twice the poverty line. The authors also use estimates in outcome responses to change in income at the lower end of credible estimates in published studies.

The bottom line of the Holzer et al. (2008[27]) estimates is that the aggregate cost of the consequences of child poverty amounts to about 4% of Gross Domestic Product (GDP). This total is made up of:

- reduced aggregate output, estimated to cost 1.3% of the US GDP;
- increased health expenditures, combined with decreased health capital, totalling 1.2% of GDP;
- increased crime victimisation, worth 1.3% of GDP. This latter figure considers only “street crime” and not other crimes, such as fraud, and assumes that the cost of police, prisons, and private security is unchanged as a result of increases in crime due to child poverty.

McLaughlin and Rank (2018[23]) build on the work of Holzer et al. (2008[27]) by updating their estimates and adding other categories of the impact of childhood poverty on society. They include crime deterrence costs, increased social costs of incarceration, costs associated with child homelessness (such as the shelter system), and costs associated with increased childhood maltreatment in poor families (such as the costs of the foster care and child welfare systems). Their estimate of the total cost of childhood poverty to society is about 5.4% of GDP.

Blanden, Hansen, and Machin (2008[25]; 2010[26]) undertook a very similar exercise for the United Kingdom, focusing on the impact of growing up in child poverty on adult employment and earnings. They analysed the role of education in the relationship between child poverty and adult earnings and employment, examined the plausibility of their estimates under different assumptions of how poverty eradication would affect labour market opportunities, and also looked at the saving of benefit expenditures which a reduction of child poverty could lead to. Their results showed that child poverty reduces the probability of being in employment at age 34 by between 4 and 7%, and earnings by between 15 and 28%. Using lower bound estimates of the impact of child poverty on employment and earnings, the authors estimated that the overall GDP savings made by eradicating child poverty would lie somewhere between 1 and 1.8% of GDP. Adopting a conservative view on whether the labour market would be able to absorb the higher skill workers created by the abolition of child poverty pushes one

towards the lower end of the range (i.e. 1% of GDP). Between a quarter and third of this 1% would be transferred through direct taxes. A relatively small impact (around 0.20% of GDP) on benefit savings was also estimated.

While not attributable only to socio-economic disadvantage, a related series of studies have looked at the economic cost of violence against children. Estimates of the lifetime economic and social costs of child maltreatment are, for instance, provided for Australia (McCarthy et al., 2016[34]; Deloitte Access Economics, 2019[35]) and for the United States (Fang et al., 2012[36]; Peterson, Florence and Klevens, 2018[37]), taking into account the impact that child maltreatment has on childhood healthcare costs, adult medical costs and output loss, as well as on child welfare costs, criminal justice costs and special education costs. Just as an example of these calculations, it is estimated that, for the year 2016-17, the annual burden of violence against children and young people below age 24 in Australia is costing 1.8% of the GDP, while the lifetime cost is estimated at around 4.2% of the GDP (Deloitte Access Economics, 2019[35]).

1 Data and methods

This paper builds on individual-level data from the 2019 round of the European Union Statistics on Income and Living Conditions (EU SILC 2019) survey, a collection of harmonised representative household surveys providing information on income, social inclusion and living conditions in the European Union Member States, plus Iceland, Norway and Switzerland. Of particular interest are a series of retrospective variables in EU SILC 2019's ad-hoc module on the intergenerational transmission of disadvantage. These variables, filled for respondents aged between 25 and 59, provide information on the respondent's home and family circumstances when they were "around 14 years old" (European Commission, 2018[38]). They cover a range of topics relevant to the respondent's socio-economic status during childhood, including the education level and labour market status of parents at around age 14, and material deprivation at home at around age 14.

1.1 Approach and measurement

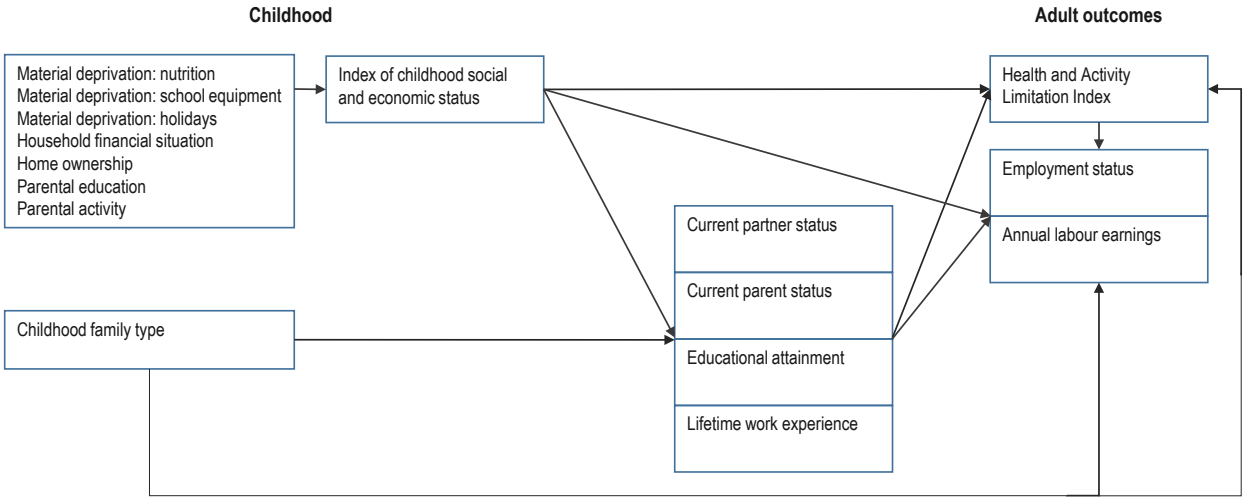
We explore associations between EU SILC 2019's retrospective variables on circumstances at age 14 and adult employment and health outcomes using a life course approach. Building on a conceptual model similar in broad terms to that used by Pakpahan, Hoffmann and Kröger (2016[39]) to examine links between retrospective childhood circumstances and old-age health, we separate our variables of interest into those relating to respondents' childhoods, those relating to their current (adult) outcomes, and those relating to a range of experiences and characteristics that develop throughout childhood and into adulthood that potentially mediate associations between childhood circumstances and adult outcomes. Figure 1 provides a graphical representation of our approach and the modelled potential pathways, with further explanation given below.

Childhood circumstances

At the childhood stage, we are interested primarily in the social and economic resources available to respondents when they were children. It is well established that children from low socio-economic backgrounds experience disadvantages in many areas of well-being (Schoon, 2019[40]; NASEM, 2019[41]; Clarke and Thévenon, 2022[2]). Generally speaking, childhood social and economic disadvantage is associated with fewer material resources at home and in the neighbourhood, lower levels of household economic security, and often also with higher levels of family stress and as a result lower quality parent-child interactions. Besides the economic and material dimension, childhood disadvantage also carries a social dimension linked to differences in family functioning and parenting behaviours (Kalil, 2015[42]; Kalil and Ryan, 2020[43]). For instance, in comparison to lower-SES parents, parents with high SES provide their children with a richer language-stimulating environment by talking more, using different words, using more complex and varied sentence structures, and using a larger proportion of conversation-eliciting questions (Golinkoff et al., 2019[44]).

Figure 1. Childhood socio-economic status, adult outcomes and our modelled potential pathways

Graphical representation of the modelled pathways between childhood socio-economic status and adult employment and health outcomes



Note: The figure illustrates the modelled pathways only; additional and/or alternative pathways may exist. Examples include the potential influence of current employment and earnings on health outcomes, which partly for technical reasons we do not model explicitly. (See later in this section).

Parental education is typically used as a proxy to capture differences in the family social environment, and has been shown to be a stronger predictor of gaps in early language development than family income (Volodina et al., 2022[45]), as well as an important factor for explaining gaps in early primary school achievements (Drager, Schneider and Washbrook, 2022[46]).

Against this background, in this paper, we measure the social and economic resources available to children through a composite index (the Index of Childhood Socio-Economic Status, or ICSES) constructed from seven variables built on information from the EU-SILC 2019 ad-hoc module. These component variables reflect not just respondents' material living conditions in childhood, but also the education level and labour market status of their parents. This is in line with much of the international child literature, which typically measures children's socio-economic status through a combination of one or more measures covering parental education, parental occupational status, and/or household income or household possessions (Cowan et al., 2012[47]; Avvisati, 2020[48]; Clarke and Thévenon, 2022[2]).

Five of these seven component variables concentrate on childhood material deprivation and household finances:

- Three measures reflect material deprivation: *Material deprivation: nutrition* reflects whether the respondent was living in a household in which all children had at least one meal with meat, chicken or fish (or vegetarian equivalent) daily when around age 14; *Material deprivation: school equipment* indicates whether the respondent was living in a household in which all children had the things they needed for school (e.g. books and equipment for school) when around age 14; and *Material deprivation: holidays* whether the respondent was living in a household in which all children had at least one weeks' holiday away from home when around age 14.[1] All three are binary variables

[1] The ability to spend one-week annual holiday away from home is a validated measure among others that are used for monitoring child deprivation at European level (Guio et al., 2018[124]). It is one of three measures of retrospective childhood deprivation included in the EU-SILC 2019 ad-hoc module. There is large variation in the percentage of

equal to one if the respondent reports that they (or at least one other child) did not have the given item for any reason.

- *Household financial situation* reflects the broader financial situation of the respondents' household when around age 14, based on the respondent's own subjective assessment. It is a six-part variable, running from 1 to 6 (very good, good, moderately good, moderately bad, bad, and very bad).
- *Home ownership* captures whether the respondent was living in a dwelling owned by the household when around age 14, and is used as a proxy for household wealth. It is equal to zero if the respondent reports that their dwelling was owned, and one if they report it was rented or provided for free.

The final two component variables reflect aspects of the broader social, cultural and economic environment in which the respondents grew up:

- *Parental education* captures the highest level of education attained by either of the respondent's (known) parents. It is a three-part variable, set to one (low) if the highest level of education corresponds to ISCED 2011 levels 0-2 (below upper secondary education), 2 (medium) if it corresponds to ISCED 2011 levels 3-4 (upper secondary education), and 3 (high) if it corresponds to ISCED 2011 levels 5-8 (tertiary education).
- *Parental activity status* measures the number of the respondent's (known) parents in employment when around age 14, and is used to capture parental earnings potential in place of reliable information on parental occupation. It is a three-part variable, set to zero if no (known) parents were employed (either as an employee or as self-employed) when the respondent was around age 14, one if one (known) parent was employed, and two if two (known) parents were employed when the respondent was around age 14.

Note that in all cases, these variables refer to the respondent's situation at age 14. The information available in the EU-SILC 2019 ad-hoc module does not allow us to measure their socio-economic situation at earlier or later ages, nor to measure the duration of exposure to, or movements across, different socio-economic statuses over childhood. We therefore capture only part of the exposure to socioeconomic disadvantage in childhood, i.e. in late childhood, which is a period that respondents are more likely to remember. However, some individuals may have been exposed to poverty at an earlier time in childhood without necessarily being in the same situation in late childhood, while their exposure to poverty and socio-economic disadvantage in the early years of life may have persistent effects on skill development and later outcomes (Duncan and Magnuson, 2013[4]).[2] Yet, the evidence available suggests that childhood socio-economic disadvantage can impact later outcomes regardless of the age it is experienced, with the relative importance of age of exposure possibly differing depending on the exact child or adult outcome of interest (Cooper and Stewart, 2013[3]). In other words, conditions in early childhood are important, but so are conditions in later childhood. In particular, exposure to socio-economic disadvantage in adolescence is critical for the key educational investment decisions made during this period, as well with respect to its importance for other factors impacting later life outcomes, such as network development (Lesner, 2018[21]; Carneiro et al., 2021[49]).

individuals reporting going on holiday away from home at least a week annually by socio-economic status (see Table A3.2) suggesting it captures an important difference in living conditions individuals were experiencing in childhood.

[2] Following in part the work of James Heckman and colleagues (Cunha and Heckman, 2007[116]; Cunha and Heckman, 2008[117]; Cunha, Heckman and Schennach, 2010[118]), there has been increasing attention in recent years on children's exposure to poverty and socio-economic disadvantage in early childhood, with many commentators pointing to the early years as a "critical period" for children's skill development and later outcomes (OECD, 2009[119]; UNICEF, 2017[120]; WHO, 2020[121]; UNESCO, 2022[122]).

We construct the ICSES itself using polychoric Principal Component Analysis (PCA) (Kolenikov and Angeles, 2009[50]). We run polychoric PCA on the pooled (cross-national) sample and keep the first principal component (PC), which explains the largest proportion of the total variance, as a measure of a respondent's socio-economic status during childhood (Flores, García-Gómez and Kalwij, 2020[51]). The first PC explains 50% of total variance for the ICSES variables cross-nationally, and all factor loadings have the expected sign in explaining childhood social and economic advantage (Online Annex Table A2.1).[3] We then split the index into country-specific quintiles based on scores on the first PC. Respondents in the first (bottom) quintile represent those who experienced the most disadvantaged childhoods within the given country, and those in the fifth (top) quintile the most advantaged childhoods.

Online Annex Table A2.2 reports statistics on the ICSES component variables by country and ICSES quintile. The numbers illustrate just how strongly the social and economic resources available to children vary both across and within countries. For example, with respect to our material deprivation measures, the share of respondents reporting not having at least one meal with meat, chicken or fish (or vegetarian equivalent) daily when around age 14 (*Material deprivation: nutrition*) varies from as low as 3% in Denmark and Sweden to 30% in Hungary. Similarly, the share reporting not having the things they needed for school when around age 14 (*Material deprivation: school equipment*) varies from less than 1% in Finland and Sweden to 11% in Greece. Among those in the first (bottom) quintile on the ICSES (i.e. among the most disadvantaged in their country), these rates vary from 12% in Denmark to 93% in Hungary, and from 4% in Sweden to 56% in Romania, respectively. The shares of respondents reporting not having at least one weeks' holiday away from home when around age 14 (*Material deprivation: holidays*) is generally higher, but still varies substantially both between and within countries: among those in the first (bottom) quintile on the ICSES, rates range from 61% in Finland to 99% in Greece, Portugal, Spain, and Hungary, and effectively 100% in Romania. Similar inter- and intra-country differences are visible on all our other ICSES component variables (Online Annex Table A2.2).

Lastly, we also construct a measure of childhood family type, again using information from the EU-SILC 2019 ad-hoc module. This is a binary measure set equal to one if the respondent reports that they were living with two parents in the same household when around age 14, and zero if the report living with one or no parents in the same household when around age 14. Although not typically used as a measure of childhood socio-economic status (Cowan et al., 2012[47]; Avvisati, 2020[48]), family type may still share important associations with family stress and children's well-being (Dinisman et al., 2017[52]; Masarik and Conger, 2017[53]) and development (Autor and Wasserman, 2013[54]; Autor et al., 2019[55]) and subsequent adult outcomes. This is particularly the case for boys, who appear particularly vulnerable to the potential negative effects of family separation and parental absence (Autor and Wasserman, 2013[54]; Autor et al., 2019[55]).

Adult outcomes

At the adult outcome stage, we focus on outcomes in two main areas: labour market outcomes, and health outcomes.

[3] The main motivation for using Principal Component Analysis is to summarise the information brought by socio-economic variables in childhood into a single continuous measure of childhood socio-economic status. Using a single index also helps avoiding estimation multi-collinearity biases that would otherwise arise by including each individual variable on socio-economic status. The results of the PCA show that the first three components explain three-quarters of the variance. The first component explains half of the total variance and projects the variables onto an axis that can be clearly interpreted as an ascending scale of socio-economic status in childhood. The other two components partly duplicate the information provided by the first component, or show values that are not consistent with a linear measure of socioeconomic status and represent informational noise. For this reason, only the information summarised by the first component is used as a proxy for measuring socioeconomic status in childhood.

We measure adult labour market outcomes through two variables: *employment status* in the income reference year*,* and *(log) annual labour earnings*. With respect to earnings, for this paper, we are most interested in how disadvantage affects the total amounts actually earned (or, equivalently, total actual output) over the income reference year, rather than wage rates or measures of labour productivity more narrowly. Focusing on total actual annual earnings helps us aggregate the effects of childhood disadvantage on earnings without the complexity of modelling or making assumptions about how disadvantage also effects working time, the frequency and distribution of second jobs, etc. We thus construct our *annual labour earnings* variable as the sum of employee cash (or near cash) income and cash benefits or losses from self-employment across the entire income reference year (2018) with *no* adjustment for working hours, second jobs, or periods of non-employment across the year. We include all respondents with positive labour earnings and who report working for at least one month in the income reference year. We leave this latter condition rather loose to avoid selecting out workers in insecure, intermittent or seasonal employment – something potentially important, as workers who experienced childhood disadvantage may be overrepresented among these groups.

Note that the use of total actual annual earnings affects the interpretation of our earnings results a little. Whereas conventional earnings measures often look to control for working time (by using, for example, hourly earnings or full-time-, full-year-equivalent annual earnings), we allow the effects of working time to be absorbed into our earnings variable, with the implication that differences in earnings between groups may reflect not just differences in wages and salaries, but also potentially differences in working hours and periods of non-employment. To the extent that working hours and the incidence of periods of non-employment correlate with wage levels, our earnings results are likely to show bigger differences between groups than if, for instance, we had measured differences in hourly earnings.

We construct our *employment status* variable to be consistent with our *annual labour earnings* variable*.* We measure employment status using a dummy variable corresponding to the income reference year (2018) in its entirety, with the variable set to one if the respondent reports working (full-time or part-time) as either an employee or as self-employed in at least one of the twelve reference months. Using the entire year as the reference period helps avoid mismatch between our employment and earnings variables, and in particular helps us avoid issues with double counting the effects of any periods of non-employment.

Again, this construction should be kept in mind when interpreting results. Our *employment status* variable should be interpreted as reflecting the probability of *any* employment over the whole income reference year or, equivalently, as the probability of avoiding long-term non-employment (i.e. spending at least twelve months outside employment). It provides no information about the stability or duration of this employment, which is instead absorbed into our earnings measure. Compared to a more conventional employment status indicator, which would typically use employment in the survey reference week, our measure is likely to produce higher rates of employment in general, and lower differences in employment between groups. As a result, our employment results are likely to be relatively conservative. In Online Annex Tables A3.3-A3.6, we provide alternative results based on two different employment status measures: “majority” employment in the income reference year, and full-year full-time employment in the income reference year.

We capture current adult health status through the Health and Activity Limitation Index (HALex) – a composite measure initially developed by the U.S. Centers for Disease Control and Prevention (Erickson, 1995[56]; Erickson, 1998[57]) to measure health-related quality of life at population level. Commonly used in the literature on childhood socio-economic status and later health outcomes (Johnson and Schoeni, 2011[58]; Halliday, Mazumder and Wong, 2021[59]; Fletcher and Jajtner, 2021[60]), the HALex combines information on general activity limitations due to health problems (GALI) and self-reported health status (SRHS) to produce a continuous measure akin to a quality adjusted life year (QALY) (see Erickson

(1995[56]) for further methodological details).[4] The resulting variable varies between zero and one and measures for each respondent the percentage of the relevant survey reference year that is considered to be lived in full health, with one denoting a year in full health without limitation and zero a year lived in a health state viewed as equivalent to death.[5]

Table 1 reports basic statistics for our adult outcome variables. As the table shows, there is substantial variation in adult labour market and health outcomes, both across countries and between men and women. For example, the share of 25- to 59-year-old men who report having been employed in the income reference year ranges from 83% in Croatia to 96% in Sweden, and the share of 25- to 59-year-old women from 72% in Greece to 93% again in Sweden.[6] Across countries, both employment rates and average annual labour earnings are lower for women than for men, often substantially so: in Italy, for instance, 25- to 59-year-old women are 15 percentage points less likely than 25- to 59-year-old men to have been employed in the income reference year, and once in work also have annual labour earnings approximately 26% lower. Women also often score lower than men on average on the Health and Activity Limitation Index, with the average score for women across the 24 cover OECD Member Countries (87 points) about 1 point lower than the average for men (88 points). This is consistent with several studies showing that despite lower mortality risks, women frequently have poorer self-rated health and more often report disabling conditions than men (Case and Paxson, 2005[61]; Crimmins, Kim and Solé-Auró, 2011[62]; Boerma et al., 2016[63]). The largest gender gaps in scores on the Health and Activity Limitation Index are found in Norway (women score 2.5 points lower on average) and Portugal (women score 3 points lower), and the smallest in Austria, Greece, Estonia and Poland. Overall, Health and Activity Limitation Index scores are highest for both men and women in Ireland (both 92 points, on average) and Greece (both 94 points) and lowest in Latvia (84 points for men, and 83 points for women).

[4] SRHS includes the standard five categories (1=Very good, 2=Good, 3=Fair, 4=Bad, 5=Very bad) and GALI (Limitation in activities people usually do because of health problems for at least the past six months) includes three categories (1=Strongly limited, 2=Limited, 3=Not limited).

[5] Values for each of the possible combination of self-reported health status and activity limitation are assigned using multi-attribute utility scaling based on responses provided by the U.S population in the 1990 National Health Survey (Erikson, 1995). Values range from 1.00 for persons who have no activity limitation and are in excellent health to 0.10 for persons who are limited in their activities and are in poor health. According to these values, if a person lives 1 year in excellent health and has no limitation in activity, then he or she has 1 full year of healthy life. Other health states result in less than a full year of healthy life. The values applied here are as follows: 1= "Very good SRHS and Not limited in GALI", 0.92="Good SRHS and Not limited in GALI ", 0.84 "Fair SRHS and Not limited in GALI" or "V. good SRHS and Limited in GALI", 0.77 "Good SRHS and Limited in GALI", 0.70 "Fair SRHS and Limited in GALI", 0.63="Bad SRHS and Not limited in GALI ", 0.57="Very good SRHS and Strongly limited in GALI", 0.51="Good SRHS and Strongly limited in GALI", 0.50="Bad SRHS and Limited in GALI", 0.47="V. bad SRHS and Not limited in GALI", 0.45="Fair SRHS and Strongly limited in GALI", 0.36="Very bad SRHS and Limited in GALI", 0.29="Bad SRHS and Strongly limited in GALI", and 0.17="Very bad SRHS and Strongly limited in GALI".

[6] Note that employment is defined in a broad sense that include people who were at work in the reference year and part of those who were on leave. In principle, the EU-SILC Methodological Guidelines state that parents on maternity or paternity leave should be considered as working, while those on (full-time) parental leave should be treated as not working (See pp.285-287 here). In practice, self-definition of activity status is used to categorise individuals in employment, implying large variation across respondents, gender and countries on the treatment of workers on leave.

