Explaining divorce gaps in cognitive and noncognitive skills of children

Gloria Moroni*

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Abstract

A substantial literature from multiple disciplines documents a negative relationship between parental divorce and child skills. We use data from the UK Millennium Cohort Study to investigate the factors which drive the children of divorce skills gaps. The data provides important conditioning information often missing from studies on divorce, such as interparental conflicts before divorce and, it allows us to capture the multidimensionality of child human capital, defining cognitive and noncognitive skills. An Oaxaca-Blinder decomposition shows that the mean divorce skills gaps are, in most of the cases, entirely explained by family characteristics observed before the divorce. Our results also indicate that whilst cognitive gaps are explained largely by differences in parents' education (about 35%) and financial resources (about 50%), noncognitive gaps are mostly explained by differences in interparental conflicts (about 50%) and financial resources (about 30%). By decomposing these gaps across the distribution of children's skills we find evidence of dynamic complementarities with larger gaps at the lower tail of the noncognitive skills distribution. Our findings suggest that interventions aimed at encouraging parents' education, reducing interparental conflicts and providing financial support are potential policy instruments to narrow the divorce skills gaps.

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1 Introduction

The increasing rates of marital instability over the last decades have raised political and public debate about the relationship between parental divorce and child development. An extensive amount of literature from multiple disciplines has investigated the effects of divorce on children outcomes. A common finding is that, children of disrupted families compared with children of intact families experience several difficulties such as, conduct disorders, emotional disturbances, problems with peers, school dropout and worse labour market outcomes (e.g., McLanahan and Sandefur, 1994; Ermisch and Francesconi, 2001; Amato and Cheadle, 2005; Amato and Anthony, 2014; Frimmel et al., 2016). Although recognising the presence of selection effects, most of these studies suggest that there is a causal relationship between disruption of family and child human capital. However, studies that account more thoroughly for potential endogeneity, have shown that the effects of disruption of family on children's skills are negligible (see e.g., Corak 2001; Ginther and Pollak 2004; Aughinbaugh et al. 2005; Hofferth 2006; Björklund and Sundström 2006; Sanz-de Galdeano and Vuri 2007; Finlay and Neumark 2010; Francesconi et al. 2010; Pronzato et al. 2013). In terms of policy implications, if divorce has a causal impact on child development, pro-marriage policies or policies discouraging divorce may be justified. Conversely, if there is no causal relationship between divorce and child's skills and the divorce skills gap is explained by other factors such as differences in their parents' characteristics, then policies aiming at reducing gaps in these characteristics are potentially more effective. We explore this area of research which has received less attention to date by addressing two questions: (1) What accounts for the divorce gaps in cognitive and noncognitive skills of children? (2) Are there any inequalities in the size or the determinants of the divorce skills gaps across the skills distribution?

We use data from the UK Millennium Cohort Study (2000-2012) to explain the divorce skills gaps at age 3, 5, 7 and 12 of the child and for divorce occurring at different stages of childhood. We define the *divorce skills gaps* as the mean difference between the skills of children of intact families and children of disrupted families, so that a positive difference indicates a disadvantage for children of divorce.

We contribute to the existing literature in three ways. First, among our large set of parental and family variables, we include a comprehensive measure of *interparental conflicts* which no study to date has considered to analyse the impact of divorce on both cognitive and noncognitive outcomes.[1] Second, we capture the multidimensionality of child human capital, defining cognitive and noncognitive skills[2] and we identify the relative importance, possibly different between

[1] Tartari (2015) includes in her analysis a measure of parental conflicts but focuses exclusively on children cognitive outcomes. Amato and Cheadle (2008) focus on the impact of marital conflicts on children outcomes regardless of divorce.

[2] Most of the existing literature focus on the impact of divorce on children's short and long term cogni-

cognitive and noncognitive skills, of six sets of factors that could account for the divorce skills gaps. These consist of child characteristics, demographic characteristics of the family, parents' education, parent's health, family financial resources and interparental conflicts.[3] Third, we add to the previous literature the first evidence of the divorce skills gaps across the distribution of children skills.