Table 1. Adult labour market and health outcomes

Key adult labour market and health outcomes, by sex, 25- to 59-year-olds, European countries, 2018/2019

	Employed in the income reference year (2018)		Annual labour earnings in the income reference year (2018)		Health and Activity Limitation Index	
	%		Euros (mean)		Mean score	
	Men	Women	Men	Women	Men	Women
Austria	92.0	84.5	47 336	30 004	0.87	0.87
Belgium	88.2	84.4	47 486	36 483	0.88	0.87
Bulgaria	89.7	85.8	8 026	6 609	0.91	0.90
Croatia	83.0	78.9	14 118	11 074	0.87	0.88
Czech Republic	94.5	83.7	18 094	11 997	0.89	0.88
Denmark	89.7	89.2	66 764	51 159	0.86	0.85
Estonia	92.4	89.1	17 062	13 418	0.85	0.85
Finland	91.4	90.6	44 064	33 912	0.87	0.85
France	91.8	86.9	38 530	28 428	0.87	0.86
Germany	92.3	85.7	48 271	30 501	0.88	0.87
Greece	84.4	71.9	18 913	14 910	0.94	0.94
Hungary	92.2	88.0	9 848	7 946	0.87	0.87
Ireland	88.3	75.2	52 436	36 910	0.92	0.92
Italy	88.9	73.5	31 516	23 394	0.91	0.90
Latvia	88.2	84.1	15 509	11 499	0.84	0.83
Lithuania	88.4	87.5	13 972	10 086	0.86	0.85
Luxembourg	91.3	82.9	75 548	53 943	0.88	0.86
Netherlands	92.7	88.5	55 565	32 336	0.89	0.87
Norway	91.8	87.2	65 352	48 202	0.89	0.86
Poland	90.5	80.9	13 143	10 112	0.88	0.87
Portugal	89.3	84.2	18 436	14 339	0.86	0.83
Romania	94.9	88.4	8 174	8 131	0.92	0.91
Slovak Republic	92.6	83.9	12 364	9 666	0.88	0.86
Slovenia	90.9	87.4	22 477	19 043	0.87	0.86
Spain	86.7	77.4	24 319	18 635	0.90	0.90
Sweden	95.7	92.3	43 504	35 460	0.91	0.90
Switzerland	94.9	86.8	88 312	52 177	0.89	0.88
OECD Europe ave.	90.8	84.4	37 034	26 440	0.88	0.87

Note: "Employment" refers to respondents who report working (full-time or part-time) as either an employee or self-employed as their main activity status in at least one of the twelve months in the income reference period (2018). "Annual labour earnings" refers to the sum of employee cash (or near cash) income and cash benefits or losses from self-employment in the income reference year. Respondents reporting zero or negative earnings are excluded. “OECD Europe ave.” refers to the unweighted average across the 24 covered European OECD countries. It excludes Bulgaria, Croatia and Romania.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

Mediators and controls

As touched on in the introduction, there are multiple mechanisms and pathways through which early life circumstances may affect later adult outcomes. Education and skill development is perhaps the most widely discussed route, but other factors, including health and patterns of family formation, may play a role too. Variable availability in our source dataset places some limits on the number and types of mediators that we are able to include in our analysis. Nonetheless, we are able to explore the competing roles of educational attainment, lifetime work experience, partner and parent status, plus health status for our estimates relating to labour market outcomes.

Education is likely to be one of the most important mediating factors, both for labour market outcomes and for health outcomes. Childhood disadvantage often limits what children learn and achieve in education (Björklund and Salvanes, 2011[64]; OECD, 2019[65]), and children's education in turn plays a strong role in shaping both labour market opportunities (OECD, 2022[33]) and health outcomes in later life (OECD, 2021[66]). We measure education using a binary variable set to one if the respondent has a highest level of educational attainment at or above ISCED 2011 level 3 (upper secondary education or above), and zero if their highest level of attainment is at or below ISCED 2011 level 2 (below upper secondary education).

Work experience is a second potential mediator, particularly for labour market outcomes. As illustrated by past OECD work on joblessness and labour market opportunities (OECD, 2014[67]; Fernandez et al., 2016[68]), prior work experience plays a major role in shaping labour market opportunities, with limited work experience acting as an important barrier to employment. But work experience may itself also be influenced by childhood disadvantage: young people from disadvantaged backgrounds are far more likely to be unemployed or inactive than those from more advantaged positions (OECD, 2016[69]), for instance, preventing them from gaining a foothold in the labour market and building a career record early on. Consistent with past OECD work (Fernandez et al., 2016[68]), we measure an individual's total relative work experience as the ratio of the reported number of years spent in paid work to the potential total number of years the individual could have spent in paid work in the absence of any years of non-employment, with the latter determined by the typical graduation age for their highest completed level of education.[7] Again consistent with past OECD work, we then transform this ratio into a binary indicator set to zero for individuals with an actual-to-potential work experience ratio of between 0 and 60% (no or low relative work experience), and one for those with a work experience ratio above 60% (medium to high relative work experience).

Two demographic behaviours – namely entering into a partnership and having children– may also potentially mediate associations between childhood disadvantage and later adult outcomes, particularly labour market outcomes, and especially for women. The evidence on the motherhood employment and earnings penalties is well known: to varying extents across countries, mothers are less likely to be employed than women without children, and gender pay gaps among men and women with children are larger than the gaps among those without (OECD, 2017[70]; OECD, 2022[71]).

At the same time, family formation behaviours and the transition to parenthood are substantially influenced by family and social background, including by childhood experience of disadvantage (Billari, Hiekel and Liefbroer, 2019[20]). For instance, studies have found that childhood poverty substantially increases the risk of early motherhood (including the risk of becoming a teenage parent) (Hobcraft and Kiernan, 2001[72]), and that exposure to poverty during adolescence may be more consequential for early parenthood than exposure earlier in childhood (Wodtke, 2013[73]). There is also some evidence of a positive correlation between the family size of parents and children, even in societies characterized by major changes in the timing of family-related events (Murphy, 2013[74]), and that the transmission of normative beliefs from parents to children about childbearing can be a mechanism through which differences in fertility behaviours by socio-economic status are mediated (Bernardi, 2013[75]; Barber, 2000[76]). However, more than fertility norms, socioeconomic differentials in contraceptive use (including method choice and consistency of use) seem being an important cause of disparities in early and unintended fertility (Guzzo and Hayford, 2020[77]). Conversely, compared to their less-advantaged counterparts, more-advantaged women may have better

[7] "Typical" graduation ages for each level of education are derived from information available in OECD Education at a Glance 2021 (OECD, 2021[123]). OECD Education at a Glance (Annex Table X1.1) provides a range of typical graduation ages for OECD countries by level of education (upper secondary education and above), with the age specified referring to the typical age of students at the beginning of the educational year. We take the OECD unweighted average of the minimum age for each level of education, and add one to produce the typical age at the end of the educational year. For lower secondary education and below, we use 16 years of age as the "typical graduation age".

control over fertility, greater ability to predict their future trajectories, and greater opportunities to find identity and meaning outside of motherhood (Guzzo and Hayford, 2020[77]; Bernardi, 2013[75]).

We measure a respondent's current partner status using a binary variable equal to one if they report a spouse or partner living in the same household, and zero if they do not. Because parent status is not readily available in the EU-SILC microdata, we proxy parenthood through a binary variable indicating the presence of dependent children in the household. The variable is set to one if there is at least one dependent child (household member aged under 18 or aged 18-24, economically inactive and living with at least one parent) in the household, and zero if there is not.[8]

Lastly, for estimates relating to our labour market outcomes, we also include health status (as measured by the HALex) as an additional mediator. Health is an important determinant of labour market outcomes (Devaux and Sassi, 2015[78]; Flores, Fernández and Pena-Boquete, 2020[79]), with health-driven activity limitations, disabilities, or poor health more generally often acting as a barrier to employment (Fernandez et al., 2016[68]). Employment may also influence health too (Devaux and Sassi, 2015[78]), both negatively (e.g. through occupational injuries) and positively (e.g. by providing income and other health-supporting resources). Partly for technical reasons,[9] we do not include our labour market outcome variables as mediators when estimating the links between childhood disadvantage and health. We do, however, continue to include our measure of lifetime work experience to capture the potential role that longer or short work histories may play in shaping current health outcomes.

Finally, across all our estimates, we also include a set of five-year age group fixed effects to control for possible secular trends and/or cohort-specific effects.

Sample sizes

Our initial overall sample consists of 211 956 respondents aged 25 to 59 from 27 European countries, with substantial variation in country-specific sample sizes (Table 2). We drop respondents with missing information on our key independent variables relating to childhood circumstances (16 125 cases), and respondents with missing information on our employment and health outcome variables, our mediator variables, and/or our control variables (18 902 cases). For annual earnings analyses, we also drop respondents reporting either zero or negative earnings or who report not working at all in the income reference year. Our final overall sample consists of 88 077 male respondents and 93 585 female respondents, with country-specific samples ranging from 950 male respondents and 901 female respondents in Sweden, to 8 190 male respondents and 8 151 female respondents in Spain (Table 2).

[8] Note that calculating this way does not allow to identify parents whose children have left parental households, which may happen especially for the oldest groups of persons in our samples. The same limit applies to parents with children who at time of survey do not live in the same household due to parental separation, for instance. Therefore, it is possible that the effect of childhood disadvantage mediated by parenthood status will be slightly underestimated.

[9] Adding our employment status variable as a predictor of HALex at the same time as allowing HALex to act as a predictor of employment status would create a non-recursive system in our estimation model.

Table 2. Initial and final sample sizes

25- to 59-year-olds who grew up in private households, by country and sex

	Initial sample			Final sample		
	Men	Women	Total	Men	Women	Total
Austria	2 522	2 877	5 399	2 386	2 702	5 088
Belgium	3 270	3 440	6 710	3 066	3 034	6 100
Bulgaria	3 546	3 502	7 048	3 072	2 980	6 052
Croatia	3 927	3 976	7 903	3 635	3 435	7 070
Czech Republic	3 753	4 022	7 775	2 162	3 085	5 247
Denmark	1 229	1 331	2 560	1 065	1 144	2 209
Estonia	3 008	3 225	6 233	2 762	3 009	5 771
Finland	2 615	2 484	5 099	2 333	2 238	4 571
France	5 112	5 606	10 718	4 245	4 731	8 976
Germany	4 209	4 907	9 116	3 583	4 121	7 704
Greece	7 559	8 121	15 680	6 828	6 045	12 873
Hungary	2 108	2 841	4 949	1 957	2 607	4 564
Ireland	1 940	2 210	4 150	1 655	1 927	3 582
Italy	8 677	9 091	17 768	7 655	7 432	15 087
Latvia	2 008	2 289	4 297	1 640	1 934	3 574
Lithuania	2 188	2 746	4 934	1 062	1 778	2 840
Luxembourg	2 473	2 690	5 163	2 066	2 252	4 318
Netherlands	3 002	3 401	6 403	2 455	2 732	5 187
Norway	1 817	1 652	3 469	1 549	1 393	2 942
Poland	7 766	9 377	17 143	6 524	7 970	14 494
Portugal	6 958	7 726	14 684	6 336	6 964	13 300
Romania	3 738	3 680	7 418	3 356	2 749	6 105
Slovak Republic	3 106	3 381	6 487	2 747	2 953	5 700
Slovenia	2 171	2 410	4 581	2 061	2 258	4 319
Spain	8 555	8 946	17 501	8 190	8 151	16 341
Sweden	1 235	1 201	2 436	950	901	1 851
Switzerland	2 963	3 369	6 332	2 737	3 060	5 797
Total	101 455	110 501	211 956	88 077	93 585	181 662

Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

1.2 Empirical strategy

Estimating associations between childhood disadvantage and adult labour market and health outcomes

We model associations between childhood social and economic disadvantage and our three key adult outcomes y_k (*Employment status*, (log) *Annual labour earnings,* and *Health and Activity Limitation Index (HALex))* using generalized Structural Equation Modelling (SEM).

SEM refers to a broad and multi-functional set of methods for modelling empirical relationships. SEM can incorporate a variety of models stretching from simple linear regression to more sophisticated techniques such as latent growth models, and is perhaps most often used in situations where researchers are interested in relationships involving latent (i.e. not directly observable) variables. In our case, we are interested in SEM primarily for its ability to conduct mediation analysis and to help model the potential pathways through which childhood disadvantage may shape our outcomes of interest. (See, for example, Pakpahan, Hoffmann and Kröger (2016[39]) for a relatively similar use case.)

We use SEM to build a two-stage mediation model. In the first stage, we regress our potential mediators (*education*, *lifetime work experience*, *partner status* and *parent status*) on our key independent variable of interest (*ICSES*), controlling for age group and childhood family type. In the second, we regress our three key adult outcomes on our independent variable of interest (*ICSES*) plus our mediators and, for our labour market outcomes, health status, again controlling for age group and childhood family type. Depending on the nature of the dependent variable (continuous or binary), estimation is conducted using either linear or logistic regression. In structural equation modelling, all equations present in the model are estimated simultaneously.

As noted above, we split our Index of Childhood Socio-Economic Status (ICSES) into country-specific quintiles ($qicsed$), with the first (bottom) quintile representing respondents who experienced the most disadvantaged childhoods within their country, and the fifth (top) quintile those who experienced the most advantaged childhoods. Substantively, we are most interested in how the outcomes for respondents in the first (bottom) quintile of our index ($qicsed = 1$; the most disadvantaged) compare to those for respondents in the third (middle) quintile ($qicsed = 3$), on the basis that respondents in the middle quintile are representative of children who experienced "average" childhoods within their given country. We thus calculate the association between childhood disadvantage and each of our three adult outcomes (y_k) by estimating:

$$\Delta_{\boldsymbol{k}} = \boldsymbol{E}[y_k | qicsed = 1] - \boldsymbol{E}[y_k | qicsed = 3]$$

In practice, for estimation, we set the third (middle) quintile ($qicsed = 3$) as the reference category for $qicsed$.

Because we are using a mediation model, in order to calculate the total (overall) association between childhood disadvantage and our outcomes, we need to combine both the estimated "direct" association between $qicsed = 1$ and our outcomes of interest (i.e. the association related to the presence of $qicsed = 1$ in the second stages regressions) and the estimated *indirect* associations with $qicsed = 1$ that run through our included mediators (i.e., by plugging our first-stage regression of each mediator variable on of $qicsed = 1$ into the second stage regression of the outcome variable y_k). We give the corresponding regressions and expectation calculations in Annex B.

We are also interested in these indirect associations and their contributions to the total (overall) association between $qicsed = 1$ and our outcomes in and of themselves. Details on how we decompose the total association between $qicsed = 1$ and our outcomes and isolate its direct and indirect components are available in Annex B.

We estimate separate two-stage models for each of our 27 covered countries. Because of known (and large) gender differences in employment and health outcomes (see Table 1) – and because there is some potential for childhood disadvantage to impact men's and women's outcomes differently, given the ways it may interact with parenthood in particular – we also estimate separate models for men and women. For comparability of estimates, we keep the specifications identical for both men and women and for all 27 countries.

Estimating the monetary value of the labour market and health penalties associated with childhood disadvantage

Our strategy for monetising the estimated labour market penalties associated with childhood disadvantage broadly follows the approach used by Blanden, Hansen, and Machin (2008[25]; 2010[26]). This process takes place in two steps, with the first focusing on monetising the employment penalty associated with childhood disadvantage, and the second on monetising earnings losses among the employed associated with childhood disadvantage.

In the first step, we calculate total lost employment as the estimated percentage point reduction in employment associated with childhood disadvantage multiplied by the 20% of the (25- to 59-year-old) population that we assume grew up in relative disadvantage. We do this separately by country and sex. We then monetise this lost employment by allocating each lost worker earnings at a set level. Blanden, Hansen, and Machin (2008[25]; 2010[26]) allocate their "lost workers" earnings at the 25th percentile of the national earnings distribution as an "*arbitrary way of acknowledging that such individuals would be likely to be in lower-paying jobs*" (Hirsch, 2008, p. 9[80]). We follow this approach, allocating our lost workers earnings at the 25th percentile of their country- and sex-specific earnings distribution.[10] The resulting Euro-amounts can be interpreted as the annual monetary value of current (2018) lost employment attributable to earlier childhood disadvantage across the 25- to 59-year-old population.

In the second step, again in line with Blanden, Hansen, and Machin (2008[25]; 2010[26]), we calculate earnings losses among those already employed as the estimated annual labour earnings penalty associated with childhood disadvantage multiplied by (country- and sex-specific) mean annual labour earnings for workers in the middle (third) quintile on the ICSES. This in turn is multiplied by the number of the employed classified as having experienced childhood disadvantage. The resulting amounts can be interpreted as the annual monetary value of current (2018) lost earnings attributable to earlier childhood disadvantage across the employed 25- to 59-year-old population.

We calculate the total monetary value of the labour market penalties associated with childhood disadvantage as the sum of the value of the employment and earnings penalties. To contextualise these amounts and facilitate cross-country comparison, we express the total penalty as a share of (2018) GDP.

Note that in both cases (the employment and the earnings penalties), we monetise the penalties associated with childhood disadvantage through assumed lost earnings, only. Employment in particular likely carries additional benefits for individuals (e.g. through increased self-esteem) and potentially also for societies (e.g. through increased social cohesion) that are not captured here. For more discussion on the broader welfare value of employment, see Boarini et al. (2016[81]).

It is also worth noting that these estimates rely on some important assumptions, including that labour demand is capable of fully absorbing the higher supply stemming from individuals with disadvantaged childhoods, and that this adjustment has no impact the employment and earnings of other groups. As Blanden, Hansen, and Machin note (2008[25]; 2010[26]), "full absorption" is a common assumption in the literature on the economic impact of migration in particular, with some empirical backing (Edo, 2019[82]), at least on average and over the medium to long term. Nonetheless, in the short term at least, it is possible that there may not be sufficient labour market opportunities for all of our "lost employed" to move into. It is also possible that increased earnings for disadvantaged groups could affect the labour market outcomes of other groups (so-called "general equilibrium" effects), especially in cases of labour demand shortages (Blanden, Hansen and Machin, 2008[25]; Blanden, Hansen and Machin, 2010[26]).

Attaching a monetary value to our estimated health penalties is perhaps a little less intuitive. While it is now common for decision-makers to place monetary values on health, especially when evaluating health treatments and other health-related interventions, exactly *what* values should be used is the subject of much debate. In recent decades, a large literature has developed around the "value of a statistical life" (VSL), which aims to assess individuals' willingness-to-pay for living longer in good health and reducing the risks of accidental death. Estimates of VSL, however, vary widely across countries and population groups. One meta-analysis by the OECD found that estimates of lifetime VSLs can range from USD (PPP 2005) 4 450 to USD (PPP 2005) 22 100 000, depending on the country and methods used (Biausque, 2012[83]). In their work on valuing the costs (including health costs) of child poverty in the United States,

[10] Note that, in order to check how sensitive our results are to the assumption made on the level of income earned by the "lost workers", the same calculations are done assuming that, with no experience of childhood disadvantage, they would have earned the mean earnings of people classified in the middle quintile of childhood Index (see Section 2.2).

Holzer et al. (2008[27]) use USD (2006) 200 000 for the annualised value of a statistical life year, which they consider conservative based on available estimates for the United States[11].

Our strategy for monetising the health penalties associated with childhood disadvantage is as follows. Because our measure of health status (the HALex) is analogous to a quality-adjusted life year, we calculate the total "lost" quality-adjusted life years associated with childhood disadvantage by summing our estimated health penalty across the population classified as having experienced childhood disadvantage.[12] We then assign a monetary value to these lost quality-adjusted life years (c.f. Finkelstein, Hendren and Luttmer (2019[84])). Following Holzer et al. (2008[27]), we use USD (2006) 200 000 as our base annualised value of a healthy life year.[13] We adjust for (CPI) inflation, which gives us an annual value of USD (2018) 249 000, and then adjust for differences in income levels between countries using the international transfer method outlined by Viscusi and Masterman (2017[85]).[14] Converting to Euros gives final annualised values per lost quality-adjusted life year that range from EUR (2018) 77 310 in Bulgaria to EUR (2018) 390 767 in Luxembourg. (See Online Annex Table A4.1 for all country-specific values). The final resulting amount can be interpreted as the annual monetary value of current (2018) lost health attributable to earlier childhood disadvantage among the 25- to 59-year-old population. We again express this amount as a share of (2018) GDP.

Lastly, as a final step, we offer an estimate of the total monetary value of the combined labour market and health penalties associated with childhood social and economic disadvantage. We calculate this total as

[11] Note that this value is in the middle range of the values that can be found in the US literature, from USD 116 000 (U.S. Department of Health and Human Services, 1998) to USD 369 000 (U.S. Department of Health and Human Services, Food and Drug Administration, 2016).

[12] Note that this total refers to the quality-adjusted years lived by respondents with disadvantaged childhoods in the survey reference year only, and does not account for the potential further effects of childhood disadvantage on longevity and health life expectancy.

[13] Holzer et al.'s (2008[27]) base value of USD (2006) 200 000 is based on the literature on the value of a statistical life year (VOLY), rather than the value of a statistical *quality-adjusted* life year (VSQ), specifically. The two may differ as the disutility from death may be different from the disutility from poor health and limitation. While a number of studies have looked to estimate the value of quality-adjusted life years specifically (Cameron, Ubels and Norström, 2018[128]), their application in cases such as ours is potentially complicated by the fact that the values attached to years lived with non-fatal health conditions may vary non-linearly with severity and duration (Hammitt and Haninger, 2017[125]; Cameron, Ubels and Norström, 2018[128]). In part for this reason, we follow Holzer et al. (2008[27]) and many other studies valuing QALYs (Cutler and Richardson, 1998[126]; García et al., 2020[127]; Finkelstein, Hendren and Luttmer, 2019[84]) in using the value of a statistical life year to monetise lost quality-adjusted life years.

[14] Viscusi and Masterman's (2017[85]) method's allows US-based VSLs to be transferred to other countries. They calculate national equivalents of US-based VSLs using:

$$VSL_C = VSL_{US} \times \left(\frac{Y_C}{Y_{US}}\right)^{\eta}$$

Where VSL denotes the given value of a statistical life, Y denotes average income and η denotes the income elasticity of the VSL, assumed to be constant and equal across the countries of interest. Viscusi and Masterman find that they cannot reject the hypothesis that the international income elasticity of a VSL is equal to 1.0, and set η equal to 1 for all countries. US-based VSLs can thus be transferred to other countries by multiplying the US VSL by the ratio of average income in country c to average income in the United States. In our case, we do this by multiplying our inflation-adjusted annualised VSL (USD (2018) 249 000) by the ratio of (USD 2018 PPP) GDP per capita in each of our covered countries to (USD 2018 PPP) GDP per capita in the United States.

the simple sum of the three monetised penalties (the monetised employment, monetised earnings and monetised health penalties).[15]

The resulting totals should be interpreted with some degree of caution, not least because they rely on the multiple assumptions outlined above when estimating the monetary values of the individual component penalties. They also take no account of the many other social and economic costs potentially associated with childhood disadvantage, such as child maltreatment and increased risks of later crime and homelessness (see **Box 1**). Nonetheless, they continue to provide an illustrative approximation of the amounts that years of accumulated childhood disadvantage are potentially costing European OECD countries through worse adult health and labour market outcomes. They can be interpreted as the approximate annual monetary value of lost employment, earnings, and health attributable to earlier childhood disadvantage among the 25- to 59-year-old population.

Estimating the public finance impact of childhood disadvantage

As an additional linked exercise, we also evaluate the public finance impact of childhood disadvantage through its associations with adult employment and earnings and subsequent effects on government revenues and benefit spending. We do this using the open-source tax-benefit microsimulation model EUROMOD, which is currently maintained by the European Commission's Joint Research Centre (JRC) in collaboration with Eurostat and EU member states.[16] Most of the EUROMOD input data comes from the EU-SILC survey, which ensures consistency between the estimates of the employment and earnings penalties experienced by individuals who were living in a socio-economically disadvantaged household in their childhood.