Our empirical analysis consists of two stages. In the first stage, we conduct an Oaxaca-Blinder (O-B) decomposition analysis of the divorce skills gaps. The decomposition approach has been extensively used in labour economics to study the gap in wages between different subsample of the population, e.g. between men and women, between ethnic groups and between disable and non-disable workers (Blinder, 1973; Oaxaca, 1973; Blau and Kahn, 1992; Doiron and Riddell, 1994; Cobb-Clark and Hildebrand, 2006; Grove et al., 2011; Longhi et al., 2012, 2013). More recently, it has been adopted also in health economics to study the racial differences in health insurance (Pylypchuk and Selden, 2008) and the gaps in waiting time or health by level of income or socioeconomic status (Johar et al., 2013; Carrieri and Jones, 2015). Using this approach we decompose children skills mean gaps in two components: one explained by differences in observed characteristics (*explained/compositional effect*) and the other due to differences in the return to these characteristics (*unexplained/ residual effect*). Then, the explained component is further decomposed to identify the contribution of each set of observed characteristics in explaining the divorce skills gaps. In the second stage, to overcome some of the O-B drawbacks, we adopt the method proposed by Firpo et al. (2007, 2009) to examine gaps across the children's skills distribution. This more flexible method may be informative because it may be that, children at the lower tail present different compositional or residual effects compared to children at the upper tail of the distribution, and this may vary between cognitive and noncognitive skills (Heckman, 2000; Heckman and Rubinstein, 2001). We also carry out several sensitivity analyses to address potential limitations of the O-B methodology.

To preview our findings, the O-B decompositions of the mean divorce skills gaps reveal that the gaps are, in most of the cases, entirely explained by compositional effects, i.e. the difference in pre-divorce characteristics between children of intact and disrupted families, in most of the cases, completely explains the skills gaps, both for cognitive and noncognitive skills gaps. However, the O-B detailed decomposition reveals clear dissimilarities between cognitive and noncognitive skills. We find that, cognitive gaps are largely explained by differences in

tive achievement, but few economic evidence (Pronzato et al., 2013; Amato and Anthony, 2014) is provided on noncognitive skills that instead are showed to be very important to shape later outcomes as well as cognitive skills (Heckman, 2000; Heckman and Rubinstein, 2001).

[3]Most of the previous works focus on evaluating the impact of divorce on children outcomes neglecting the importance of the factors that account for the gaps. To our knowledge, Kalil et al. (2011) is the only paper looking at the mechanisms explaining the impact of divorced father's proximity and children later outcomes.

parents' education (about 35%) and financial resources (about 50%), whilst noncognitive gaps are mostly explained by interparental conflicts (about 50%) and financial resources (about 30%). Finally, by decomposing the children's skills gaps across the distribution of children's skills, we find larger gaps at the lower tail of the noncognitive skills distribution which provide evidence of dynamic complementarities of skills (Cunha et al., 2010).

Overall, our results indicate that the divorce skills gaps mainly reflect the selection effect, rather than a direct negative causal effect of separation on children's outcomes. In addition to that, the detailed decomposition provides evidence that the divorce gap for different dimensions of skills, i.e. cognitive and noncognitive, can be ascribed to different factors. With parental education being correlated with parental cognitive abilities and interparental conflicts being correlated with parental noncognitive abilities, our results can be interpreted in terms of intergenerational transmission of skills as one of the main driver for the lower achievements of children of divorce. On the basis of this evidence, the introduction of policies that seek to discourage divorce do not seem to be justified, at least if the aim is to preserve child development. This is because, as our results illustrate, interparental conflicts, parental education and financial resources are the main factors accounting for the divorce skills gaps.

The outline of the paper is as follows. Section 2 presents the previous literature and describes the institutional environment that characterises the UK in terms of divorce law and related institutions. Section 3 presents the data and the sample selection. In Section 4 we explain our empirical strategy and in Section 5 we report our findings. Section 6 shows that our results are robust to several sensitivity analyses, conducted to address the main drawbacks of the O-B methodology such as the linearity assumption, the common support assumption and the choice of the counterfactual. Section 7 concludes with discussion of the results.

2 Background

2.1 Previous Literature

A large number of empirical studies have established a negative correlation between parental divorce and children attainments. Few examples are, Jonsson and Gähler (1997), McLanahan and Sandefur (1994), Amato and Cheadle (2005), Steele et al. (2009). Although all these works provide a clear picture of the negative relationship, they fail to provide a causal interpretation of their results. Conversely, among the economic contributions aimed to establish the causal impact of parental separation on children outcomes, the empirical findings are mixed and far from being conclusive.[4]

[4] McLanahan et al. (2013) provide a comprehensive survey of this literature.