We use the EUROMOD micro-simulation models to compare current levels of government tax revenues and social benefit spending against those that might be achieved in a counterfactual scenario whereby there are no employment and earnings penalties associated with childhood social and economic disadvantage (i.e. employment and earnings outcomes for individuals in the bottom (first) quintile on the ICSES are assumed to match those for individuals in the middle (third) quintile on the ICSES). We keep all tax and benefit rules constant in this alternative scenario, changing only the employment and earnings outcomes of those individuals that experienced childhood social and economic disadvantage. In practice, we run the EUROMOD simulations twice: once on an unmodified version of the input data, and once on a modified version where the employment and earnings penalties experienced by adults who were disadvantaged in childhood are removed.[17] The difference between the two cases makes it possible to

[15] We are able to do this despite health acting as a mediator in our labour market estimates because the monetary value we attach to lost health refers to health's intrinsic value, rather than its value as an instrument for employment. As Holzer et al. (2008[27]) point out, estimates of the value of a statistical life are typically calculated based on actual expenditures or surveys on "willingness to pay" for health-promoting or risk-averting goods or activities, and are not based on estimates of the impact of health on earnings as we estimated earlier. They reflect the value attached to health in and of itself as revealed for instance by expenditures on health care products, rather than the instrumental value of good health for people's abilities to work and earn. As a result, our monetised health penalties reflect the intrinsic value of lost health itself irrespective of the effect of lost health on labour market outcomes, which are accounted for separately when assessing the labour market penalties.

[16] We use EUROMOD for this exercise, rather than the OECD's in-house tax-benefit model (oe.cd/taxben), because of its ability to use nationally representative input data and to produce results that are aggregatable at the country-level without the need for additional assumptions about households and the distribution of household types.

[17] More precisely, the employment status of a proportion of the 25 to 59 years old population in the first quintile of the ICSES childhood deprivation index ($qicsed1 = 1$) is changed to equal the absolute percentage change in employment rate calculated in the former step. Only fully non-employed people have been switched to *full-time* employment status (and all employed), with earnings equal to the 25th percentile of each country's income distribution (taken separately

assess for each country the budgetary implications of the hypothetical situation in which the effects of childhood deprivation on labour market outcomes are cancelled out. As our labour market penalties focus on working-age adults aged 25 to 59, our tax and benefit estimates also cover households with at least one member aged 25 to 59, only.

Simulation results are then used to examine the impact the assumed increases in employment and earnings of the adults with a disadvantaged childhood on government tax revenues and on the amounts of social benefits received by the working age adults for as many as possible European OECD countries,[18] assuming there is no change in legislation.

for each sex) to be consistent with the former analysis. For simulation purposes, all the employment-related benefits they may have received before are also set to zero. Some assumptions are also needed to select the population that is moved to employment; a priority is given to the unemployed people looking for a job, then the inactive, and when needed to be consistent with the aggregate figures sick or disabled people may be moved to employment. Regarding earnings, in our new scenario all people from the first quintile of the ICSES childhood deprivation index are given an increase in earnings that corresponds to the childhood deprivation-related loss previously assessed for each country and each sex.

[18] Three EU OECD countries for which matching EUROMOD input data with our childhood disadvantage microdata was not possible are not included in these tax-benefit calculations: Italy, Lithuania and the Slovak Republic. Besides, since our data on childhood disadvantage only included a fraction of the total 25 to 59 years old population of the EUROMOD datasets (for most of the countries, around 80%, see Online Annex Table A2.3), and for many countries, only one 25 to 59 years old person per household, we first calculated ratios of change in public finances indicators on reduced versions of the dataset, limited to the observations matching with childhood disadvantage data. Then, we applied these ratios to the aggregated figures computed on the whole EUROMOD dataset, restricted to households with at least a 25 to 59 year-old, as mentioned previously.

2 Childhood disadvantage and adult labour market outcomes

2.1 Estimated labour market penalties associated with childhood disadvantage

Employment status

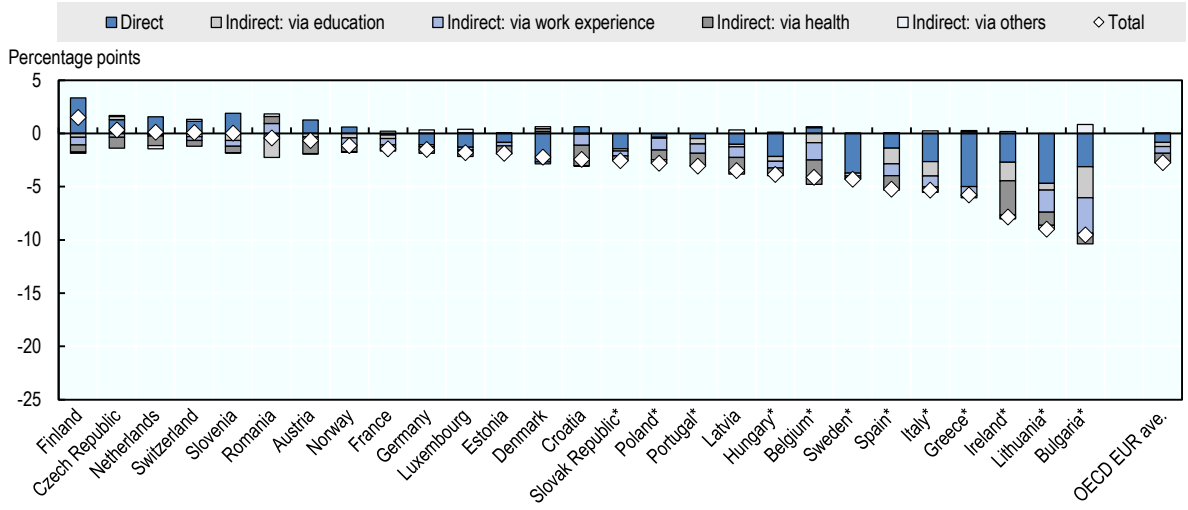
Figure 2 summarises results from our models estimating associations between childhood disadvantage and adult employment status. It shows the total estimated percentage point difference in the probability of employment between individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, other things being equal, by country. To illustrate the major pathways, the figure also disaggregates this total association into indirect associations (i.e. the portions of the total association that run through our mediators) and the estimated "direct" association (i.e. the portion of the total association that cannot be explained by our included mediators). As touched on below, the latter (the "direct" effect) is best interpreted as reflecting an "unexplained" association between childhood disadvantage and adult employment status, and includes the potential role of un-modelled factors such as the development of social and emotional skills. Full results from the underlying regression models are given in Online Annex Tables A3.1-A3.2.

The estimates in Figure 2 show negative associations between childhood social and economic disadvantage and employment in many countries, especially for women. On average across the 24 covered European OECD Member Countries, men and women in the first (bottom) quintile on the ICSES are, respectively, 3 and 6 percentage points less likely to have been employed in the income reference year than individuals in the third (middle) quintile, all else equal. For men, among the covered OECD countries, the largest penalties linked to childhood disadvantage are in Ireland – where men in the first (bottom) quintile on the ICSES are 8 percentage points less likely to be in employment than those in the third (middle) quintile – and Lithuania (9 percentage points). For women, the largest penalties are in Spain (16 percentage points) and Ireland (21 percentage points). In a minority of countries, after controlling for other factors, individuals in the first (bottom) quintile on the ICSES are slightly *more* likely to have been employed for one month or more in the income reference year than their counterparts in the third (middle) quintiles. In all cases, however, these positive associations are not statistically significant at the 10% level.

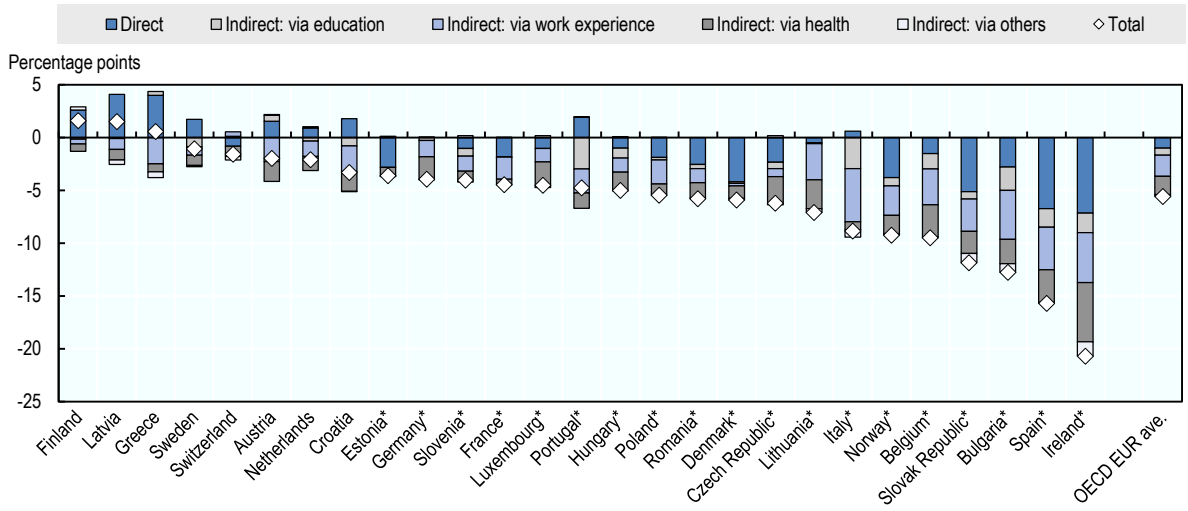
Figure 2. Childhood disadvantage is negatively associated with employment in many countries, especially for women

Estimated percentage point difference in the probability of employment between individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, by sex and country, with decomposition into direct and indirect associations, 2018

Panel A: Men



Panel B: Women



Note: Summary of estimates from country- and sex-specific two-stage GSEM mediation models with five-year age group fixed effects. Results for employment status are estimated using (weighted) logistic regression. Shown results are based on average marginal effects calculated across the (weighted) sample. In countries marked with an *, the total association is statistically significant at $p < 0.1$. Significance tests are performed at the mean average values of control variables. Indirect associations are approximated using the Karlson, Holm, and Breen (KHB) decomposition method on the second stage regressions. "Employment" refers to respondents who report working (full-time or part-time) as either an employee or self-employed as their main activity status in at least one of the twelve months in the income reference period (2018). "Indirect: via others" refers to the sum of the indirect associations via partner status and the presence of at least one child in the household. See Online Annex Tables A3.1-A3.2 for full underlying results. "OECD EUR ave." refers to the unweighted average across the 24 covered European OECD countries. It excludes Bulgaria, Croatia and Romania.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

Much of the overall association between childhood disadvantage and employment runs indirectly through mediators like health status and lifetime work experience (Figure 2). Childhood disadvantage is frequently negatively associated with education, health and the probability of having a fuller employment record (see Online Annex Tables A3.1-A3.2 and Section 3 below), all of which in turn decrease the probability of employment in the income reference year (see Online Annex Tables A3.1-A3.2). Lifetime work experience plays a large role: we estimate that on average, through its association with work experience, being in the first (bottom) quintile on the ICSES is associated with a 0.6 percentage point decrease in the probability of employment for men (about 23% of the overall association between childhood disadvantage and employment), and a 2.0 percentage point decrease for women (about 36% of the overall association). Health status, as measured by the Health and Activity Limitation Index, is also important, accounting for a 0.9 percentage point decrease in the probability of employment for men in the bottom ICSES quintile, and a 1.7 percentage point decrease for women, on average (about 33% and 31% of the overall association, respectively).

However, in several countries (e.g. Greece, Ireland, Spain), there are also non-negligible "direct" associations between childhood disadvantage and employment – that is, associations between being in the bottom ICSES quintile and employment that hold even after accounting for our selected mediators. Where statistically significant (see Online Annex Tables A3.1-A3.2), these direct associations are in almost all cases negative, as we would expect. Importantly, these associations are likely to be "direct" in a statistical sense only – the statistical association runs directly between childhood disadvantage and employment status, rather than indirectly through our included mediators – and are best interpreted as capturing "unexplained" associations between disadvantage and employment that run through pathways not modelled here. One potential un-modelled pathway is the role played by social and emotional skills, which are both negatively affected by childhood socio-economic disadvantage and positively valued in the labour market above and beyond educational attainment (Kautz et al., 2014[86]). Family stress models suggest that the stresses caused by economic insecurity and socio-economic disadvantage can be an important factor impacting parenting behaviours and thereby children's social-emotional development (Kalil and Ryan, 2020[43]). We also cannot rule out a role for factors that often correlate with socio-economic status and that also affect labour market opportunities, such as ethnic background and ethnicity-based labour market discrimination.

Note that the exact size of the estimated association between childhood disadvantage and employment is to some extent sensitive to the construction of our employment status measure. As discussed in Section 1.1, we measure employment with reference to the income reference year (2018) in its entirety, with "employed" respondents being those who report working in at least one of the twelve reference months. In Online Annex Tables A3.3-A3.6, we provide alternative estimates based on two alternative employment status measures: "majority" employment in the income reference year (with "employed" defined as working in more than half of the twelve reference months), and full-year full-time employment in the income reference year. In both cases, these stricter employment status measures produce larger estimated associations between childhood socio-economic disadvantage and employment in most of the covered countries: on average across the covered European OECD countries, men and women in the first (bottom) quintile on the ICSES are, respectively, 4 and 7 percentage points less likely than those in the third (middle) quintile to have been "majority" employed in the income reference year, and 7 and 10 percentage points less likely to have been employed full-time over the full year (see Online Annex Table A3.7 for a comparison of results). This suggests that adults who have experienced childhood disadvantage often have additional difficulties accessing secure employment, and especially secure full-time employment, over and above the challenges they face finding *any* employment.

Annual labour earnings

Figure 3 summarises our estimated associations between childhood disadvantage and annual labour earnings. It shows the estimated percentage difference in annual labour earnings between individuals in

the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, all other things being equal, with disaggregation into "direct" (i.e. "unexplained") and indirect associations. Full results from the underlying regression models are given in Online Annex Tables A3.1-A3.2.

Associations between childhood social and economic disadvantage and adult annual labour earnings are clear and large. On average across the 24 covered OECD Member Countries, men and women in the first (bottom) quintile on the ICSES earn, respectively, 20% and 21% less each year than otherwise similar individuals in the third (middle) quintile on the ICSES (Figure 3). In several countries, the earnings penalties associated with childhood disadvantage reach over 30%, with the largest penalties in Bulgaria (42% for men, and 39% for women). Even in the countries with the smallest gaps (Denmark and Norway for men, and Estonia and Finland for women), individuals in the bottom quintile on the ICSES still earn between 4% and 9% less per year than those in the middle quintile.

These earnings penalties result from a combination of lower wages and salaries and reduced working time. As outlined in Section 1.1, our earnings variable captures total labour earnings (both employee and self-employment earnings) among individuals who reported working for at least one month during the income reference period (2018). As a result, differences in earnings between individuals in the first and third quintiles on the ICSES reflect not just differences in occupations and wages but also potential differences in working hours and periods of non-employment. Figure 4 compares our overall earnings penalty with estimates from a second specification that adds months in employment and main part-time/full-time status in the income reference year as additional controls (see Online Annex Tables A3.9-A3.10 for the full results). On average across OECD Members, including these controls reduces the estimated earnings penalty by about 3.5 percentage points (or 18%) for men, and 4.2 percentage points (or 20%) for women. We interpret this as indicating that on average, roughly one-fifth of the annual earnings penalty associated with childhood social and economic disadvantage is attributable to differences in working hours and periods of non-employment.

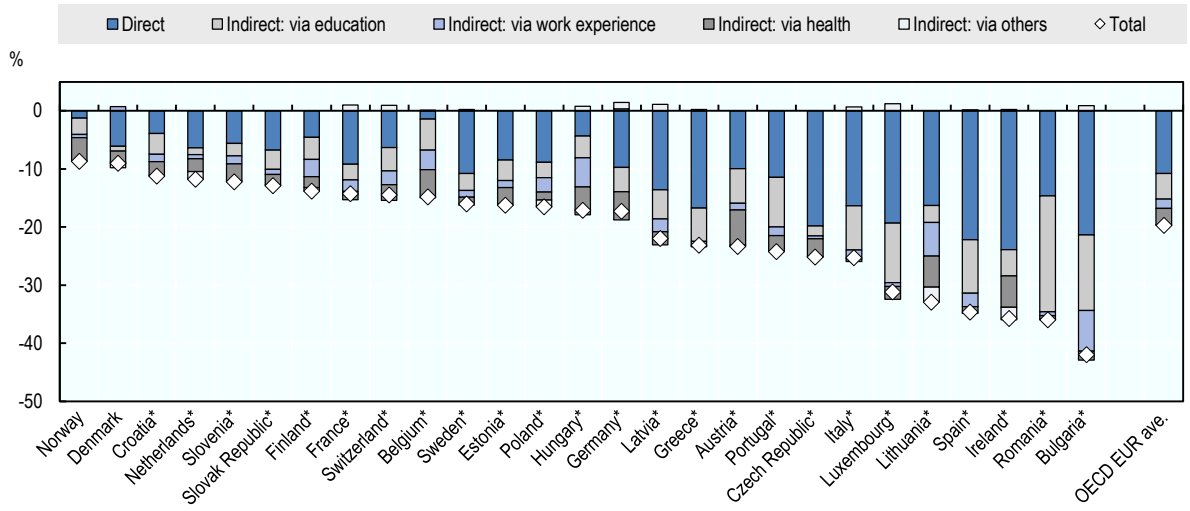
As with employment, much of the overall association between childhood social and economic disadvantage and annual earnings is indirect and works through our mediators (Figure 3). Education plays the strongest role: on average across the 24 covered OECD Member Countries, reduced education accounts for a 4-percentage-point decrease in annual labour earnings for bottom-ICSES-quintile men (about 22% of the overall effect of being in the bottom quintile), and a 5 percentage point decrease for bottom-ICSES-quintile women (about 24% of the overall association). Education is a particularly important mediator for women in Portugal (14 percentage points) and for both men and women in Romania (20 and 21 percentage points, respectively). Health status is also important, accounting for about 3 percentage points of the earnings penalty associated with being in the bottom quintile on the ICSES for both men and women (about 14% of the overall association in both cases).

Even after accounting for our mediators, the "direct" (or unexplained) association between childhood social and economic disadvantage and annual labour earnings often remains large (Figure 3). On average across the 24 covered OECD Member Countries, for both men and women, about half of the overall difference in labour earnings between individuals in the bottom and the middle quintile on the ICSES cannot be accounted for by our included mediators. As noted above, this "direct" association reflects an unexplained association between disadvantage and earnings that runs through un-modelled pathways, such as, for instance, social and emotional skills. The size of these "direct" associations in many countries reinforces the point that the effects of childhood disadvantage on later outcomes likely work through multiple mechanisms, including but not limited to more-easily measurable factors like educational attainment.

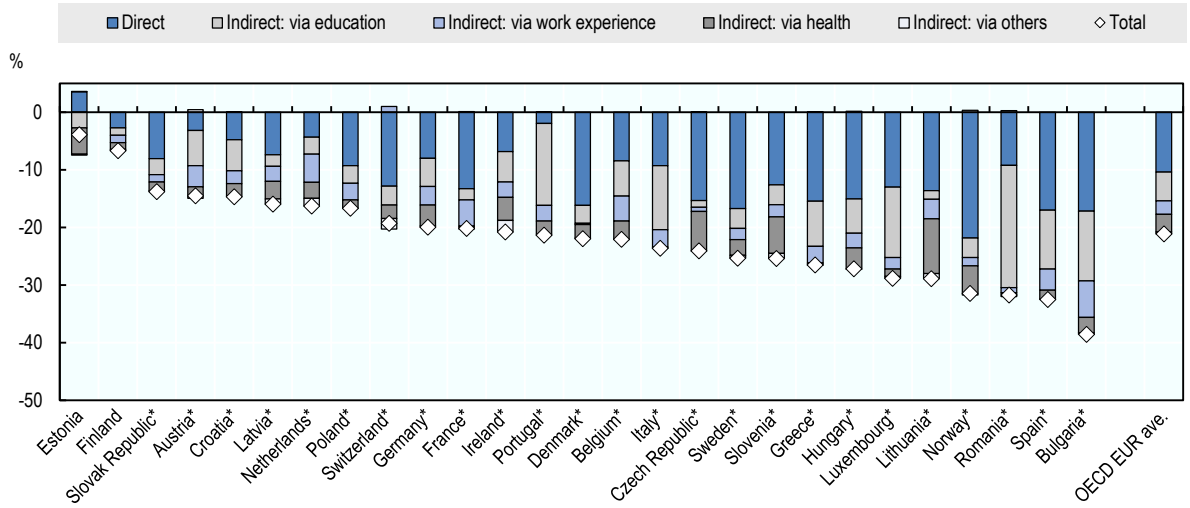
Figure 3. Associations between childhood disadvantage and adult earnings are often large

Estimated percentage difference in annual labour earnings between employed individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, by sex and country, with decomposition into direct and indirect associations, 2018

Panel A: Men



Panel B: Women



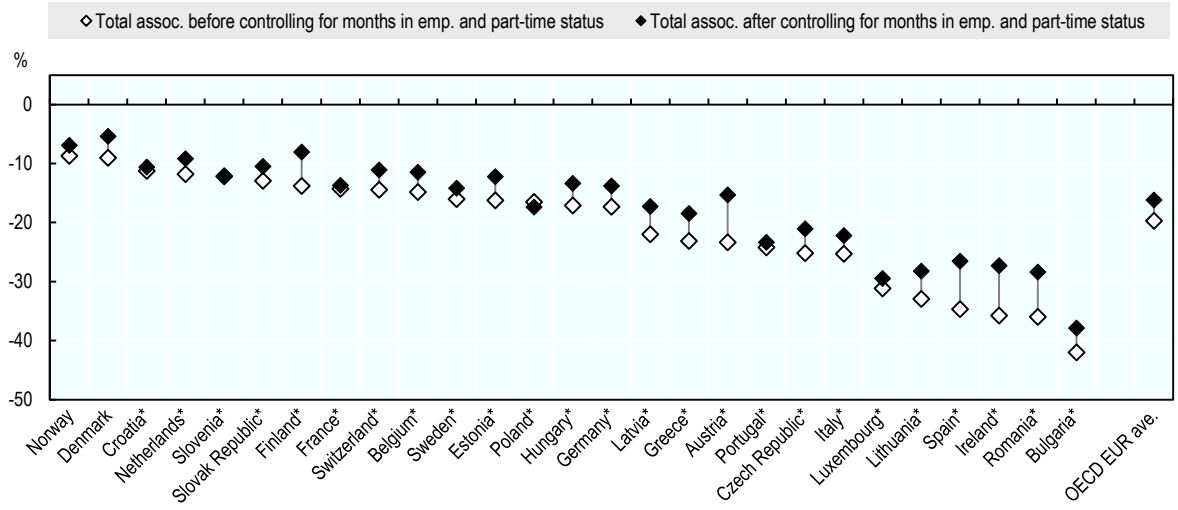
Note: Summary of estimates from country- and sex-specific two-stage GSEM mediation models with five-year age group fixed effects. Results for (log) annual labour earnings are estimated using (weighted) linear regression. Estimates are expressed as exp(b)-1 (i.e. as percentage differences) for ease of interpretation. In countries marked with an *, the total association is statistically significant at $p < 0.1$. Significance tests are performed at the mean average values of control variables. "Employed" refers to respondents who report working (full-time or part-time) as either an employee or self-employed as their main activity status in at least one of the twelve months in the income reference period (2018). "Annual labour earnings" refers to the sum of employee cash (or near cash) income and cash benefits or losses from self-employment in the income reference year. Respondents reporting zero or negative earnings are excluded. “Indirect: via others” refers to the sum of the indirect associations via partner status and the presence of at least one child in the household. See Online Annex Tables A3.1-A3.2 for full underlying results. “OECD EUR ave.” refers to the unweighted average across the 24 covered European OECD countries. It excludes Bulgaria, Croatia and Romania.

Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

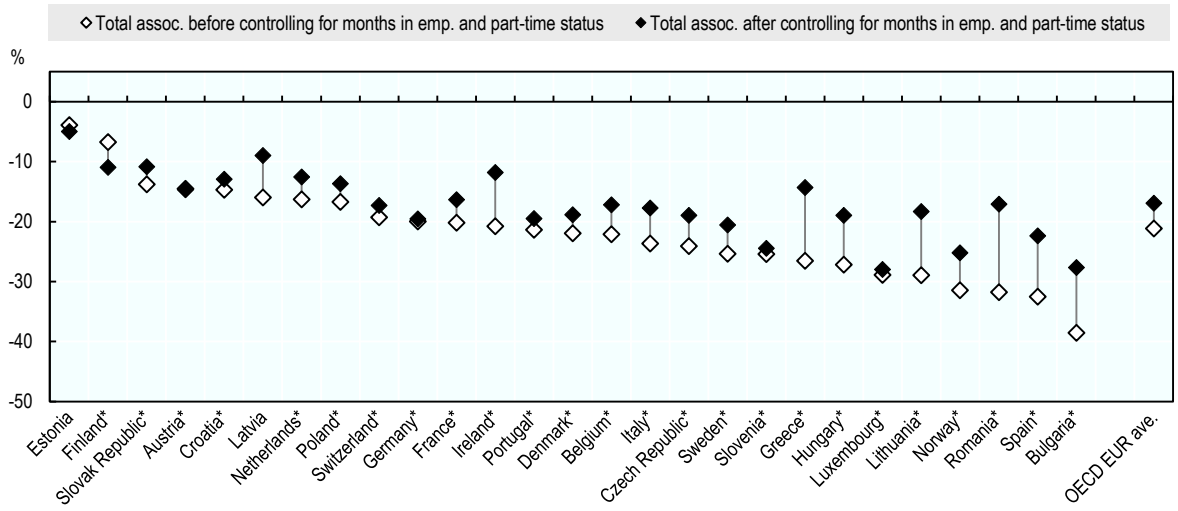
Figure 4. About one-fifth of the annual earnings penalty associated with childhood disadvantage is attributable to differences in working hours and periods of non-employment

Estimated percentage difference in annual labour earnings between employed individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, before and after controlling for months in employment and part-time status, by sex and country, 2018

Panel A: Men



Panel B: Women



Note: Summary of estimates from country- and sex-specific two-stage GSEM mediation models with five-year age group fixed effects. Results for (log) annual labour earnings are estimated using (weighted) linear regression. Estimates in the second specification additionally control for months in employment in the income reference year and main part-time/full-time status in the income reference year. In countries marked with an *, the total association in the second specification is statistically significant at $p < 0.1$. Significance tests are performed at the mean average values of control variables. Estimates are expressed as exp(b)-1 (i.e. as percentage differences) for ease of interpretation. "Employed" refers to respondents who report working (full-time or part-time) as either an employee or self-employed as their main activity status in at least one of the twelve months in the income reference period (2018). "Annual labour earnings" refers to the sum of employee cash (or near cash) income and cash benefits or losses from self-employment in the income reference year. Respondents reporting zero or negative earnings are excluded. “Indirect: via others” refers to the sum of the indirect associations on partner status and the presence of at least one child in the household. See Online Annex Tables A3.9-A3.10 for full underlying results. “OECD EUR ave.” refers to the unweighted average across the 24 covered European OECD countries. It excludes Bulgaria, Croatia and Romania.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

2.2 The monetary value of the labour market penalties associated with childhood disadvantage

Figure 5 summarises the estimated monetised value of the employment and earnings penalties associated with childhood social and economic disadvantage. As outlined in Section 1.2, these estimates rely on a series of assumptions about the labour market behaviours and opportunities of disadvantaged individuals in the hypothetical scenario where they experience no (effects from) disadvantage. For the employment penalty, we calculate total lost employment by multiplying the estimated percentage point reduction in employment associated with childhood disadvantage (see Figure 2) by the 20% of the (25- to 59-year-old) population that we assume grew up in relative disadvantage. We then monetise this lost employment by assuming that had these individuals been in employment, they would have earned at the 25th percentile of their country- and sex-specific earnings distribution. For the earnings penalty, we calculate the value of lost earnings per worker by multiplying the earnings penalty associated with childhood disadvantage (see Figure 3) by (country- and sex-specific) mean annual labour earnings for workers in the middle (third) quintile on the ICSES. We then aggregate this monetised earnings penalty across all workers who experienced disadvantage in childhood. Online Annex Table A3.11 shows these calculations step by step.

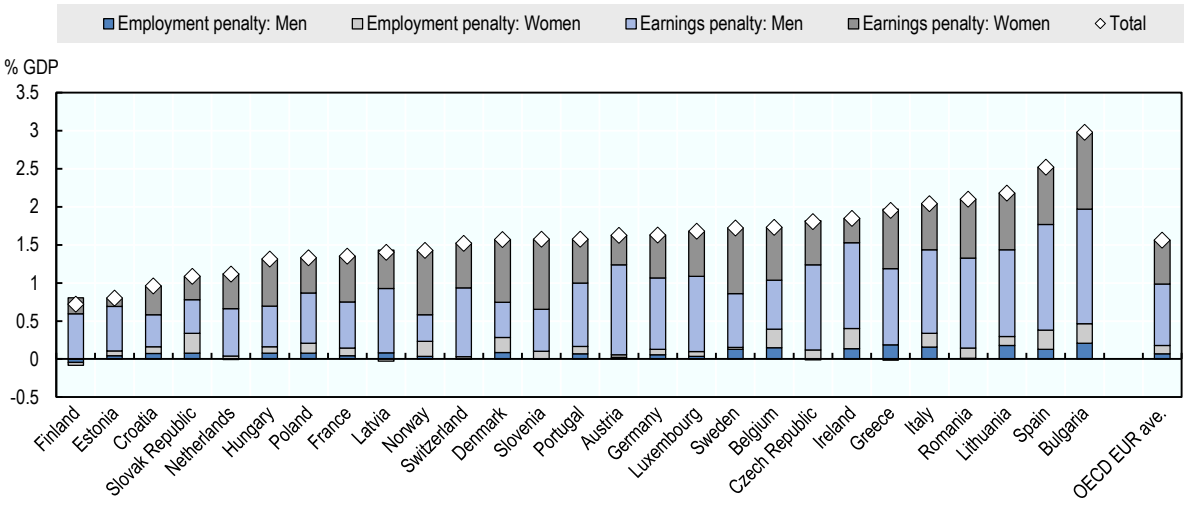
The overall monetised value of the employment and earnings penalties associated with childhood disadvantage varies across countries, but is frequently large (Figure 5). On average across the 24 covered OECD Member Countries, the annual value of lost employment and earnings equates to just under 1.6% of GDP; in other words, through reduced employment and lower earnings when in work, 25- to 59-year-olds in European OECD Member Countries who grew up in relative disadvantage miss out collectively on earnings worth on average the equivalent of 1.6% of GDP each year. This is comparable to Holzer et al.'s (2008[27]) and particularly McLaughlin and Rank's (2018[23]) estimates of the value of reduced earnings due to child poverty in the United States (1.3% and 1.6% of GDP, respectively). It is also relatively consistent with Blanden, Hansen, and Machin's (2010[26]) primary estimate for the GDP value of the lost employment and earnings associated with child income poverty in the United Kingdom (0.95% of GDP), especially given that we use a broader measure of childhood disadvantage than Blanden, Hansen, and Machin do (see Section 1.1).

Among the covered European OECD Member Countries, the monetised value of lost employment and earnings is greatest in Lithuania and especially Spain (Figure 5). In the former, the value of lost employment and earnings among 25- to 59-year-olds growing up in relative disadvantage comes to a fraction under 2.2% of GDP; in the latter, it reaches 2.5% of GDP. Estonia and Finland are the only covered OECD Member Countries where the monetised employment and earnings penalties associated with childhood disadvantage come to less than 1% of GDP.

The majority of the overall monetised employment and earnings penalty runs through lost earnings among those already in work. On average across the covered OECD Member Countries, the total monetised employment penalty (for men and women combined) comes to just under 0.2% of GDP, and the total monetised earnings penalty to 1.4% of GDP (Figure 5). This is not surprising since, as discussed earlier, our earnings penalty captures not just differences in occupations and wages, but also differences in working hours and periods of non-employment. Our assumption that any "lost workers" would otherwise have earned at the 25th percentile of the earnings distribution also plays a role. This is a lower earnings level than we assume for disadvantaged respondents who were already in work, on the grounds that disadvantaged individuals who were out of work in the income reference year may have lower earnings potential than those who were already working. Relaxing this assumption and allocating these lost workers annual earnings equal to the mean for workers in the middle quintile on the ICSES produces slightly larger monetised employment penalties: 0.3% of GDP on average, for men and women combined (Online Annex Table A3.12).

Figure 5. On average, 25- to 59-year-olds who grew up in relative disadvantage miss out on employment and earnings worth a combined 1.6% of GDP annually

Estimated annual monetary value of the employment and earnings penalties for 25- to 59-year-olds who grew up in relative disadvantage based on the Index of Childhood Socio-Economic Status, % of GDP, by country, 2018



Note: "Employment penalty" refers to the estimated difference in the probability of employment between individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status. "Earnings penalty" refers to the estimated difference in annual labour earnings between employed individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status. The employment penalty is monetised by multiplying the estimated employment penalty by the population who grew up in disadvantage and assigning each "lost worker" earnings at the 25th percentile of the country- and sex-specific earnings distribution. The earnings penalty is monetised by multiplying the estimated earnings penalty by the mean annual labour earnings for workers in the third (middle) quintile on the ICSES, multiplied by the number of employed experiencing childhood disadvantage. See Section 1.2 for more details. “OECD EUR ave.” refers to the unweighted average across the 24 covered European OECD countries. It excludes Bulgaria, Croatia and Romania.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

Despite both the employment and earnings penalties associated with childhood disadvantage often being greater for women than for men (see Figure 2 and Figure 3), our estimated *monetised* employment and earnings penalties are in most countries larger for men. On average across the covered OECD Members, the combined monetised employment and earnings penalties for men come to 0.9% of GDP, and for women to 0.7% of GDP (Figure 5). This is a direct consequence of gender differences in earnings and our use of gender-specific earnings distributions for monetising the employment and earnings penalties. As documented at length by the OECD (OECD, 2017[70]; OECD, 2021[87]), progress on the gender pay gap has stalled in recent decades and gender differences in earnings remain substantial in many countries. Gender differences in our monetised employment and earnings penalties should be interpreted with these gender pay inequalities in mind, rather than as evidence of smaller penalties from disadvantage for women as such.

2.3 Exploring cross-national differences in the labour market penalties associated with childhood disadvantage

This subsection examines cross-national differences in our estimated labour market penalties and their potential country-level drivers. The nature of our data on childhood disadvantage places limits on what we can and cannot say about the determinants of these penalties: we use data from a single cross-section so cannot make causal claims about country-level factors, and the number of countries covered in our study

(27 European countries) does not allow us to control for or separate out the competing influence of different potential drivers. Nonetheless, simple country comparisons can provide clues as to the types of country-level factors that may help reduce the labour market impact of childhood disadvantage. These include the absolute depth of childhood disadvantage, inequalities in the social and economic resources available in childhood, labour market conditions and levels of social spending.

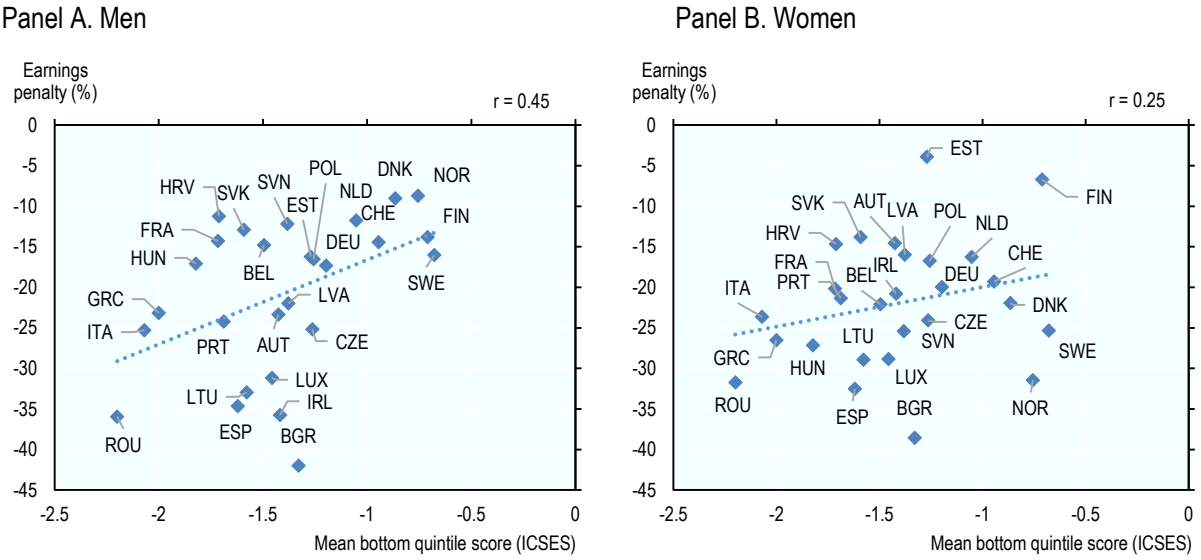
Absolute levels of childhood disadvantage

So far, and in line with the OECD's broader approach to measuring poverty, this paper has taken a fully relative approach to childhood social and economic disadvantage: we measure disadvantage as being placed in the first (bottom) quintile on our Index of Childhood Socio-Economic Status within a given country, irrespective of what that represents in absolute terms. However, as noted in Section 1.1 what it means to be in the bottom quintile on the ICSES varies considerably from one country to another (See Online Annex Table A2.2). For example, in Hungary, as many as 93% of bottom-quintile respondents report not having at least one meal with meat, chicken or fish (or vegetarian equivalent) daily when around age 14, compared to 14% of bottom-quintile respondents in Sweden and 12% in Denmark. Similarly, in Romania, 56% of bottom-quintile respondents report not having the things they needed for school when around age 14, compared to 4% in Finland and Sweden (Online Annex Table A2.2).

Cross-national differences in the absolute depth of childhood disadvantage may help explain at least part of the differences we see across countries in the size of the labour market penalties attached to disadvantage. For example, Figure 6 plots our estimated earnings penalties against average ICSES scores for respondents in the bottom ICSES quintile within their country. Higher average scores represent lower levels of absolute disadvantage for those in the bottom quintile, and lower average scores represent higher levels of absolute disadvantage. While the association is far from perfect, the figure shows a positive correlation between average bottom-quintile ICSES scores and the size of the earnings penalty, especially for men: countries with higher average bottom-quintile ICSES scores often have smaller earnings penalties associated with childhood disadvantage, and those with lower average bottom-quintile ICSES scores often have larger earnings penalties ($r=0.45$ for men, and $r=0.25$ for women). The inference is that, to some extent, countries with stronger levels of absolute disadvantage for children at the bottom end of the socio-economic ladder also often see these children fall further behind in the labour market once they reach adulthood.

Figure 6. The earnings penalties attached to childhood disadvantage are often larger in countries where absolute disadvantage is more severe

Mean bottom quintile scores on the Index of Childhood Socio-Economic Status, and estimated percentage difference in annual labour earnings between employed individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, by sex, 2018



Note: "Annual labour earnings" refers to the sum of employee cash (or near cash) income and cash benefits or losses from self-employment in the income reference year. Respondents reporting zero or negative earnings are excluded.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

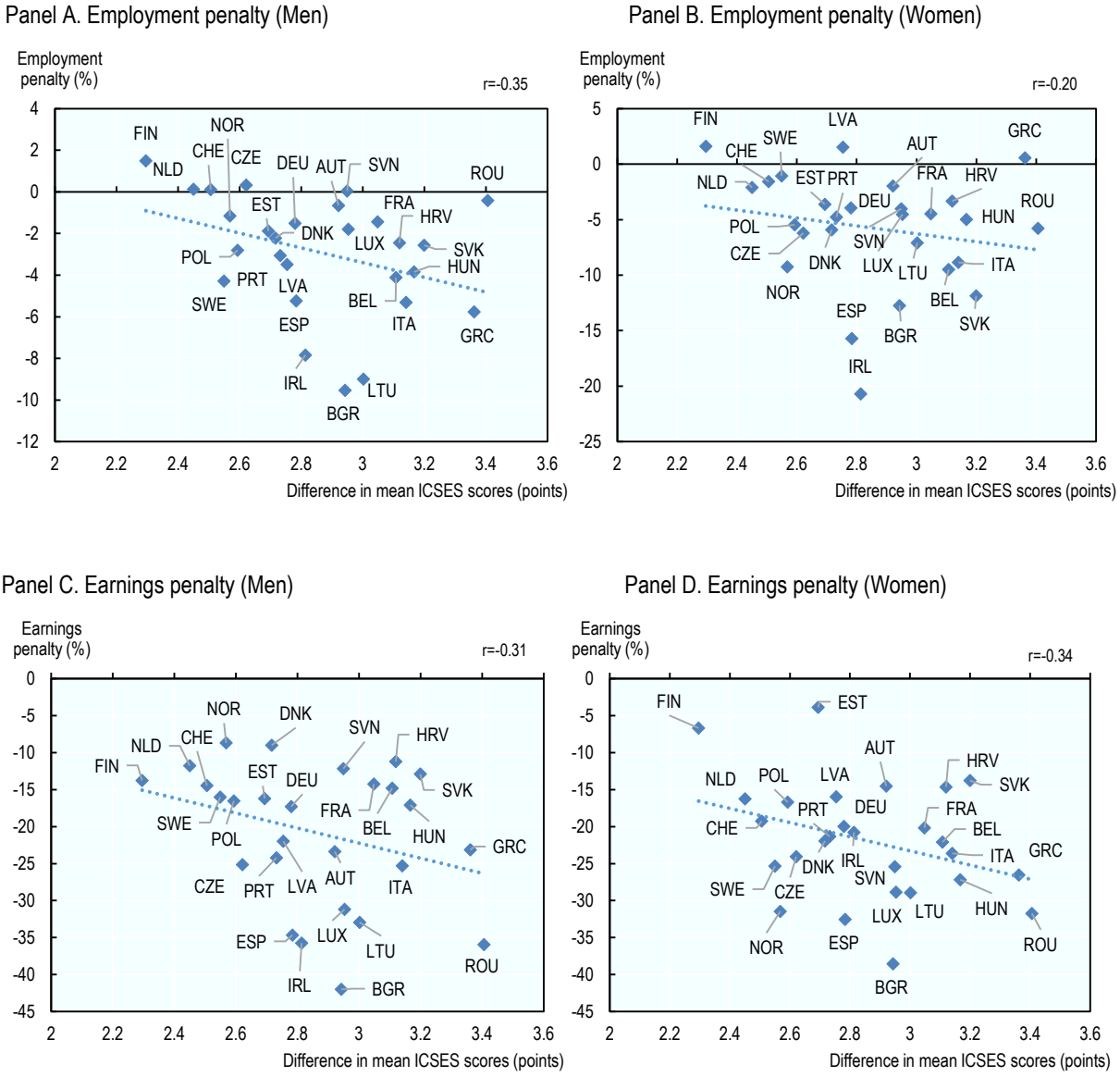
Inequality in childhood social and economic resources

It may not be just the absolute level of disadvantage experienced by the worst-off children that matters for later outcomes, but also the size of the gap – that is, the degree of inequality – in resources between disadvantaged children and their better-off peers.

Figure 7 plots our employment (Panels A and B) and earnings (Panels C and D) penalties against differences in average ICSES scores between respondents in the top and bottom ICSES quintiles within their country. Larger gaps represent larger within-country disparities in childhood social and economic resources (i.e. greater inequality), and smaller gaps smaller disparities (i.e. lower inequality). In both cases, the penalties associated with childhood disadvantage share a negative and moderate correlation with the size of the gap in average ICSES scores: for men and women respectively, r=-0.35 and r=-0.20 in the case of the employment penalty (Panels A and B), and r=-0.31 and r=-0.34 in the case of the earnings penalty (Panels C and D). In other words, at least to some extent, both the employment and the earnings penalties attached to relative childhood disadvantage tend to be larger in countries with larger inequalities in childhood social and economic resources.

Figure 7. Employment and earnings penalties associated with relative childhood disadvantage are often larger in countries where childhoods are more unequal

Differences between the first (bottom) and fifth (top) quintiles in mean scores on the Index of Childhood Socio-Economic Status, estimated percentage point difference in the probability of employment, and estimated percentage difference in annual labour earnings between employed individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, by sex, 2018



Note: “Employed" refers to respondents who report working (full-time or part-time) as either an employee or self-employed as their main activity status in at least one of the twelve months in the income reference period (2018). "Annual labour earnings" refers to the sum of employee cash (or near cash) income and cash benefits or losses from self-employment in the income reference year. Respondents reporting zero or negative earnings are excluded.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

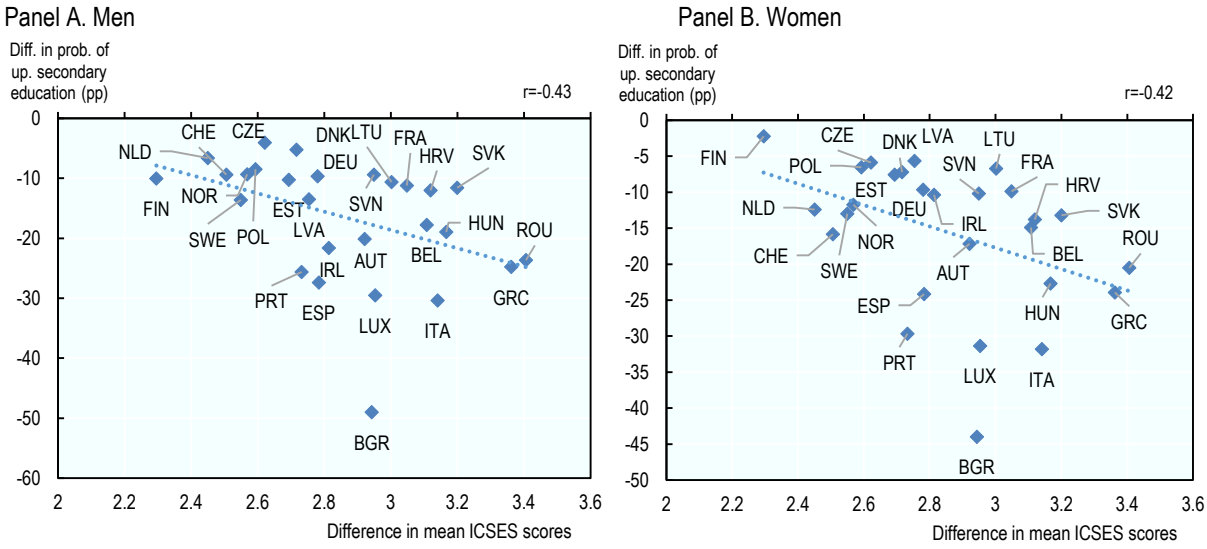
This result is consistent with past OECD work (OECD, 2008[88]; OECD, 2015[89]; OECD, 2018[11]), which has long stressed that economic inequality may limit opportunities for people growing up at the bottom end of the socio-economic ladder. Evidence summarised by the so-called “Great Gatsby Curve”, first developed

by Corak (2006[90]; 2013[91]) and later extended by the OECD, suggests that earnings mobility and the opportunity for individuals to move outside the earnings class in which they were born is often more limited in countries experiencing higher economic inequality. The correlations shown in Figure 7 cautiously point in a similar direction: that in countries where childhoods were more unequal, adults who experienced the most disadvantaged childhoods are at least to some extent less able to compete with, and fall further behind, their more advantaged counterparts in the labour market.