Gruber (2004) using unilateral divorce reform in the US on 1960-1990 CENSUS data and exploiting the variation across states and over time in changes in divorce regulation, provides two main findings: (i) the reform significantly increases the incidence of divorce and (ii) making divorce easier have negative long-run implications for children. On the contrary, Björklund and Sundström (2006) considering Swedish administrative data from 1948 -1963, adopt a sibling difference approach and show that the negative correlation between divorce and children attainments is due to selection and not due to causation. Likewise, Sanz-de Galdeano and Vuri (2007) using double and triple difference models find no causal effect of divorce on teenagers' reading abilities and find that most of the disadvantages experienced by children of divorce were already apparent before parental separation. Similarly, Francesconi et al. (2010), using the German Socio-Economic Panel (GSOEP), analysed the relationship between parental separation and children's high school grades and test scores. Addressing the endogeneity of parental break-up via sibling fixed effects models, Instrumental Variables and Manski bounds, they find that, after controlling for selection, the effects of family structure are remarkably smaller, with different short-term and long-term effects of disruption of family. More recently, Amato and Anthony (2014) use child fixed effect and find negative - although small - effect of separation on several children cognitive and noncognitive skills, more pronounced for children with higher probability of experiencing divorce. Differently from most of the related literature, Frimmel et al. (2016) implements an instrumental variable approach, using as instrument the sex-ratio at work of the father to predict the probability of parental divorce and find a negative causal impact of divorce on children college attendance, later labour outcomes and higher mortality, with significant differences between boys and girls.

The disparities in the literature are even more pronounced when comparing cognitive and noncognitive skills, with scant evidence provided for noncognitive or behavioural outcomes. One contribution to this literature, which is also the most related to our study is Pronzato et al. (2013), who look at children's behavioural problems after parental divorce using, as we do, the Millennium Cohort Study (2000-2007) and following children over time. They use fixed effect models throughout the analysis and find that divorce had a moderate effect on children's noncognitive abilities albeit significantly smaller than the effect estimated with cross-sectional data. Differently from Pronzato et al. (2013), our aim is to identify the channels through which divorce affects children outcomes and estimate their contributions in explaining the skills gaps. We also distance from them by including as one of the factors the *interparental conflicts*, which turns out to be the most important in accounting for divorce noncognitive skills gaps.

The endogeneity of parental divorce issue is well-recognized in the related literature (Manski et al., 1992). The identification of the effect of divorce on children outcomes requires an instrument that causes some families to divorce and others not, without affecting directly chil-

dren's outcomes (Gruber, 2004). However, Stevenson and Wolfers (2006) point out that not even changes in divorce law can be considered a valid instrument because they may directly affect the bargaining power within the family with potential implication for children outcomes. Similarly, controlling for time-invariant unobserved characteristics (Sanz-de Galdeano and Vuri, 2007; Pronzato et al., 2013; Amato and Anthony, 2014) may not be enough for establishing the causal effect of separation on children's outcomes, because this methodology does not allow to disentangle the effect of time-varying determinant of parental separation possibly correlated with children outcomes such as, interparental conflicts.[5] Indeed, inter-parental conflicts may be even more harmful to child development than parental dissolution itself (Fincham, 2001, 2003).

Only a few papers analyse the relationship between marital status and the cognitive development of children taking into account the role of the quality of relationship between the parents, but none of them look at the impact on noncognitive development. Piketty (2003) suggests that the negative effect of divorce on children school attainments is mainly explained by the adverse effect of parental conflicts, although unobservable in his empirical model. To support this selection argument, he adopts two strategies. First of all, he compares the outcome of children of disrupted families and children of intact families which are observed to divorce within a two-year spell and finds no difference between the two groups. The other strategy exploits the 1975 divorce law reform in France and the corresponding cross-regional variation in divorce rates. Overall, his results suggest that parental conflicts are harmful for children, rather than separation *itself*. Conversely, Tartari (2015) studies the relationship between marital status and children cognitive development in a dynamic theoretical framework and model the possibility of conflictual marriages together with the decision on child investment. In a counter-factual exercise using the National Longitudinal Survey of Youth (NLSY79) data she finds that children of divorced parents would have been better off if their parents had not divorced.

Our paper draws from this literature but, on the other hand, it aims at going beyond the evidence provided so far by offering a comprehensive picture of the factors explaining the divorce skills gaps. Additionally to all previous works, the analysis is enriched by the inclusion among the explanatory variables of the *interparental conflicts* with the final aim of reconciling the mixed results achieved so far in the related empirical studies.