Why would greater inequality in childhood increase the size of the adult labour market penalties attached to disadvantage? One explanation is that when inequality is higher, disadvantaged families are less able to match the investments made by better-off families in their children's education and skill development, hampering disadvantaged children's ability to compete in education and, subsequently, the labour market (OECD, 2015[89]; Doepke and Zilibotti, 2019[92]). As shown in Section 2.1, education is an important mediator in the link between childhood disadvantage and later labour market outcomes, especially earnings. By limiting disadvantaged children's chances of competing in education, greater inequality may put constraints on what they able to achieve later in the labour market.

Figure 8. Disadvantage has a larger impact on the chances of attaining upper-secondary education in countries where larger inequalities in childhood social and economic resources

Differences between the first (bottom) and fifth (top) quintiles in mean scores on the Index of Childhood Socio-Economic Status, and estimated percentage point difference in the probability of having attained upper secondary education between individuals in the first (bottom) and third (middle) quintiles on the ICSES, by sex, 2018



Note: "Differences in probability of upper secondary education" refers to the average marginal effect of being in the first (bottom) quintile on the ICSES on the probability of attaining upper secondary education. "Upper secondary education" refers to a highest level of educational attainment at or above ISCED 2011 level 3 (upper secondary education or above).
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

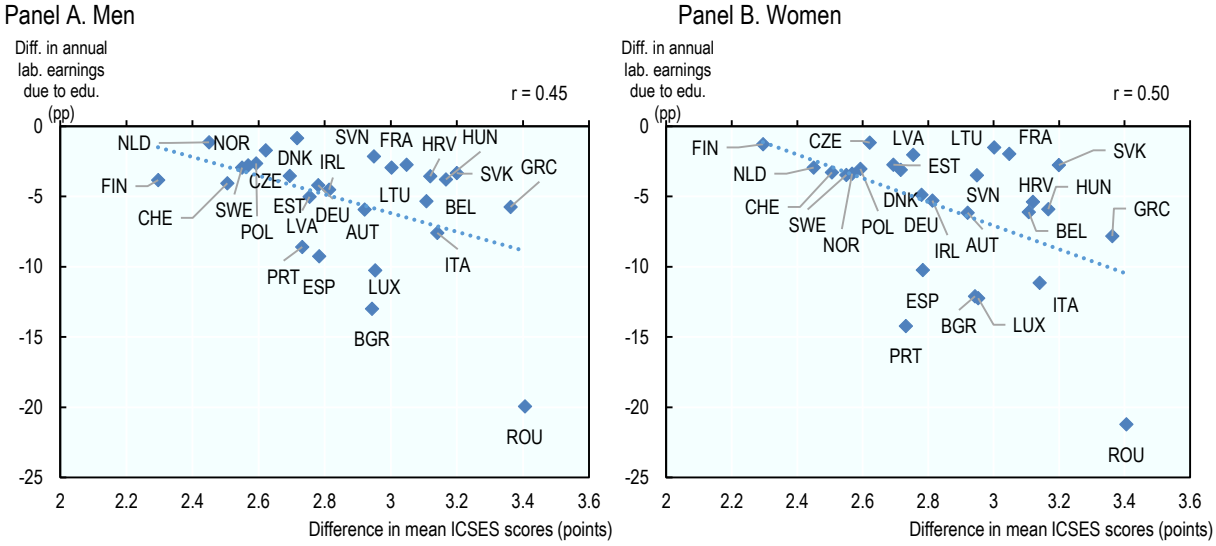
We find some support for this explanation. Figure 8 plots the gap in average ICSES scores between respondents in the top and bottom ICSES quintiles within their country (i.e. inequality in childhood resources) against the predicted impact of childhood disadvantage on the probability of attaining upper secondary education (i.e. the effect of disadvantage on education) from our first stage regressions (see Online Annex Tables A3.1-A3.2). In other words, it shows how the associations between disadvantage and educational attainment vary with levels of childhood inequality. Both panels show negative and at least moderate correlations between the size of the gap in ICSES scores and the impact of disadvantage on

upper secondary education (r=-0.43 for men and r=-0.42 for women), especially if Bulgaria is removed as an outlier (r=-0.51 and r=-0.47, respectively): the greater the level of inequality in childhood social and economic resources, the greater the impact of disadvantage on education.

To some extent, we can also go further and see how this inequality-education effect potentially impacts earnings by zooming in on the parts of our labour market penalties mediated by education. Figure 9 plots the same gap in average ICSES scores (i.e. inequality in childhood resources) against the education-mediated effect of childhood disadvantage on earnings; that is, against the part of the earnings penalty attached to disadvantage that can be explained by education.[19] This education-mediated association is moderated in part by how each country's labour market rewards education, so we would not expect associations here to match exactly those in Figure 8. Nonetheless, Figure 9 shows a moderate and negative correlation between the size of the gap in ICSES scores and the education-mediated effect of disadvantage on earnings (r=-0.45 for men and r=-0.50 for women) – the greater the level of childhood inequality, the greater the education-mediated effect of disadvantage on earnings – albeit in this case with the association driven in part by Romania as an outlier (r=-0.27 and r=-0.35, respectively, if Romania is removed). Together with Figure 8, we interpret this as providing cautious support for the argument that inequality, through education, might limit the opportunities of those growing up in social and economic disadvantage.

Figure 9. The education-mediated impact of childhood disadvantage on later earnings is larger in countries with larger inequalities in childhood social and economic resources

Differences between the first (bottom) and fifth (top) quintiles in mean scores on the Index of Childhood Socio-Economic Status, and the education-mediated percentage difference in annual labour earnings between employed individuals in the first (bottom) and third (middle) quintiles on the ICSES, by sex, 2018



Note: "Annual labour earnings" refers to the sum of employee cash (or near cash) income and cash benefits or losses from self-employment in the income reference year. Respondents reporting zero or negative earnings are excluded. "Education-mediated percentage difference in annual labour earnings" means the part of our estimated earnings penalty attached to disadvantage that can be explained by education (See Figure 3 and Online Annex Tables A3.1-A3.2).
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

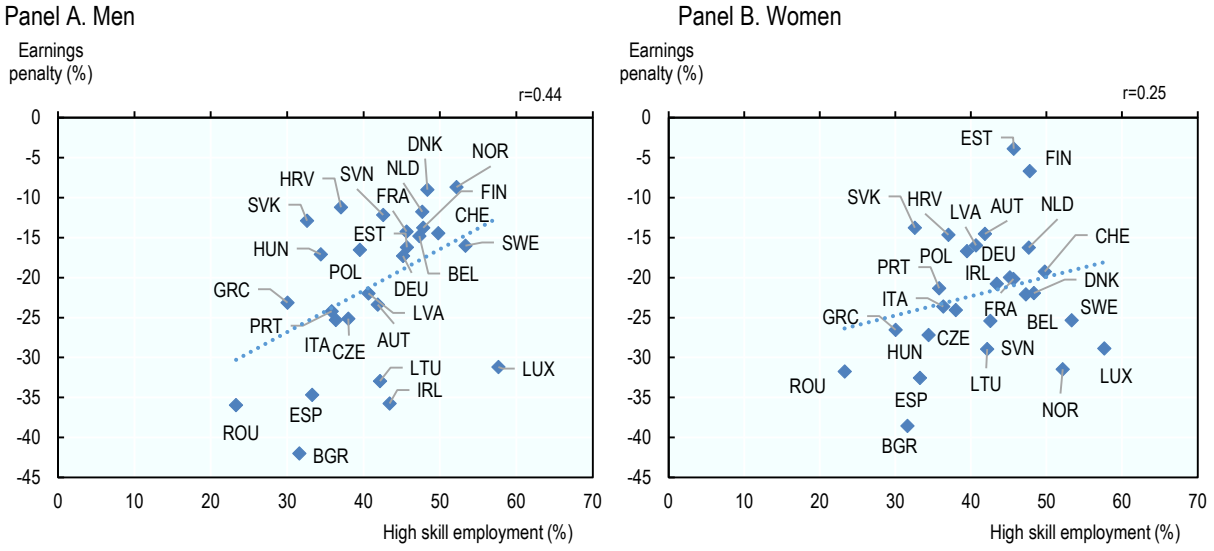
[19] These education-mediated effects are those represented by the light grey bars in Figure 3.

Labour market skills requirements

Childhood disadvantage has an impact on the skills that people can bring to the labour market, which is in large part mediated by the above-mentioned differences in educational attainment. The size of the employment and earnings penalty experienced by persons with disadvantaged childhoods is then likely to depend on the skills required to meet labour demand. *A priori*, we might expect the employment and earnings penalties associated with childhood disadvantage to be higher in labour markets dominated by high-skill jobs, on the grounds that relative disadvantage hampers children's opportunities to develop the skills needed to find work and build good careers in high-skill labour markets. In fact, if anything, the opposite appears to be true: especially for men, earnings penalties are often lower, not higher, in countries with larger shares of high-skill employment (r=0.44 for men, and r=0.25 for women) (Figure 10). The association between the employment penalty attached to disadvantage and high-skill employment (not shown) is similar if slightly weaker.

Figure 10. The earnings penalties associated with childhood disadvantage are often lower, not higher, in high-skill labour markets

High skill employment as a percentage of total employment, and estimated percentage difference in annual labour earnings between employed individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, and, by sex, 2018



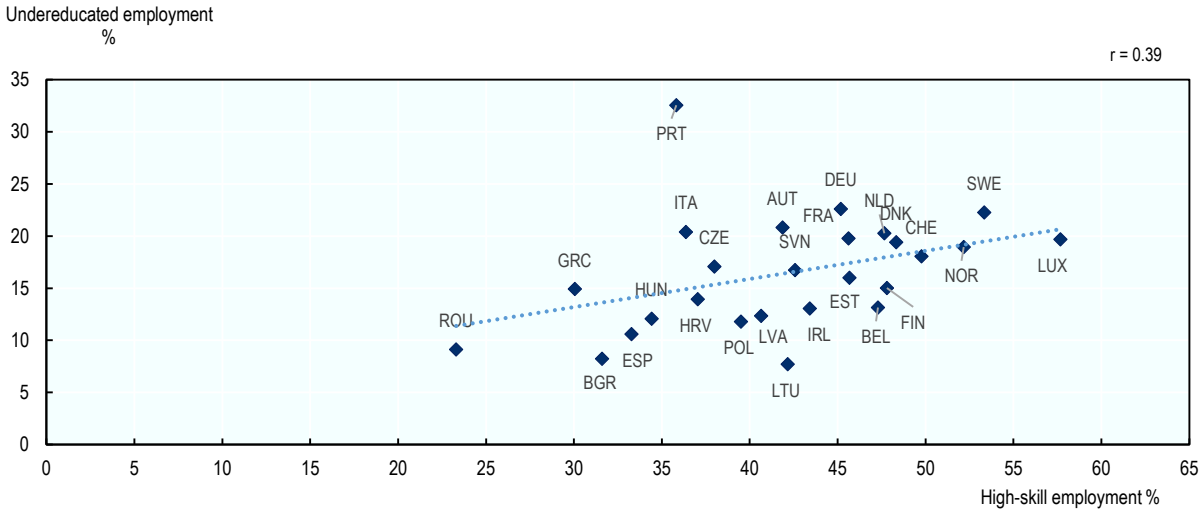
Note: "Annual labour earnings" refers to the sum of employee cash (or near cash) income and cash benefits or losses from self-employment in the income reference year. Respondents reporting zero or negative earnings are excluded. "High-skill employment" refers to employment in occupations categorised in ISCO skill levels 3 and 4.
Source: ILOSTAT, and OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

There are several potential explanations for this positive association. It could be coincidental: several of those countries with larger shares of high-skill employment (e.g. the Nordic countries) also have lower levels of income inequality, highlighted above as another factor potentially influencing the size of the labour market penalties attached to childhood disadvantage. Relatedly, these same countries also often have labour markets with more compressed pay structures (OECD, 2022[93]), meaning that the penalty for finding non-high-skill employment may not be as large as in some others. But it is also possible that countries with high-skill labour markets also often do better at helping individuals with lower formal qualifications move up the occupational skill ladder itself. As shown in Figure 11, countries with larger shares of high-skill employment also often have higher rates of "undereducated employment" (r=0.39, or r=0.62 if Portugal is

excluded as an outlier), that is, higher shares of workers in jobs with an expected level of education greater than their own. In these countries, despite the high skill requirements of many jobs, lower educational attainment does not act as a barrier to higher skill employment in quite the same way as in some other countries – something that might be particularly important for the careers of those who experienced childhood disadvantage, given its impact on education.

Figure 11. High-skill employment is correlated with opportunities for less educated workers to move up the occupational skill level

High-skill employment as a percentage of total employment, and undereducated employment as a percentage of total employment, 2018



Note: "High-skill employment" refers to employment in occupations categorised in ISCO skill levels 3 and 4. "Undereducated employment" refers to the employed in jobs with an expected level of education greater than their current highest level of educational attainment (normative approach).
Source: ILOSTAT, https://ilostat.ilo.org/.

Gender equality

It is notable that across the majority of the potential country-level factors highlighted so far, associations with women's labour market penalties have generally been weaker than those for men.

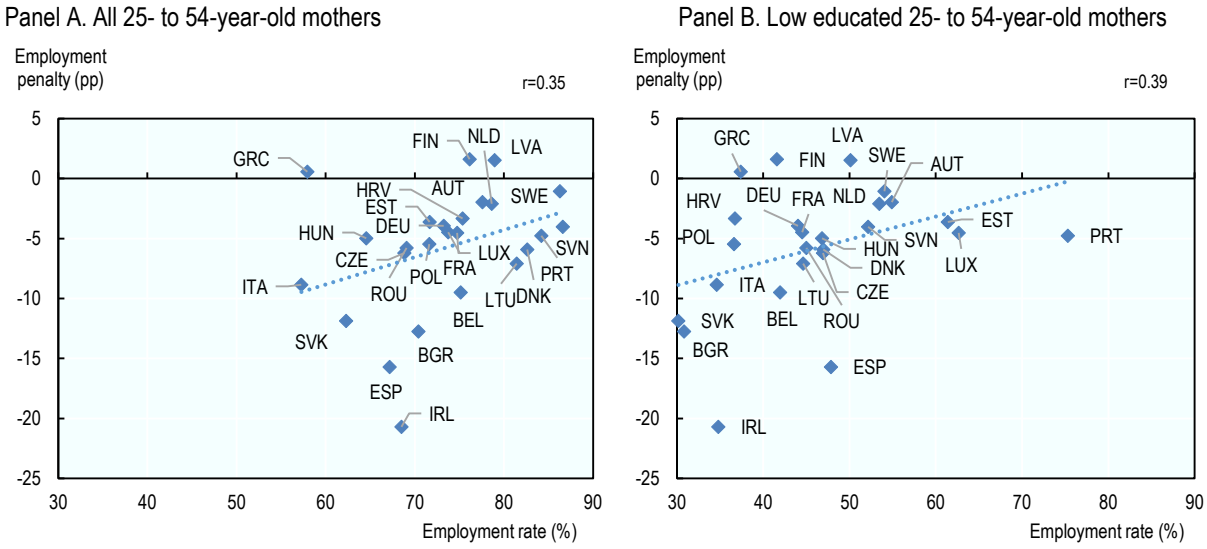
One potential reason is that in addition to the factors highlighted above, the labour market penalties for disadvantaged women may also be influenced by differences across and within countries in attitudes towards gender roles, and especially by the extent to which societies and labour markets encourage employment among lower-skilled women. Support for more egalitarian gender roles is often weaker at the lower end of the socio-economic ladder (Yu and Lee, 2013[94]; Salin, Ylikännö and Hakovirta, 2018[95]; Ferragina, 2019[96]; Hook et al., 2020[97]), and many labour markets struggle to provide (good) employment opportunities for lower skill women. As a result, in many countries, gender employment gaps are far larger among low educated men and women than among their more educated counterparts (OECD, 2017[70]). These gender-based inequalities may well complicate and compound associations between childhood disadvantage and later labour market outcomes for women.

The extent to which policies and labour markets are supportive of employment among mothers, and especially less-educated mothers, is likely to be particularly important. Mothers are less likely than childless women to be employed generally, but motherhood has a particularly large impact on employment for women with low levels of education (OECD, 2017[70]; Ferragina, 2019[96]). Child care fees, and the

disproportionate effect they have on work incentives for women with lower earnings potential in many countries, is one major reason for this (OECD, 2017[70]; OECD, 2020[98]). As shown by Figure 12, the employment penalty attached to childhood disadvantage for women is positively correlated with overall maternal employment rates (r=0.35), and especially with maternal employment rates for low educated women (r=0.39). The association here is likely to be at least slightly circular, especially in the latter case: women who have experienced childhood disadvantage are likely to make up a large share of less educated mothers themselves. Nonetheless, what the positive correlations shown in Figure 12 still suggest is that policies that are known to help (less educated) women and mothers into work (e.g. child care support, flexible working arrangements (OECD, 2017[70])) may also be useful for helping mitigate the effects of childhood disadvantage on women's labour market outcomes.

Figure 12. The employment penalty attached to childhood disadvantage for women is often lower in countries where more low educated mothers are in work

Maternal employment rates (25- to 54-year-olds) for all mothers and for low-educated mothers, and estimated percentage point difference in the probability of employment between individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, women, 2018



Note: "Employed" refers to respondents who report working (full-time or part-time) as either an employee or self-employed as their main activity status in at least one of the twelve months in the income reference period (2018). "Maternal employment" refers to employment among women (25- to 54-year-olds) with at least one child aged 0-14, with 'children' defined as any children aged 0-14 inclusive who live in the same household as the woman and who are reported as the child of the woman. Women with children who do not live in the same household are not included, nor are women with children aged 15 and over regardless of whether or not the child lives in the same household and/or is dependent on the mother. "Low educated" refers to a highest level of educational attainment at ISCED 2011 levels 0-2 (early-childhood education, primary or lower secondary education).
Source: OECD Family Database, oe.cd/fdb, and OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

Social expenditure

Public social policy can play a key role in combatting disadvantage and helping all individuals lead a fulfilling life. Social policies not only seek to redistribute resources towards those in need, but also to provide all individuals, regardless of circumstances, with the means and opportunities to flourish and thrive (OECD, 2005[99]; Castles et al., 2010[100]). This often means the provision of supplementary income (for example, in case of unemployment, disability, or retirement), but can also include the delivery of services

or in-kind benefits (for example, health insurance and child care services) that might be unaffordable for many or not otherwise well provided by the market (Förster and Verbist, 2012[101]). Most if not all of these social policies have the potential to help mitigate or offset at least part of the effects childhood social and economic disadvantage. All else equal, we might expect the labour market penalties experienced by those who grew up in relative disadvantage to be somewhat smaller in countries with better and more comprehensive social policies.

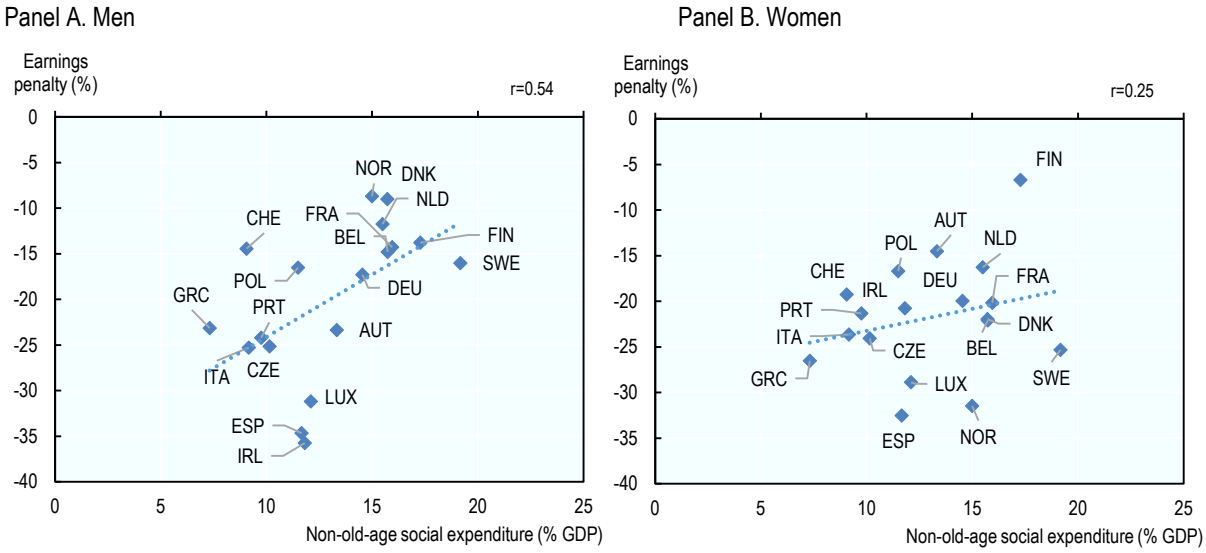
Exploring the role played by social policies in tackling or mitigating the adverse effects of childhood disadvantage observed in our dataset is not straightforward. Of primary interest are the policies in place when our target population (25- to 59-year-olds) was young, but cross-national data on the design and implementation of many of the most relevant policies (e.g. social assistance, child care support) are often not available stretching back that far. In this context, one valuable resource is the OECD Social Expenditure Database, which provides comparable information on public *spending* on social policies going back in some cases to the early 1980s, and for many of our sample countries to at least the early 1990s. While these spending data cannot by themselves provide information on policy design and use, they do offer valuable insight into the level of overall state effort and involvement in various social policy areas (Lohmann et al., 2009[102]).

In general, the labour market penalties attached to childhood disadvantage tend to be smaller in countries with higher historic social spending, particularly in the case of our earnings penalty, and especially for men. Figure 13 plots for a sub-sample of countries with available data our estimated earnings penalties against average public non-old-age social expenditure for the years 1990 to 2005. Spending levels are positively correlated with the size of the earnings penalty, and the association with men's earnings penalty is especially strong. Associations with the employment penalties (not shown), while slightly weaker, point in a similar direction. While again this is not evidence of causal relationship, it provides at least some indication that greater public spending on working-age benefits and services may help reduce the impact of early disadvantage on later labour market outcomes.

Public expenditure on families is of particularly interest. Although covering a diverse range of family-related benefits, programmes and services, spending in this area often aims to help families with the costs associated with raising children (Adema and Fron, 2019[103]) – something that is potentially particularly valuable for those growing up in relative disadvantage. As with overall social spending, historic public expenditure on families is positively correlated with the earnings penalty attached to childhood disadvantage, again especially for men (Figure 14): earnings penalties tend to be smaller in countries that have historically spent more supporting families, and larger in those that have historically spent less.

Figure 13. Earnings penalties associated with childhood disadvantage are smaller in countries that historically spent more on social policies

Average public non-old-age social expenditure, % GDP, 1990-2005, and estimated percentage difference in annual labour earnings between employed individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, 2018

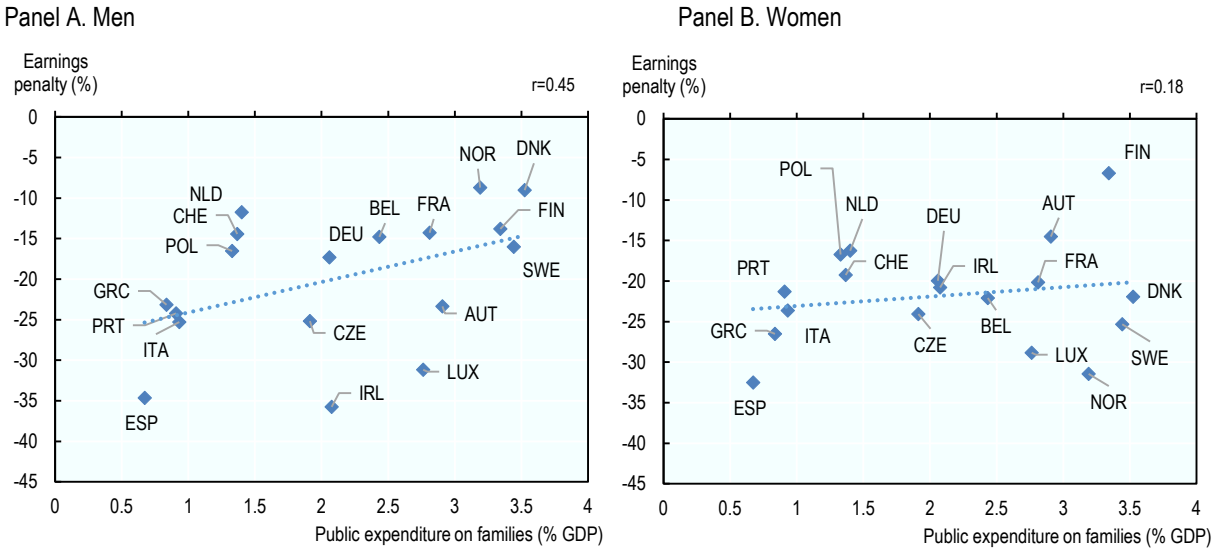


Note: "Public non-old-age social expenditure" refers to total public social expenditure less public social expenditure on "old age" (e.g. pensions) and survivors. Data shown only for countries with full social expenditure data for the years 1990-2005.
Source: OECD Social Expenditure Database, oe.cd/socx, and OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

Again, it is notable that the correlation for women is weaker than that for men (Figure 14). This is consistent with the strong selection of women into employment in countries where work-family supports and family spending is low. In these countries, women who were disadvantaged in childhood are much less likely to be in employment than others, but when they are, the earnings penalty attached to childhood disadvantage is not significantly higher than in other countries. By contrast, in countries such as Denmark, Norway, and Sweden, strong family supports and high family spending helps bring many women (including those who experienced disadvantage childhoods) into employment, with women who were disadvantaged in childhood bearing a quite significant earnings penalty (Mandel and Semyonov, 2006[104]; Kleven et al., 2019[105]).

Figure 14. At least for men, historic public family spending is correlated with smaller earnings penalties associated with childhood disadvantage

Average public expenditure on families, % GDP, 1990-2005, and estimated percentage difference in annual labour earnings between employed individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, 2018



Note: "Public social expenditure on families" refers to public social spending that is targeted at supporting families (i.e., excluding one-person households). Spending is often related to the costs associated with raising children or with the support of other dependants. Data shown only for countries with full social expenditure data for the years 1990-2005.

Source: OECD Social Expenditure Database, oe.cd/socx, and OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

3 Childhood disadvantage and adult health outcomes

3.1 Estimated health penalties associated with childhood disadvantage

Figure 15 summarises results from our models estimating associations between childhood disadvantage and adult health outcomes as measured by the Health and Activity Limitation Index (HALex). As with the earlier employment and earnings penalty estimates, it shows the *total* estimated percentage point difference on the HALex between individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, all other things being equal, with disaggregation into the "direct" and indirect associations. Full results are given in Online Annex Tables A3.1-A3.2. As a reminder, the HALex is an index running from zero to one that measures the percentage of the survey reference year lived in full health, with one denoting a year in full health without limitation, and zero a year of life lived in a health state viewed as equivalent to death.

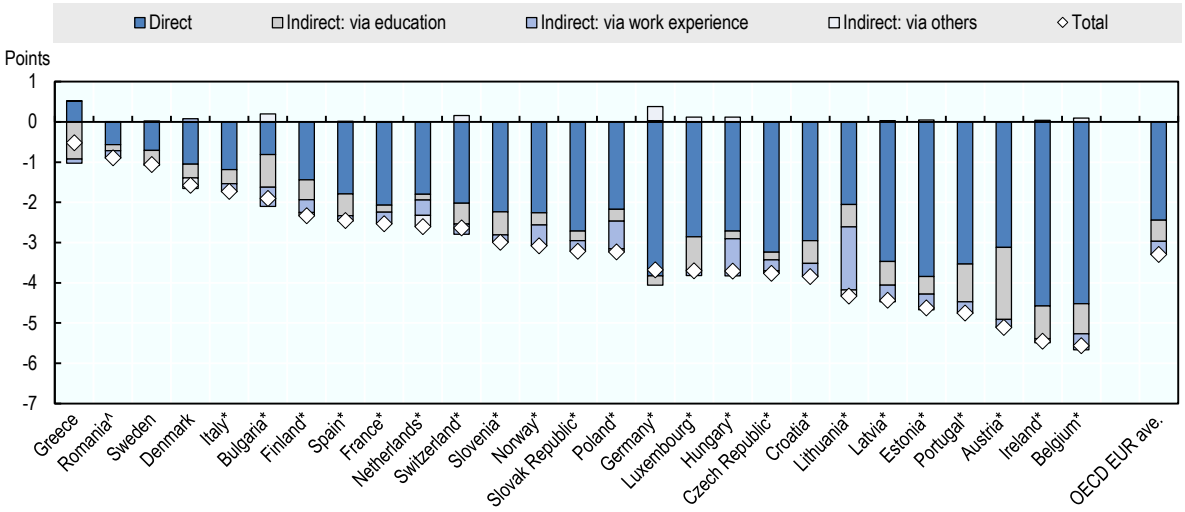
Consistent with much of the literature on childhood circumstances and later health outcomes (Case, Lubotsky and Paxson, 2002[106]; Case, Fertig and Paxson, 2005[107]; Flores and Kalwij, 2014[15]; Flores and Wolfe, 2020[108]; Arpino, Gumà and Julià, 2018[109]), the estimates in Figure 15 show important associations between childhood social and economic disadvantage and adult health in most countries. On average across the 24 covered OECD Member Countries, men and women in the first (bottom) quintile on the ICSES score, respectively, 3 and 4 percentage points lower on the Health and Activity Limitation Index than individuals in the third (middle) quintile on the ICSES. This is equivalent on average to about a two-week per year reduction in time lived in full health without limitation. For men, among the covered OECD countries, the largest estimated health penalties associated with childhood disadvantage are in Ireland (5.5 percentage points) and Belgium (5.6 points). For women, the largest health penalties are in Slovenia (6.3 percentage points) and Lithuania (6.4 points). The smallest points are typically found in Southern European countries (e.g. Italy and Greece) and Nordic countries (e.g. Finland and Sweden), plus also France for women.

In most (but not all) of the covered OECD countries, the health penalties associated with childhood social and economic disadvantage are larger for women than for men. This is consistent with existing studies showing that links between childhood socio-economic status and later health are often stronger for women (Flores and Kalwij, 2014[15]), as well as studies that find that low (current) socio-economic status has a particularly damaging effect on women's (self-reported) health (Roxo, Bambra and Perelman, 2021[110]). Gender gaps in health penalties are largest in Sweden (the health penalty is 2.8 points higher for women than men), Slovenia (3.3 points higher for women), and Denmark (3.6 points higher for women). This is perhaps surprising given that these countries are generally considered high performers in many areas of gender equality (especially so in the case of Denmark and Sweden), but is consistent with evidence elsewhere showing, on the one hand, that the influence of family background on child and adult outcomes remains large in countries like Denmark despite generous social policies (Heckman and Landersø, 2021[111]), and, on the other, that gender-based health inequalities persist in these countries despite greater societal gender equality more broadly (Roxo, Bambra and Perelman, 2021[110]).

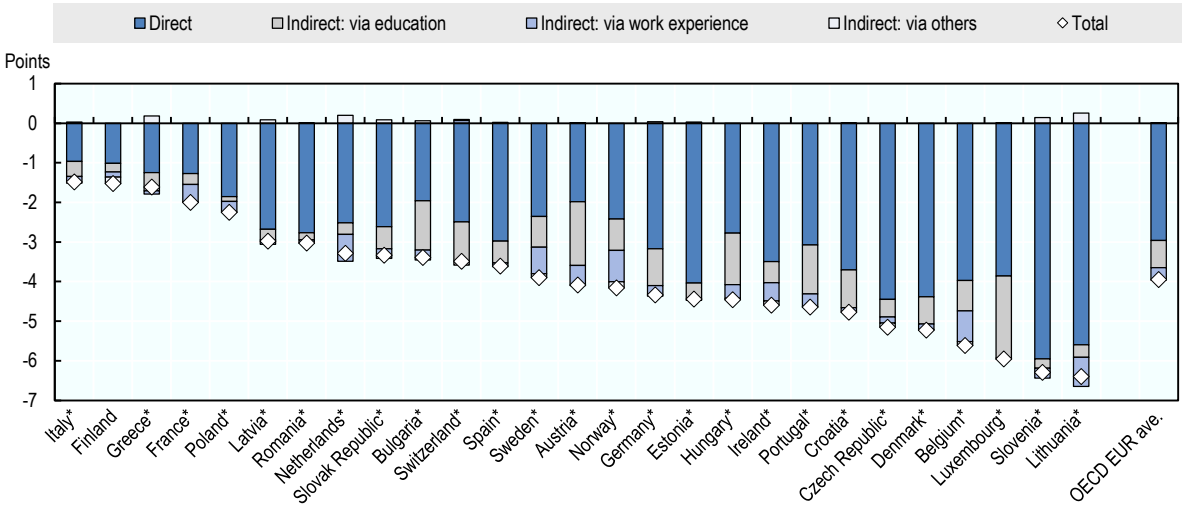
Figure 15. Childhood social and economic disadvantage is associated with poorer self-reported health and activity limitation outcomes

Estimated percentage point difference on the Health and Activity Limitation Index between individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status, by sex and country, with decomposition into direct and indirect associations, 2019

Panel A: Men



Panel B: Women



Note: Summary of estimates from country- and sex-specific two-stage GSEM mediation models with five-year age group fixed effects. Results for the Health and Activity Limitation Index are estimated using (weighted) linear regression. Estimates are multiplied by 100 to ease interpretation. In countries marked with an *, the total association is statistically significant at $p < 0.1$. Significance tests are performed at the mean average values of control variables. ^: No test available. The Health and Activity Limitation Index is a composite measure of health-related quality of life running from zero to one, with one denoting a year lived in full health without limitation and zero a year of life lived in a health state viewed as equivalent to death. "Indirect: via others" refers to the sum of the indirect associations via partner status and the presence of at least one child in the household. See Online Annex Tables A3.1-A3.2 for full results. "OECD EUR ave." refers to the unweighted average across the 24 covered European OECD countries. It excludes Bulgaria, Croatia and Romania.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

As with employment and earnings, part of the overall association between childhood social and economic disadvantage and adult health is indirect and runs through our mediators (Figure 15). Education plays the largest role: on average across the 24 covered OECD Member Countries, disadvantage-driven differences in education accounts for a 0.5 percentage point decrease in the HALex for men (about 16% of the overall association between childhood disadvantage and adult health), and a 0.7 percentage point decrease for women (about 17% of the overall association). Lifetime work experience also seems to have a mediating influence in some countries, possibly reflecting the links between employment, income, and health outcomes. However, most of the association between childhood social and economic disadvantage and adult health is not mediated by these factors: on average across the 24 covered OECD Member Countries, for both men and women, about three-quarters of the overall difference in scores on the HALex between individuals in the bottom and the middle quintile on the ICSES cannot be accounted for by our included mediators. Part of the explanation may be that socio-economic living conditions in childhood have a direct influence on child health, which, in addition to other factors that add up throughout the life course, is a significant predictor of adult (and old-age) health (Case, Lubotsky and Paxson, 2002[106]; Flores and Wolfe, 2020[108]; Pakpahan, Hoffmann and Kröger, 2016[39]).

3.2 The monetary value of health penalties associated with childhood disadvantage

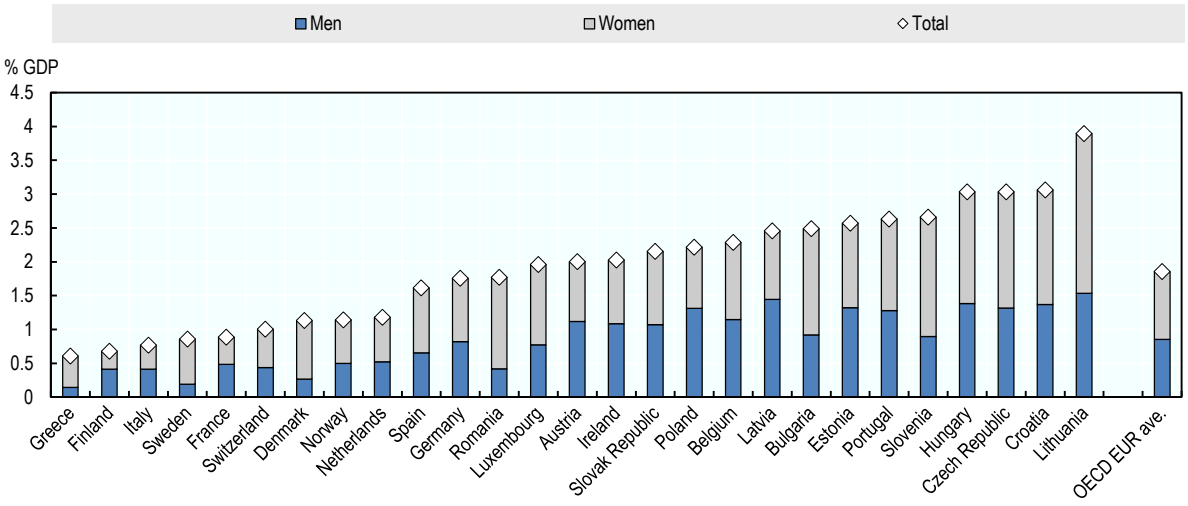
Figure 16 summarises the estimated monetised value of the health penalties associated with childhood social and economic disadvantage. As outlined in Section 1.2, these estimates are calculated by summing the estimated health penalty associated with childhood disadvantage across the population who experienced childhood disadvantage to arrive at an estimate for total "lost" quality-adjusted life years, and then assigning each of these quality-adjusted life years a country-specific monetary value based on Holzer et al.'s estimate of USD (2006) 200 000 for the annualised value of a statistical life year. Online Annex Table A4.1 shows these calculations step by step.

Expressed as a percentage of GDP, the estimated monetised value of the health penalties associated with childhood disadvantage differs considerably across countries (Figure 16). Our estimates for the value of lost health range from as low as 0.6% of GDP in Greece and 0.7% in Finland to 3.9% in Lithuania, with the average across the 24 covered OECD Member Countries standing at 1.9%. This average is slightly higher than Holzer et al.'s (2008[27]) estimate of the value of the lost quality-adjusted life years associated with child poverty in the United States more than ten years ago (1.1% of GDP).

Monetised health penalties are lowest in the Nordic (Denmark, Finland, Norway and Sweden) and some of the Southern European (e.g. Italy, Greece) OECD Members, plus France, Switzerland and the Netherlands, where estimated health penalties themselves are relatively low. The largest monetised penalties are found in the Baltic countries (Estonia, Latvia, and especially Lithuania), several Central and Eastern European OECD countries (e.g. the Czech Republic, Hungary, Slovenia), and also Portugal.

Figure 16. The monetised value of the health penalties associated with childhood disadvantage varies considerably across countries

Estimated annual monetary value of the health penalty for 25- to 59-year-olds who grew up in relative disadvantage based on the Index of Childhood Socio-Economic Status, % of GDP, by sex and country, 2018-19



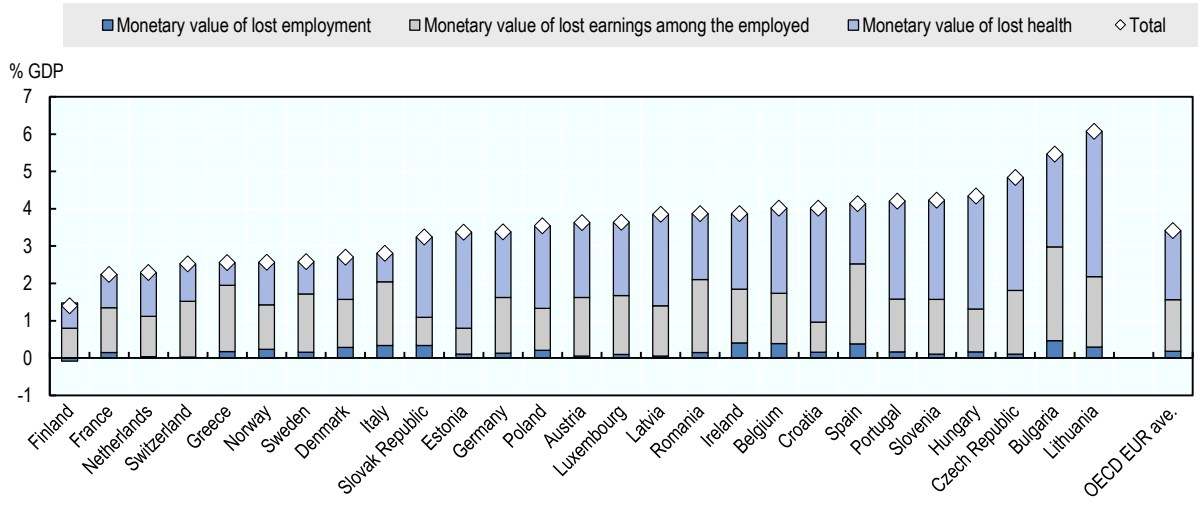
Note: "Health penalty" refers to the estimated percentage point difference on the Health and Activity Limitation Index between individuals in the first (bottom) and third (middle) quintiles on the Index of Childhood Socio-Economic Status. The health penalty is monetised by summing the estimated health penalty associated with childhood disadvantage across the population who experienced childhood disadvantage, and multiplying the resulting total lost quality-adjusted life years by an assigned country-specific value for the value of a statistical life year. See Section 1.2 for more details. "OECD EUR ave." refers to the unweighted average across the 24 covered European OECD countries. It excludes Bulgaria, Croatia and Romania.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

4 The total monetary value of the labour market and health penalties associated with childhood disadvantage

Figure 17 summarises the estimated total value of the labour market and health penalties associated with childhood social and economic disadvantage. As outlined in Section 1.2, these estimates are calculated by summing the monetised labour market and health penalties associated with childhood disadvantage. Online Annex Table A5.1 shows these calculations step by step.

Figure 17. On average across European OECD countries, historic childhood disadvantage costs the equivalent of 3.4% of GDP in lost employment, earnings and health

Estimated total monetary value of lost employment, earnings, and health for 25- to 59-year-olds who grew up in relative disadvantage based on the Index of Childhood Socio-Economic Status, % of GDP, by country, 2018-19



Note: "OECD EUR ave." refers to the unweighted average across the 24 covered European OECD countries. It excludes Bulgaria, Croatia and Romania.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019.

Considered together, the overall value of the labour market and health penalties associated with childhood disadvantage is often large (Figure 17). On average across the 24 covered European OECD Member

Countries, the overall value of lost employment, earnings, and health comes to the equivalent of 3.4% of GDP; in other words, through weaker health, reduced employment, and lower earnings, historic childhood disadvantage among 25- to 59-year-olds is costing European OECD countries the equivalent of 3.4% of GDP each and every year. In many countries, the bulk of this overall cost comes from the value of lost health (54%, on average). However, in some countries (e.g. Italy, Sweden and especially Greece), lost earnings makes up a sizable majority (over 60%) of the overall cost.

These overall costs do, however, vary substantially across countries (Figure 17). The overall cost of childhood disadvantage is lowest in Finland (1.4% of GDP), where the monetary values of the three components (lost employment, lost earnings, and lost health) are low across the board. The Netherlands and France also see relatively low overall costs (2.2-2.3% of GDP). Among the covered OECD countries, the costs of childhood disadvantage are largest in Hungary (4.3% of GDP), the Czech Republic (4.8%), and especially Lithuania (6.1%), in all cases due largely to the high costs of lost health in these countries (see Figure 16). Belgium, Portugal, Slovenia and Spain also see relatively high overall costs (equivalent to 4% or more of GDP), in the latter case due mostly to the strong association between childhood disadvantage and later employment and labour earnings (see Figure 5).

These economic costs underline the importance of tackling childhood social and economic disadvantage. Ensuring all children start life on an equal footing with full and equal opportunities is first and foremost a matter of equity and fairness. But as the numbers in Figure 17 show, there is also an economic case for investing in changing the odds for disadvantaged children. The potential gains from reducing current losses in economic output and welfare are substantial.

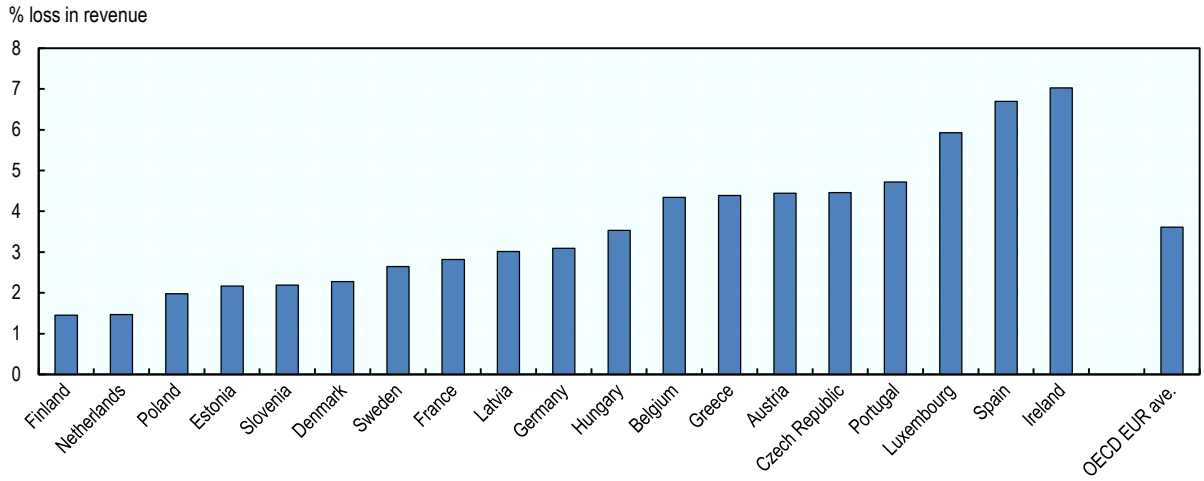
OECD countries are often already taking many initiatives in many policy areas to improve children’s lives, and the amounts involved are already large. For example, OECD countries spend on average slightly more than 3% of their GDP on children's education, and around 2.3% to support families with children. Not all of these expenditures are specifically targeted at disadvantaged children, and therefore cannot be viewed as seen as the resources put already on the table to tackle the costs associated with childhood disadvantage. However, the results in Figure 17 show that despite the many efforts already made, further steps could be taken to improve the situation of socio-economically disadvantaged children, and that these new steps could lead to economic gains, should these efforts lead to higher levels of adult human capital.