This study draws also from the human capital formation literature. Specifically, analysing the divorce skills gaps in cognitive and noncognitive skills of children is important given the long term consequences of childhood skills for education and other adult outcomes including labour market outcomes, probability of being married or divorced, receiving welfare, voting

[5]It may be also argued that the instrumental variable proposed by Frimmel et al. (2016) is a good predictor not only of parental separation, but also of parental conflicts. If so, the results would be unable to disentangle the effects of the two.

and risky health behaviours (Cunha et al., 2010).[6] Related literature on child development has shown that the role of family in shaping child abilities through genetics, parental investment and through the choice of parental environment is crucial. Many of the determinants of children's achievements such as, family financial resources and family composition, parental schooling, mother's employment, parental time investment, child care, school quality and neighbourhood characteristics, have been already studied (e.g., Haveman and Wolfe 1995; Ruhm 2004; Björklund et al. 2011; Almond and Currie 2011; Ermisch et al. 2012; Del Bono et al. 2015; Carneiro et al. 2015) with most of these works focusing on intact families. In the same vein, parental divorce during childhood is an important element of family environment and may be seen as a shock faced by the child possibly affecting his human capital formation.

2.2 Institutional Background

Given this discussion, it is important to consider the institutional background characterising the UK and our sample. The most important divorce reform in the UK was the Divorce Reform Act 1969, strengthened in the Matrimonial Causes Act 1973 which still contains the divorce law UK is subject to today. This reform yielded remarkable changes because, in addition to the three grounds of divorce of adultery, behaviour and desertion, already present in the previous Matrimonial Causes Act 1937, it adds grounds for divorce, based on two years' separation with the other party's consent, or five years' without. This legislation removed the concept of 'matrimonial offences' and introduced some elements of no-fault divorce, although a formal 'no fault' divorce has not been introduced yet in the UK with a still ongoing debate. The divorce reform, together with the change in attitudes and expectations toward marriage, and the higher women's employment rate[7], contributed to a sharp increase in the number of divorces from 50,000 per year in 1971 to 150,000 a decade later.[8] Then the number of divorces remain stable for 20 years until recently, when it has fallen steadily, together with the number of marriages.[9] More precisely, the number of divorce in England and Wales in 2013 was 114,720, involving 94,864 children under 16. Among these children, 21% were under 5 and 64% were under 11 years old.[10]

In addition to the divorce law the UK has implemented, there are other policies indirectly related to divorce, e.g. pro-marriage policies. In 2015 the UK has introduced a new public policy called *Married couples allowance*, aimed to reduce the tax bill each year if a couple is married or

[6] For a comprehensive review consider, Borghans et al. (2008); Almlund et al. (2011)

[7] Evidence on no-fault divorce law and female labour supply is provided for US (Genadek et al., 2007).

[8] González and Viitanen (2009) analyse the effect on divorce rate of no-fault divorce reform in Europe and find a sizeable effect of the reform in increasing the divorce rate.

[9] The same figure characterizes US (Rotz, 2015)

[10] Source: Office from National Statistics, November 2015

in a civil partnership.[11] This policy promotes marriages and civil partnerships and discourages divorce, without considering the possible drawback of reshaping the incentive to divorce and convincing conflictual couples to stay married.[12] If these policies are motivated by promoting two-parents families as the best environment for child development, we need to establish that the negative association between parental separation and children outcomes cannot be entirely explained by selection.

Finally, Child Maintenance policies may indirectly affect divorce decisions (Walker and Zhu 2006 for the UK and Nixon 1997 for the US). During our sample period (2000-2012) child maintenance has been regulated by the Child Support Agency (CSA) introduced in 1993, a reform that mandated child support payment for the first time. In 2003 a simplified scheme was introduced based on the net weekly income of the non-resident parent. In addition, this scheme included the possibility of shared care for parents, meaning that if a child for whom the non-resident parent pays child maintenance stays with them for at least 52 nights a year, the non-resident parent will pay less.[13] More recently, the Children and Families Act 2014 replaced the CSA with the Child Maintenance Service which includes the possibility of 50-50 shared parenting and a statutory requirement on applicants in relevant family proceedings to first attend a Mediation Information and Assessment Meeting before making an application to court.[14] This procedure is aimed at encouraging cooperation between the parents and at reducing conflicts in the best interest of the child. Although this scheme does not regard our sample it is important to mention it for policy implication purposes.

3 Description of data

3.1 Millennium Cohort Study

We use data from the UK Millennium Cohort Study (MCS), a multidisciplinary cohort member longitudinal survey which comprises a representative sample of children born in the UK between September 2000 and January 2002 and followed across time with interviews collected in 2000, 2004, 2006, 2008 and 2012, when cohort members are 9 months and ages 3,5,7 and

[11] A similar policy, the *Temporary Assistance to Needy Families* (TANF) introduced in 1997 can be found in the US.