5 The public finance impact of childhood disadvantage

As an additional linked exercise, for a selected number of countries, Figure 18. and Figure 19. summarise the estimated public finance impact of childhood disadvantage through its associations with adult employment and earnings. They show, respectively, the estimated percentage loss in government revenue (i.e. income tax and social contribution revenue) from non-old age households, and the estimated percentage increase in non-pension benefit spending going to non-old age households, due to the employment and earnings penalties associated with childhood disadvantage. As outlined in Section 1.2, these estimates are produced using the EUROMOD microsimulation model and are based on a counterfactual whereby there are no employment and earnings penalties associated with childhood social and economic disadvantage (i.e. employment and earnings outcomes for individuals in the bottom (first) quintile on the ICSES are assumed to match those for individuals in the middle (third) quintile on the ICSES).

Figure 18. Reduced employment and weaker earnings among adults who grew up in disadvantage may result in losses of up to 7% in government tax revenues from working-age households

Estimated loss in government revenue attributable to childhood social and economic disadvantage through its impact on adult employment and earnings, as a percentage of total government revenue from non-old age households, 2019



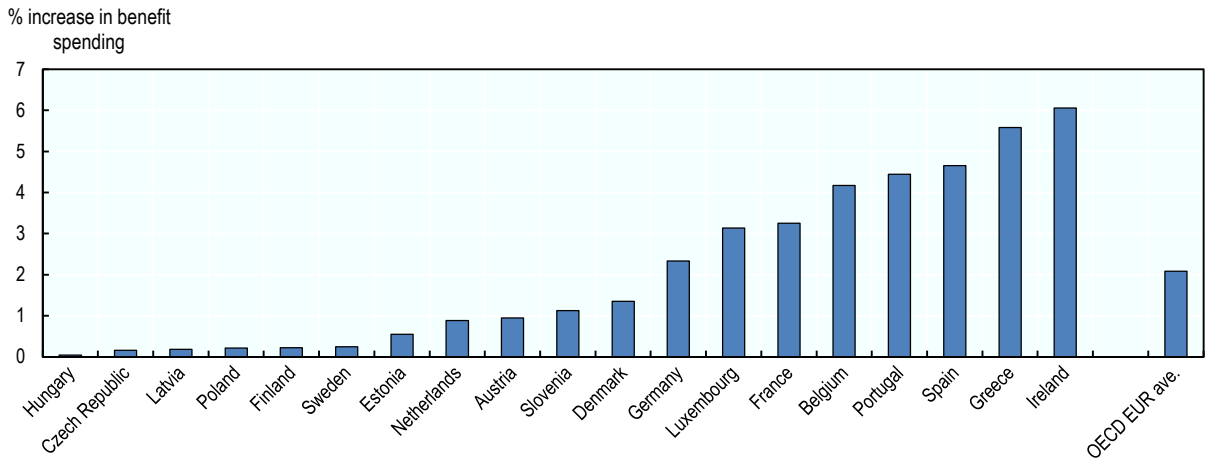
Note: “Non-old age households” refers to households with at least one member aged 25-59. No estimates available for Bulgaria, Croatia, Italy, Lithuania, Luxembourg, Norway, Romania, the Slovak Republic and Switzerland. "OECD EUR ave." refers to the unweighted average across the 19 European OECD countries with available data.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019 and EUROMOD static microsimulations.

The estimates in Figure 18. show that governments are potentially missing out on large revenues on account of the lost output associated with childhood disadvantage. On average across the 19 European OECD Countries with available data, we estimate that governments are losing 3.6% of total potential income tax and social contribution revenue from non-old-age households because of the impact of childhood disadvantage on employment and earnings. These losses vary widely across countries, however, largely in accordance with cross-country differences in our estimated labour market penalties. They are lowest in Finland and the Netherlands, where the estimated forgone revenue represents less than 1.5% of the total government revenue coming from non-old age households, and highest at around 7% in Ireland and Spain, where the labour market penalties associated with childhood disadvantage are large (see Figure 2 and Figure 3).

Lost revenue is only one side of the equation; public budgets may also be hit if the loss of employment and earnings associated with childhood disadvantage leads to increased social benefit receipt among those affected. Based on current (2019) policy rules, Figure 19. illustrates the potential increase in spending on non-pension benefits going to working-age household attributable to childhood disadvantage through its associations with later labour market outcomes. This cost is often small in comparison to the revenue losses shown in Figure 18. , representing less than 1% of total non-pension benefit spending going to working-age households in half of the covered countries. However, in Greece and in Ireland this increase comes to close to or above 6%. In Ireland, this is mainly due to the additional payment of unemployment benefit, while in Greece the cost is explained by a significant increase in social assistance and housing benefits.

Figure 19. Lower employment and earnings due to childhood disadvantage could lead to increases in public non-pension benefit spending of up to 6%

Estimated increase in non-pension benefit spending attributable to childhood social and economic disadvantage through its impact on adult employment and earnings, as a percentage of total non-pension benefits paid to non-old age households, 2019

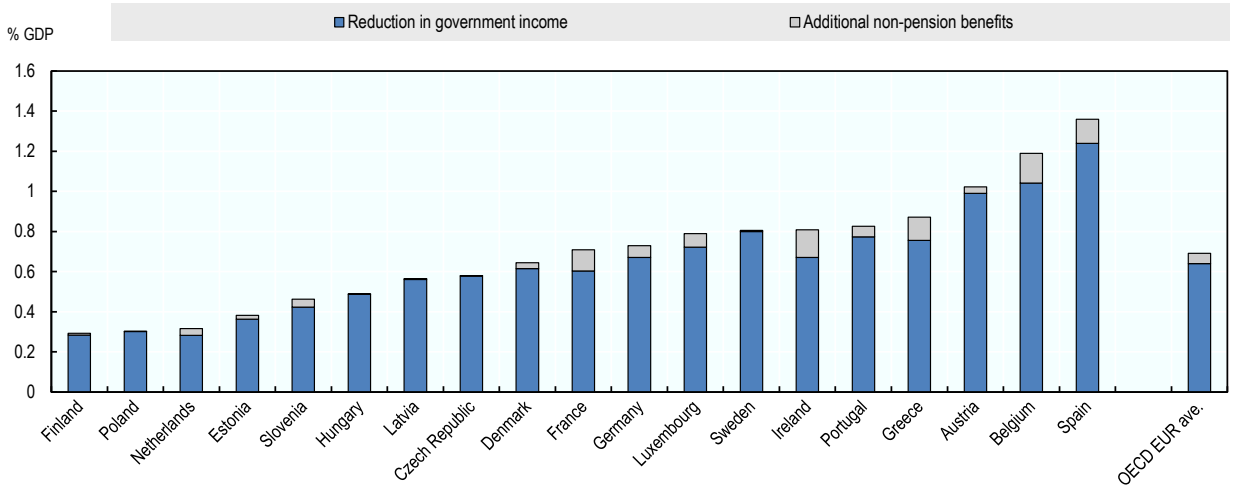


Note: “Non-pension benefits” include unemployment benefits, family and education benefits, social assistance and housing benefits, health and disability benefits as defined in (JRC, 2022[112]). “Non-old age households” refers to households with at least one member aged 25-59. No estimates available for Bulgaria, Croatia, Italy, Lithuania, Luxembourg, Norway, Romania, the Slovak Republic and Switzerland. "OECD EUR ave." refers to the unweighted average across the 19 European OECD countries with available data.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019 and EUROMOD static microsimulations.

Figure 20. converts these percentage losses into GDP-equivalent values. Again, these amounts vary considerably across the covered countries. We estimate that the total public finance cost of childhood disadvantage, through its impact on employment and earnings, varies from 0.3% of GDP (2019) in Finland to 1.4% in Spain, with the average across the covered countries 0.7% of GDP. These figures are largely consistent with the labour market penalties shown in Section 2.2 (see Figure 5): the countries with smaller monetised labour market penalties (Finland, Poland, Netherlands, Estonia) also face a smaller budgetary burden. They represent, on average across the 19 covered European OECD countries, about 44% of the overall monetised labour market penalties (1.6% of GDP) shown earlier in Figure 5.

Figure 20. On average across countries with available data, the total budgetary cost of childhood disadvantage is worth the equivalent of just under 0.7% of GDP

Estimated monetary value of lost government revenue and increased non-pension social benefit spending attributable to childhood social and economic disadvantage through its association with adult employment and earnings (% of GDP), non-old age households, 2019



Note: “Non-pension benefits” include unemployment benefits, family and education benefits, social assistance and housing benefits, health and disability benefits as defined in (JRC, 2022[112]). “Non-old age households” refers to households with at least one member aged 25-59. No estimates available for Bulgaria, Croatia, Italy, Lithuania, Luxembourg, Norway, Romania, the Slovak Republic and Switzerland. "OECD EUR ave." refers to the unweighted average across the 19 European OECD countries with available data.
Source: OECD calculations based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey 2019 and EUROMOD static microsimulations.

References

Adema, W. and P. Fron (2019), *The OECD SOCX Manual - 2019 Edition: A guide to the OECD Social Expenditure Database*, OECD Publishing, Paris. [103]

Alwin, D. and R. Hauser (1975), "The Decomposition of Effects in Path Analysis", *American Sociological Review*, Vol. 40/1, pp. 37–47, https://doi.org/10.2307/2094445. [115]

Arpino, B., J. Gumà and A. Julià (2018), "Early-life conditions and health at older ages: The mediating role of educational attainment, family and employment trajectories", *PLOS ONE*, Vol. 13/4, https://doi.org/10.1371/JOURNAL.PONE.0195320. [109]

Autor, D. et al. (2019), "Family Disadvantage and the Gender Gap in Behavioral and Educational Outcomes", *American Economic Journal: Applied Economics*, Vol. 11/3, pp. 338-381, https://doi.org/10.1257/app.20170571. [55]

Autor, D. and M. Wasserman (2013), *Wayward Sons: The Emerging Gender Gap in Labor Markets and Education*, Third Way. [54]

Avvisati, F. (2020), "The measure of socio-economic status in PISA: a review and some suggested improvements", *Large-Scale Assessments in Education*, Vol. 8/1, pp. 1-37, https://doi.org/10.1186/S40536-020-00086-X. [48]

Barber, J. (2000), "Intergenerational Influences on the Entry into Parenthood: Mothers' Preferences for Family and Nonfamily Behavior", *Social Forces*, Vol. 79/1, p. 319, https://doi.org/10.2307/2675573. [76]

Barlow, J. (ed.) (2014), "Family socio-economic status and young children's outcomes", *Journal of Children's Services*, Vol. 9/2, pp. 83-95, https://doi.org/10.1108/jcs-01-2014-0004. [9]

Bernardi, L. (2013), "From mothers to daughters: intergenerational transmission of fertility norms", *The Social Meaning of Children and Fertility Change in Europe*, pp. 165-181, https://doi.org/10.4324/9780203070635-15. [75]

Biausque, V. (2012), "The Value of Statistical Life: A Meta-Analysis", *Working Party on National Environmental Policies*, OECD, Paris. [83]

Billari, F., N. Hiekel and A. Liefbroer (2019), "The Social Stratification of Choice in the Transition to Adulthood", *European Sociological Review*, Vol. 35/5, pp. 599-615, https://doi.org/10.1093/ESR/JCZ025. [20]

Björklund, A. and K. Salvanes (2011), "Education and Family Background: Mechanisms and Policies", *Handbook of the Economics of Education*, Vol. 3, pp. 201-247, https://doi.org/10.1016/B978-0-444-53429-3.00003-X. [64]

Blanden, J., M. Doepke and J. Stuhler (2022), "Education Inequality", in Hanushek, E., S. Machin and L. Woessman (eds.), *Handbook of the Economics of Education*, North Holland. [6]

Blanden, J., K. Hansen and S. Machin (2010), "The Economic Cost of Growing Up Poor: Estimating the GDP Loss Associated with Child Poverty", Vol. 31/3, pp. 289-311. [26]

Blanden, J., K. Hansen and S. Machin (2008), *The GDP cost of the lost earning potential of adults who grew up in poverty*, Joseph Rowntree Foundation, https://www.jrf.org.uk/report/gdp-cost-lost-earning-potential-adults-who-grew-poverty (accessed on 10 June 2021). [25]

Boarini, R. et al. (2016), "Multi-dimensional Living Standards: A Welfare Measure Based on Preferences", *OECD Statistics Working Papers*, No. 2016/5, OECD Publishing, Paris, https://doi.org/10.1787/5jlpq7qvxc6f-en. [81]

Boerma, T. et al. (2016), "A global assessment of the gender gap in self-reported health with survey data from 59 countries", *BMC Public Health*, Vol. 16/1, pp. 1-9, https://doi.org/10.1186/S12889-016-3352-Y/FIGURES/2. [63]

Breen, R., K. Karlson and A. Holm (2013), "Total, Direct, and Indirect Effects in Logit and Probit Models", *Sociological Methods and Research*, Vol. 42/2, https://doi.org/10.1177/0049124113494572. [113]

Cameron, D., J. Ubels and F. Norström (2018), "On what basis are medical cost-effectiveness thresholds set? Clashing opinions and an absence of data: a systematic review", *Global Health Action*, Vol. 11/1, https://doi.org/10.1080/16549716.2018.1447828. [128]

Carneiro, P. et al. (2021), "Intergenerational mobility and the timing of parental income", *Journal of Political Economy*, Vol. 129/3, pp. 757-788, https://doi.org/10.1086/712443/SUPPL_FILE/2015685DATA.ZIP. [49]

Case, A., A. Fertig and C. Paxson (2005), "The lasting impact of childhood health and circumstance", *Journal of health economics*, Vol. 24/2, pp. 365-389, https://doi.org/10.1016/J.JHEALECO.2004.09.008. [107]

Case, A., D. Lubotsky and C. Paxson (2002), "Economic Status and Health in Childhood: The Origins of the Gradient", *American Economic Review*, Vol. 92/5, pp. 1308-1334, https://doi.org/10.1257/000282802762024520. [106]

Case, A. and C. Paxson (2005), "Sex differences in morbidity and mortality", *Demography*, Vol. 42/2, pp. 189-214, https://doi.org/10.1353/DEM.2005.0011. [61]

Castles, F. et al. (2010), *The Oxford Handbook of the Welfare State*, Oxford University Press, https://doi.org/10.1093/OXFORDHB/9780199579396.001.0001. [100]

Ciani, E. (2022), *Current Challenges to Social Mobility and Equality of Opportunity: Policy brief to accompany the launch of the Observatory on Social Mobility and Equal Opportunity*, OECD Publishing. [22]

Clarke, C. and O. Thévenon (2022), "Starting unequal: How's life for disadvantaged children?", *OECD Papers on Well-being and Inequalities*, No. 06, OECD Publishing, Paris, https://doi.org/10.1787/a0ec330c-en. [2]

Clark, H. et al. (2020), "The Lancet Commissions A future for the world's children? A WHO-UNICEF-Lancet Commission Executive summary", *The Lancet*, Vol. 395, pp. 605-658, https://doi.org/10.1016/S0140-6736(19)32540-1. [8]

Cooper, K. and K. Stewart (2013), *Does Money Affect Children's Outcomes? A Systematic Review*, Joseph Rownthree Foundation, https://www.jrf.org.uk/sites/default/files/jrf/migrated/files/money-children-outcomes-full.pdf (accessed on 9 April 2018). [3]

Corak, M. (2013), "Income Inequality, Equality of Opportunity, and Intergenerational Mobility", *Journal of Economic Perspectives*, Vol. 27/3, pp. 79-102, https://doi.org/10.1257/JEP.27.3.79. [91]

Corak, M. (2006), "Do Poor Children Become Poor Adults? Lessons for Public Policy from a Cross Country Comparison of Generational Earnings Mobility", *Research on Economic Inequality*, Vol. Vol. 13, Dynamics of Inequality. [90]

Cowan, C. et al. (2012), *Improving the measurement of socioeconomic status for the National Assessment of Educational Progress: A theoretical foundation*, National Center for Education Statistics. [47]

Crimmins, E., J. Kim and A. Solé-Auró (2011), "Gender differences in health: results from SHARE, ELSA and HRS", *The European Journal of Public Health*, Vol. 21/1, p. 81, https://doi.org/10.1093/EURPUB/CKQ022. [62]

Cunha, F. and J. Heckman (2008), "Formulating, Identifying and Estimating the Technology of Cognitive and Noncognitive Skill Formation", *Journal of Human Resources*, Vol. 43/4, pp. 738-782, https://doi.org/10.3368/JHR.43.4.738. [117]

Cunha, F. and J. Heckman (2007), "The Technology of Skill Formation", *American Economic Review*, Vol. 97/2, pp. 31-47, https://doi.org/10.1257/AER.97.2.31. [116]

Cunha, F., J. Heckman and S. Schennach (2010), "Estimating the Technology of Cognitive and Noncognitive Skill Formation", *Econometrica*, Vol. 78/3, pp. 883-931, https://doi.org/10.3982/ECTA6551. [118]

Currie, J. (2016), "The long-term consequences of children's health and circumstance", *Focus*, Vol. 3/1, pp. 11-16. [16]

Currie, J. et al. (2010), "Child Health and Young Adult Outcomes", *The Journal of Human Resources*, Vol. 45/3. [14]

Cutler, D. and E. Richardson (1998), "The Value of Health: 1970-1990", *The American Economic Review*, Vol. 88/2, pp. 97-100, https://www.jstor.org/stable/116900#metadata_info_tab_contents (accessed on 17 November 2022). [126]

Deloitte Access Economics (2019), *The Economic Cost of Violence Against Children and Young People*, Deloitte Access Economics, https://www2.deloitte.com/au/en/pages/economics/articles/economic-cost-violence-against-children-young-people.html (accessed on 28 September 2022). [35]

Devaux, M. and F. Sassi (2015), "The Labour Market Impacts of Obesity, Smoking, Alcohol Use and Related Chronic Diseases", *OECD Health Working Papers*, No. 86, OECD Publishing, Paris, https://doi.org/10.1787/5jrqcn5fpv0v-en. [78]

Dinisman, T. et al. (2017), "Family structure and family relationship from the child well-being perspective: Findings from comparative analysis", *Children and Youth Services Review*, Vol. 80, pp. 105-115, https://doi.org/10.1016/J.CHILDYOUTH.2017.06.064. [52]

Doepke, M. and F. Zilibotti (2019), *Love, money & parenting : how economics explains the way we raise our kids*, https://press.princeton.edu/titles/13326.html (accessed on 15 May 2019). [92]

Drager, J., T. Schneider and L. Washbrook (2022), *Cross-national differences in socioeconomic achievement inequality in early primary school: The role of parental education and income in six countries*. [46]

Duncan, G. (2019), *A roadmap to reducing child poverty*, National Academies Press, https://doi.org/10.17226/25246. [24]

Duncan, G. et al. (2022), "Investing in Early Childhood Development in Preschool and at Home", https://doi.org/10.3386/W29985. [30]

Duncan, G. and K. Magnuson (2013), "The Importance of Poverty Early in Childhood", *Policy Quaterly*, Vol. 9/2, pp. 12-17. [4]

Edo, A. (2019), "The impact of immigration on the labor market", *Journal of Economic Surveys*, Vol. 33/3, pp. 922-948, https://doi.org/10.1111/JOES.12300. [82]

Erickson, P. (1998), "Evaluation of a population-based measure of quality of life: the Health and Activity Limitation Index (HALex)", *Quality of Life Research*, Vol. 7/2, pp. 101-114, https://doi.org/10.1023/A:1008897107977. [57]

Erickson, P. (1995), "Years of healthy life", *Healthy People 2000 Stat Notes*, Vol. 7, pp. 1-15, https://doi.org/10.1037/e583992012-001. [56]

European Commission (2018), "Commission Regulation (EU) 2018/174 of 2 February 2018 implementing Regulation (EC) No 1177/2003 of the European Parliament and of the Council concerning Community statistics on income and living conditions (EU-SILC) as regards the list of target secondar", *Official Journal of the European Union*, Vol. L 32, pp. 35-47. [38]

Fang, X. et al. (2012), "The economic burden of child maltreatment in the United States and implications for prevention", *Child Abuse & Neglect*, Vol. 36/2, pp. 156-165, https://doi.org/10.1016/J.CHIABU.2011.10.006. [36]

Feinstein, L. et al. (2015), "Social class differences in early education", *Longitudinal and Life Course Studies*, Vol. 6/3, https://doi.org/10.14301/llcs.v6i3.361. [5]

Fernandez, R. et al. (2016), "Faces of Joblessness : Characterising Employment Barriers to Inform Policy", *OECD Social, Employment and Migration Working Papers*, No. 192, OECD Publishing, Paris, https://www.oecd-ilibrary.org/social-issues-migration-health/faces-of-joblessness_5jlwvz47xptj-en (accessed on 7 October 2022). [68]

Ferragina, E. (2019), "Does Family Policy Influence Women's Employment?: Reviewing the Evidence in the Field", *Political Studies Review*, Vol. 17/1, pp. 65-80, https://doi.org/10.1177/1478929917736438/ASSET/IMAGES/LARGE/10.1177_1478929917736438-FIG2.JPEG. [96]

Finkelstein, A., N. Hendren and E. Luttmer (2019), "The value of medicaid: Interpreting results from the oregon health insurance experiment", *Journal of Political Economy*, Vol. 127/6, pp. 2836-2874, https://doi.org/10.1086/702238/SUPPL_FILE/2015388DATA.ZIP. [84]

Fletcher, J. and K. Jajtner (2021), "Intergenerational health mobility: Magnitudes and Importance of Schools and Place", *Health Economics*, Vol. 30/7, pp. 1648-1667, https://doi.org/10.1002/HEC.4273. [60]

Flores, M., M. Fernández and Y. Pena-Boquete (2020), "The impact of health on wages: evidence from Europe before and during the Great Recession", *Oxford Economic Papers*, Vol. 72/2, pp. 319-346, https://doi.org/10.1093/OEP/GPZ033. [79]

Flores, M., P. García-Gómez and A. Kalwij (2020), "Early life circumstances and labor market outcomes over the life cycle", *The Journal of Economic Inequality 2020 18:4*, Vol. 18/4, pp. 449-468, https://doi.org/10.1007/S10888-020-09446-7. [51]

Flores, M. and A. Kalwij (2014), "The associations between early life circumstances and later life health and employment in Europe", *Empirical Economics*, Vol. 47/4, pp. 1251-1282, https://doi.org/10.1007/S00181-013-0785-3/TABLES/7. [15]

Flores, M. and B. Wolfe (2020), *The Influence of Early Life Health Conditions on Life Course Health*, National Bureau of Economic Research, Cambridge, MA, https://doi.org/10.3386/w27174. [108]

Förster, M. and G. Verbist (2012), "Money or Kindergarten? Distributive Effects of Cash Versus In-Kind Family Transfers for Young Children", *OECD Social, Employment and Migration Working Papers*, No. 135, OECD Publishing, Paris, https://doi.org/10.1787/5k92vxbgpmnt-en. [101]

García, J. et al. (2020), "Quantifying the life-cycle benefits of an influential early-childhood program", *Journal of Political Economy*, Vol. 128/7, pp. 2502-2541, https://doi.org/10.1086/705718. [127]

Golinkoff, R. et al. (2019), "Language Matters: Denying the Existence of the 30-Million-Word Gap Has Serious Consequences", *Child Development*, Vol. 90/3, pp. 985-992, https://doi.org/10.1111/CDEV.13128. [44]

Guio, A. et al. (2018), "Towards an EU measure of child deprivation", *Child Indicators Research*, Vol. 11/3, pp. 835-860, https://doi.org/10.1007/s12187-017-9491-6. [124]

Guzzo, K. and S. Hayford (2020), "Pathways to Parenthood in Social and Family Contexts: Decade in Review, 2020", *Journal of Marriage and Family*, Vol. 82/1, pp. 117-144, https://doi.org/10.1111/JOMF.12618. [77]

Halliday, T., B. Mazumder and A. Wong (2021), "Intergenerational mobility in self-reported health status in the US", *Journal of Public Economics*, Vol. 193, p. 104307, https://doi.org/10.1016/J.JPUBECO.2020.104307. [59]

Hammitt, J. and K. Haninger (2017), "Valuing nonfatal health risk as a function of illness severity and duration: Benefit transfer using QALYs", *Journal of Environmental Economics and Management*, Vol. 82, pp. 17-38, https://doi.org/10.1016/J.JEEM.2016.10.002. [125]

Heckman, J. and R. Landersø (2021), "Lessons from Denmark about Inequality and Social Mobility", http://www.nber.org/papers/w28543 (accessed on 16 November 2022). [111]

Hirsch, D. (2008), *Estimating the costs of child poverty*, Joseph Rowntree Foundation, York, UK, http://www.jrf.org.uk (accessed on 15 October 2022). [80]

Hobcraft, J. and K. Kiernan (2001), "Childhood poverty, early motherhood and adult social exclusion", *The British Journal of Sociology*, Vol. 52/3, pp. 495-517, https://doi.org/10.1080/00071310120071151. [72]

Holzer, H. et al. (2008), "The economic costs of childhood poverty in the United States", https://doi.org/10.1080/10796120701871280. [27]

Hook, J. et al. (2020), "Gendered Tradeoffs", *The Palgrave Handbook of Family Policy*, pp. 249-266, https://doi.org/10.1007/978-3-030-54618-2_11. [97]

Jackson, M. (2015), "Cumulative Inequality in Child Health and Academic Achievement", *Journal of Health and Social Behavior*, Vol. 56/2, pp. 262-80, https://doi.org/10.1177/0022146515581857. [18]

Johnson, R. and R. Schoeni (2011), "The Influence of Early-Life Events on Human Capital, Health Status, and Labor Market Outcomes Over the Life Course", *The B.E. journal of economic analysis & policy*, Vol. 11/3, https://doi.org/10.2202/1935-1682.2521. [58]

JRC, E. (2022), *EUROMOD I4.0+ model documentation*, https://euromod-web.jrc.ec.europa.eu/resources/model-documentation. [112]

Kalil, A. (2015), "Inequality Begins at Home: The Role of Parenting in the Diverging Destinies of Rich and Poor Children", in Amato, P. et al. (eds.), *National symposium on family issues. Families in an era of increasing inequality: Diverging destinies*, https://doi.org/10.1007/978-3-319-08308-7_5. [42]

Kalil, A. and R. Ryan (2020), "Parenting practices and socioeconomic gaps in childhood outcomes", *Future of Children*, Vol. 30/1, pp. 29-54, https://doi.org/10.1353/FOC.2020.0004. [43]

Kautz, T. et al. (2014), "Fostering and Measuring Skills: Improving Cognitive and Non-cognitive Skills to Promote Lifetime Success", *OECD Education Working Papers*, No. 110, OECD Publishing, Paris, https://doi.org/10.1787/5jxsr7vr78f7-en. [86]

Kleven, H. et al. (2019), "Child Penalties across Countries: Evidence and Explanations", *AEA Papers and Proceedings*, Vol. 109, pp. 122-126, https://doi.org/10.1257/pandp.20191078. [105]

Kolenikov, S. and G. Angeles (2009), "Socioeconomic Status Measurement with Discrete Proxy Variables: Is Principal Components Analysis a Reliable Answer?", *Review of Income and Wealth*, Vol. 55/1, pp. 128-165, https://doi.org/10.1111/J.1475-4991.2008.00309.X. [50]

Lesner, R. (2018), "The long-term effect of childhood poverty", *J Popul Econ*, Vol. 31, pp. 969-1004, https://doi.org/10.1007/s00148-017-0674-8. [21]

Lohmann, H. et al. (2009), "Towards a Framework for Assessing Family Policies in the EU", *OECD Social, Employment and Migration Working Papers*, No. 88, OECD Publishing, Paris, https://doi.org/10.1787/223883627348. [102]

Mandel, H. and M. Semyonov (2006), "A Welfare State Paradox: State Interventions and Women's Employment Opportunities in 22 Countries", *American Journal of Sociology*, Vol. 111/6, pp. 1910-1949, https://doi.org/10.1086/499912. [104]

Masarik, A. and R. Conger (2017), "Stress and child development: a review of the Family Stress Model", *Current Opinion in Psychology*, Vol. 13, pp. 85-90, https://doi.org/10.1016/J.COPSYC.2016.05.008. [53]

Masten, A. et al. (2010), "The significance of childhood competence and problems for adult success in work: A developmental cascade analysis", *Development and Psychopathology*, Vol. 22/3, pp. 679-694, https://doi.org/10.1017/S0954579410000362. [12]

Masten, A. et al. (2005), "Developmental cascades: Linking academic achievement and externalizing and internalizing symptoms over 20 years", *Developmental Psychology*, Vol. 41/5, pp. 733-746, https://doi.org/10.1037/0012-1649.41.5.733. [13]

McCarthy, M. et al. (2016), "The lifetime economic and social costs of child maltreatment in Australia", *Children and Youth Services Review*, Vol. 71, pp. 217-226, https://doi.org/10.1016/j.childyouth.2016.11.014. [34]

McLaughlin, M. and M. Rank (2018), "Estimating the Economic Cost of Childhood Poverty in the United States", *Social Work Research*, Vol. 42/2, pp. 73-83, https://doi.org/10.1093/swr/svy007. [23]

Murphy, M. (2013), "Cross-National Patterns of Intergenerational Continuities in Childbearing in Developed Countries", *Biodemography and Social Biology*, Vol. 59/2, p. 101, https://doi.org/10.1080/19485565.2013.833779. [74]

NASEM (2019), *A Roadmap to Reducing Child Poverty*, National Academies Press, https://doi.org/10.17226/25246. [41]

OECD (2022), *Education at a Glance 2022: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/19991487. [33]

OECD (2022), *OECD Employment Database*, http://www.oecd.org/employment/emp/onlineoecdemploymentdatabase.htm (accessed on 16 October 2022). [93]

OECD (2022), *OECD Family Database*, http://www.oecd.org/els/family/database.htm (accessed on 7 October 2022). [71]

OECD (2022), *OECD Social Expenditure Database (SOCX)*, http://www.oecd.org/social/expenditure.htm (accessed on 20 November 2022). [32]

OECD (2021), *Education at a Glance 2021: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/b35a14e5-en. [123]

OECD (2021), *Health at a Glance 2021: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/ae3016b9-en. [66]

OECD (2021), *Measuring What Matters for Child Well-being and Policies*, OECD Publishing, Paris, https://doi.org/10.1787/e82fded1-en. [1]

OECD (2021), *Pay Transparency Tools to Close the Gender Wage Gap*, Gender Equality at Work, OECD Publishing, Paris, https://doi.org/10.1787/eba5b91d-en. [87]

OECD (2020), "Is Childcare Affordable?", *Policy Brief on Employment, Labour and Social Affairs*, OECD, Paris, http://oe.cd/childcare-brief-2020 (accessed on 11 July 2020). [98]

OECD (2019), *Changing the Odds for Vulnerable Children: Building Opportunities and Resilience*, OECD Publishing, Paris, https://doi.org/10.1787/a2e8796c-en. [28]

OECD (2019), *PISA 2018 Results (Volume II): Where All Students Can Succeed*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/b5fd1b8f-en. [65]

OECD (2018), *A Broken Social Elevator? How to Promote Social Mobility*, OECD Publishing, Paris, https://doi.org/10.1787/9789264301085-en. [11]

OECD (2017), *Educational Opportunity for All: Overcoming Inequality throughout the Life Course*, Educational Research and Innovation, OECD Publishing, Paris, https://doi.org/10.1787/9789264287457-en. [29]

OECD (2017), *Preventing Ageing Unequally*, OECD Publishing, Paris, https://doi.org/10.1787/9789264279087-en. [31]

OECD (2017), *The Pursuit of Gender Equality: An Uphill Battle*, OECD Publishing, Paris, https://doi.org/10.1787/9789264281318-en. [70]

OECD (2016), *Society at a Glance 2016: OECD Social Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/9789264261488-en. [69]

OECD (2015), *In It Together: Why Less Inequality Benefits All*, OECD Publishing, Paris, https://doi.org/10.1787/9789264235120-en. [89]

OECD (2014), *OECD Employment Outlook 2014*, OECD Publishing, Paris, https://doi.org/10.1787/empl_outlook-2014-en. [67]

OECD (2009), *Doing Better for Children*, OECD Publishing, Paris, https://doi.org/10.1787/9789264059344-en. [119]

OECD (2008), *Growing Unequal?: Income Distribution and Poverty in OECD Countries*, OECD Publishing, Paris, https://doi.org/10.1787/9789264044197-en. [88]

OECD (2005), *Extending Opportunities: How Active Social Policy Can Benefit Us All*, OECD Publishing, Paris, https://doi.org/10.1787/9789264007956-en. [99]

Otis, D. (1966), "Path Analysis: Sociological Examples", *American Journal of Sociology*, Vol. 72/1, pp. 1–16, https://www.jstor.org/stable/2775755. [114]

Pakpahan, E., R. Hoffmann and H. Kröger (2016), "The long arm of childhood circumstances on health in old age: Evidence from SHARELIFE", *Advances in Life Course Research*, Vol. 1-10, p. 31. [39]

Patton, G. et al. (2016), "Our future: a Lancet commission on adolescent health and wellbeing The Lancet Commissions Executive summary", *The Lancet*, Vol. 387, pp. 2423-2478, https://doi.org/10.1016/S0140-6736(16)00579-1. [7]

Peterson, C., C. Florence and J. Klevens (2018), "The economic burden of child maltreatment in the United States, 2015", *Child abuse & neglect*, Vol. 86, p. 178, https://doi.org/10.1016/J.CHIABU.2018.09.018. [37]

Poulton, R. et al. (2002), "Association between children's experience of socioeconomic disadvantage and adult health: A life-course study", *Lancet*, Vol. 360/9346, pp. 1640-1645, https://doi.org/10.1016/S0140-6736(02)11602-3. [17]

Roxo, L., C. Bambra and J. Perelman (2021), "Gender Equality and Gender Inequalities in Self-Reported Health: A Longitudinal Study of 27 European Countries 2004 to 2016", *International Journal of Health Services*, Vol. 51/2, p. 146, https://doi.org/10.1177/0020731420960344. [110]

Salin, M., M. Ylikännö and M. Hakovirta (2018), "How to Divide Paid Work and Unpaid Care between Parents? Comparison of Attitudes in 22 Western Countries", *Social Sciences*, Vol. 7/10, p. 188, https://doi.org/10.3390/SOCSCI7100188. [95]

Schoon, I. (2019), "The well-being of children in the face of socio-economic deprivation and family instability", *Revue des politiques sociales et familiales*, Vol. 131/1, pp. 189-202, https://doi.org/10.3406/CAF.2019.3359. [40]

UNESCO (2022), *Global Partnership Strategy for Early Childhood: 2021-2030*, UNESCO, Paris. [122]

UNICEF (2017), *Early Moments Matter for Every Child*, UNICEF, New York, NY. [120]

Vauhkonen, T. et al. (2017), "Intergenerational accumulation of social disadvantages across generations in young adulthood", *Research in Social Stratification and Mobility*, Vol. 48, pp. 42-52, https://doi.org/10.1016/J.RSSM.2017.02.001. [19]

Vera-Toscano, E. and R. Wilkins (2020), *Does poverty in childhood beget poverty in adulthood in Australia?*, Melbourne Institute: Applied Economic & Social Research, University of Melbourne, https://melbourneinstitute.unimelb.edu.au/research/reports/ (accessed on 20 November 2022). [10]

Viscusi, W. and C. Masterman (2017), "Income Elasticities and Global Values of a Statistical Life", *J. Benefit Cost Anal*, Vol. 8/2, pp. 226-250, https://doi.org/10.1017/bca.2017.12. [85]

Volodina, A. et al. (2022), "Explaining gaps by parental education in children's early language and social outcomes at age 3–4 years: evidence from harmonised data from three countries", *Current Psychology*, Vol. 1, pp. 1-20, https://doi.org/10.1007/S12144-022-03754-Z/TABLES/2. [45]

WHO (2020), *Improving early childhood development: WHO guideline*, World Health Organization, Geneva, https://www.who.int/publications/i/item/97892400020986 (accessed on 13 November 2022). [121]

Wodtke, G. (2013), "Duration and Timing of Exposure to Neighborhood Poverty and the Risk of Adolescent Parenthood", *Demography*, Vol. 50/5, pp. 1765-1788, https://doi.org/10.1007/S13524-013-0219-Z. [73]

Yu, W. and P. Lee (2013), "Decomposing Gender Beliefs: Cross-National Differences in Attitudes Toward Maternal Employment and Gender Equality at Home", *Sociological Inquiry*, Vol. 83/4, pp. 591-621, https://doi.org/10.1111/SOIN.12013. [94]

Annex A. Online annex tables

The online annex tables are freely available to download (in Excel format) from the OECD website:

https://www.oecd.org/wise/OECD-Cost-Childhood-Socio-Economic-Disadvantage-Online-Annex-Tables.xlsx

Annex B. Additional technical details

Calculating the penalties associated with childhood disadvantage

List of variables

1st stage dependent variables:

- qicsesk: quantile indicator k for the Index of Childhood Socio-Economic Status (ICSES) (1 = most disadvantaged)
- famtype: childhood family type (1 if two parents ; 0 = otherwise)
- age_k: current age group (years) of individual ($k \epsilon \{[30;34];[35;39];[40;44];[45;49];[50;54];[55;59];[60;64]\}$ the $[25;29]$ age group is the reference)

Mediator variables:

- edubin: current education attainment (1= at least upper secondary; 0 = otherwise)
- work_share: ratio of actual to maximum possible years worked (1 if ratio above 0.6; 0 otherwise)
- partner: current partnership status (1 = currently lives with a partner in the same household; 0 otherwise)
- hhchild: presence of a child in the household (1 = individual currently lives with a child in the same household; 0 otherwise)

Outcome variables:

- empirp: employee or self-employed for at least one month during the income reference year (binary)
- earn: annual labour earnings during income reference year, if employed at all (continuous)
- halex: health and activity limitation index (continuous, between 0 and 1)

First stage regressions of the GSEM model

For each mediator variable in $\{\text{edubin}; \text{work share}; \text{partner}; \text{hhchild}\}$, the corresponding first stage regression can be written as:

$$\mathrm{P}[\text{mediator}_i = 1] = \frac{1}{1 + e^{-\beta_{\text{qicses1}} \cdot \text{qicses1}_i - \beta_{\text{qicses2}} \cdot \text{qicses2}_i - \beta_{\text{qicses4}} \cdot \text{qicses4}_i - \beta_{\text{qicses5}} \cdot \text{qicses5}_i - \beta_{\text{famtype}} \cdot \text{famtype}_i - \sum_k \beta_{\text{age k}} \cdot \text{age k}}}$$

Second stage regressions of the GSEM model

The three outcomes of interest are predicted as:

$$\mathrm{P}[\mathrm{empirp}_i = 1] = \mathrm{logistic}\left(\beta_{\mathrm{qicses1\ em}} \cdot \mathrm{qicses1}_i + \sum_{k=2;\, k\neq 3}^{5} \beta_{\mathrm{qicsesk\ em}} \cdot \mathrm{qicsesk}_i + \beta_{\mathrm{edubin\ em}} \cdot \mathrm{edubin}_i + \beta_{\mathrm{work\ share\ em}} \cdot \mathrm{work\ share}_i + \beta_{\mathrm{partner\ em}} \cdot \mathrm{partner}_i + \beta_{\mathrm{hhchild\ em}} \cdot \mathrm{hhchild}_i + \beta_{\mathrm{halex\ em}} \cdot \mathrm{halex}_i + \beta_{\mathrm{famtype\ em}} \cdot \mathrm{famtype}_i + \sum_{k} \beta_{\mathrm{age\ k\ em}} \cdot \mathrm{age\ k}\right)$$

$$\text{With } \mathrm{logistic}(x) = \frac{1}{1+e^{-x}}$$

$$\ln(\mathrm{earn}_i) = \beta_{\mathrm{qicses1\ ea}} \cdot \mathrm{qicses1}_i + \sum_{k=2;\, k\neq 3}^{5} \beta_{\mathrm{qicsesk\ ea}} \cdot \mathrm{qicsesk}_i + \beta_{\mathrm{edubin\ ea}} \cdot \mathrm{edubin}_i + \beta_{\mathrm{work\ share\ ea}} \cdot \mathrm{work\ share}_i + \beta_{\mathrm{partner\ ea}} \cdot \mathrm{partner}_i + \beta_{\mathrm{hhchild\ ea}} \cdot \mathrm{hhchild}_i + \beta_{\mathrm{halex\ ea}} \cdot \mathrm{halex}_i + \beta_{\mathrm{famtype\ ea}} \cdot \mathrm{famtype}_i + \sum_{k} \beta_{\mathrm{age\ k\ ea}} \cdot \mathrm{age\ k} + \varepsilon_{i\ \mathrm{ea}}$$

$$\mathrm{halex}_i = \beta_{\mathrm{qicses1\ h}} \cdot \mathrm{qicses1}_i + \sum_{k=2;\, k\neq 3}^{5} \beta_{\mathrm{qicsesk\ h}} \cdot \mathrm{qicsesk}_i + \beta_{\mathrm{edubin\ h}} \cdot \mathrm{edubin}_i + \beta_{\mathrm{work\ share\ h}} \cdot \mathrm{work\ share}_i + \beta_{\mathrm{partner\ h}} \cdot \mathrm{partner}_i + \beta_{\mathrm{hhchild\ h}} \cdot \mathrm{hhchild}_i + \beta_{\mathrm{famtype\ h}} \cdot \mathrm{famtype}_i + \sum_{k} \beta_{\mathrm{age\ k\ h}} \cdot \mathrm{age\ k} + \varepsilon_{i\ \mathrm{h}}$$

- As discussed in Section 1, halex is present as a mediator variable when predicting empirp and earn.
- Predicted halex values are manually censored between 0 and 1 after the OLS prediction (as the HALex index varies between 0 and 1)

Calculating the penalties from childhood disadvantage

As stated in Section 2.2, the average absolute penalties in outcome variables y_k associated with childhood social and economic disadvantage (relative to respondents in the middle quintile on the ICSES) can be expressed as:

$$\Delta_k = \boldsymbol{E}[y_k | qicses = 1] - \boldsymbol{E}[y_k | qicses = 3]$$

These penalties can be calculated by chaining first stage regressions into the second stage regressions. In linear equations, the differences in expectations between the $\mathrm{qicses} = 1$ and $\mathrm{qicses} = 3$ situations are simply the coefficients associated with the $\mathrm{qicses} = 1$ indicator variables (as the third quintile is taken as reference for indicator categories). However, in the logit equations, there is no such expression; therefore, we calculated explicitly all the values predicted in the $\mathrm{qicses} = 1$ and $\mathrm{qicses} = 3$ cases from the EU-SILC dataset and average them for each country and sex.

In the earnings regression, the Δ_k quantity actually represents the absolute variation in $\ln(\mathrm{earn})$ (and not earn itself). In this case, we calculated the quantity $e^{\Delta_k} - 1$ which is equal to the relative variation of earn.

Decomposing the direct and indirect effects of childhood disadvantage

In Sections 2.1 and 3.1, we decompose the contributions of childhood disadvantage $(\mathrm{qicses} = 1)$ to the disadvantage penalties Δ_k into "direct" and "indirect" associations, the latter accounting for the presence of mediator variables.

For linear second stage regressions (which is the case of outcomes halex and $\ln(\mathrm{earn})$), the decomposition is straightforward. The direct associations between childhood disadvantage and adult outcome $\mathrm{y_k}$ is equal to $\beta_{qicses1\ yk}$, coefficient of $\mathrm{qicses} = 1$ in the second stage regression. The indirect association through mediator variable med is equal to:

$$\beta_{med\ yk} * (\boldsymbol{E}[med|qicses = 1] - \boldsymbol{E}[med|qicses = 3])$$

Calculating the contributions to the employment outcome is more complex, since contributions to empirp in the second stage regressions cannot be decomposed in an additive way - these regressions are logistic instead of linear. In this case, we first compute the direct contribution of $\mathrm{qicses} = 1$ as a difference between the average value of y_k when $qicsed = 1$ in the second stage regression and the average value of y_k when $qicses = 3$, without accounting for the change in mediator variables caused by the change in qicses. The remaining (indirect) contributions are decomposed according to the proportions given by the method developed by (Breen, Karlson and Holm, 2013[113]) – the KHB method. The KHB method is based on an additive decomposition method which has been used regularly in social sciences since in the 1950s and 1960s for linear models (see (Otis, 1966[114]) and (Alwin and Hauser, 1975[115]) for early examples). With y being the dependant variable, x the main explanatory variable and z another variable contributing to the relationship between x and y, we can write:

$$\mathrm{y} = \beta_{\mathrm{xy}}\mathrm{x} + \varepsilon_{\mathrm{xy}}\ (1)$$

$$\mathrm{y} = \beta_{\mathrm{xy(z)}}\mathrm{x} + \beta_{\mathrm{zy(x)}}\mathrm{z} + \varepsilon_{\mathrm{xzy}}\ (2)$$

Comparing those two models, we can consider that the difference $\delta = \beta_{\mathrm{xy}} - \beta_{\mathrm{xy(z)}}$ quantifies how much of the relationship between x and y is explained by z.

We can also consider the auxiliary regression of z on:

$$\mathrm{z} = \beta_{\mathrm{zx}}\mathrm{x} + \varepsilon_{\mathrm{xz}}\ (3)$$

Inserting this expression of z in equation (2), equating (2) with (1), and identifying the coefficients for x, we have:

$$\beta_{\mathrm{xy}} = \beta_{\mathrm{xy(z)}} + \beta_{\mathrm{zy(x)}} \cdot \beta_{\mathrm{zx}}$$

This way, we can decompose the total effect $\mathrm{Tot} = \beta_{\mathrm{xy}}$ into a direct effect $\mathrm{Dir} = \beta_{\mathrm{xy(z)}}$, which is the coefficient of x when z is included in the regression, and an indirect effect $\mathrm{Ind} = \delta = \beta_{\mathrm{zy(x)}} \cdot \beta_{\mathrm{zx}}$, which can be calculated with the help of the regression of z on x.

More recently (Breen, Karlson and Holm, 2013[113]) proposed a similar method to decompose contributions to coefficients in logistic regressions (which is the case of the outcome empirp). With the KHB method, the decomposition is made on the quantity $\ln\left(\frac{\mathrm{p}}{1-\mathrm{p}}\right)$, with p the probabilty calculated from the logit regression. This quantity is a linear function of the variables, on which the previous decomposition method for linear regressions can be applied. However, in this type of regressions, the coefficients are not directly interpretable in terms of marginal effects (only their ratios are). That's why we applied the proportions given by the KHB method to the difference between the total effect Δ_k and the direct effect mentioned above.