[12] Consider McLanahan (2007), Amato and Furstenberg (2007), and Frimmel et al. (2014) for evaluation of pro-marriage policies.

[13] Source: www.csa.gov.uk

[14] Source: www.gov.uk

12.[15][16] Information is available on both the child and the parents. The data includes detailed information regarding child cognitive and noncognitive skills. Specifically, child cognitive assessments are collected directly from the child by trained interviewers, whilst questions about the cohort members' socio-emotional behaviour were asked to one of the parent, typically the mother. In addition, the survey includes a wide variety of other variables on social, demographic and economic circumstances at parental and family level.

The sample is selected to include all singleton children interviewed at 9 months, with the main respondent being the natural mother and the partner respondent being the natural father, who are either married or cohabiting. This selection reduces our original sample size of 31.8 percent and gives us 13,131 children. We consider a balanced panel of cohort members with valid information on a set of variables on family and child characteristics.[17] Since we want to analyse the short and medium term effect of separation, occurring at different stage of childhood, we consider three different samples according to different timing of separation. For separation between 9 months and age 3 of the child we analyse the link between divorce and children skills at age 3-5-7 and 12 on 5251 observations, excluding those children whose parents separate between age 3 and 12. Similarly, for separation between age 3 and 5 of the child we look at children outcomes at age 5, 7 and 12 on 5351, disregarding those children whose parents separate between age 5 and 12. Finally, for separation between age 5 and 7 of the child we consider children's outcomes at age 7 and 12 on 5721 observations, excluding those children whose parents separate between age 7 and 12.

In this study the key variable is the relationship between the natural parents, i.e. whether they are in relationship or separated. Since our analysis comprises both married and cohabiting couples, it follows that, the notion of divorce will include not only legally divorced or legally separated couples but, divorce will occur as soon as one of the two natural parents leaves the house. This choice is motivated by the fact that the shock faced by the child in case of parental split-up arises as soon as the two parents separate, that is when they stop living together, regardless their legal marital status. Among our initial sample of 13,131 children at 9 months, 72.29% of them have married parents whilst the rest have cohabiting parents. For the rest of the paper, the notion of divorce and separation will be used interchangeably.

[15]For details on the survey design, recruitment process and fieldwork consider Dex and Joshi (2005).

[16] We focus on children skills up to 12 years old because of the higher effectiveness of early intervention to compensate the disadvantages arising in early childhood (Cunha et al., 2006; Heckman and Kautz, 2014)

[17]Descriptive statistics for the unbalanced panel are available upon request.

3.2 Dependent Variable: Child outcomes

3.2.1 Cognitive skills

The dataset provides different measures of cognitive abilities. The first set of measures comes from a widely used age-varying test from the British Ability Scales (BAS) which includes the BAS Naming Vocabulary Test, the BAS Word Reading Test, the BAS Verbal Similarities Test, the BAS Picture Similarity Test and the BAS Pattern Construction Test (Elliott et al., 1996, 1997). The second measure of cognitive skill available in MCS is an adapted version of the National Foundation for Educational Research Progress in Maths Test (NFER).

At age 3 children's cognitive abilities are evaluated with the BAS Naming Vocabulary Test which assesses child's expressive verbal ability and consists of a set of coloured pictures of objects shown to the child one by one and asked to name. Successful performance depends on the child's previous knowledge of a vocabulary of nouns.

When the child is 5 years old, cognitive abilities are measured by the BAS Naming Vocabulary Test, as at age 3, together with the BAS Picture Similarity and the BAS Pattern Construction. The Picture Similarity Test measures children's problem solving abilities by showing a row of 4 pictures and asking the child to choose another picture most similar to one of those. The Pattern Construction Test instead asks the child to constructs a design by putting together coloured flat squares or solid cubes. This assessment tests child accuracy, speed and spatial awareness, but can also be used to observe dexterity and coordination, as well as traits like perseverance and determination.

At age 7 cognitive abilities are assessed with three tests, the BAS Pattern Construction test which is the same as at age 5, the BAS Word Reading Test, and the National Foundation for Educational Research Progress in Maths Test (NFER). The Word Reading Test asks the child to read aloud a series of 90 words presented on a card, to assess children's English reading ability.[18] The NFER Test instead is a Math assessment which initially tests all children equally and then, based on their score, they are routed to easier, medium or harder questions.

Finally, 12-years-old children's cognitive abilities are measured with the BAS Verbal Similarities Test, which evaluates verbal reasoning and verbal knowledge with the interviewer who reads out three words to the child who must recognize the similarities among them.

Among the three types of score provided for each measure of the BAS tests, the raw score,

[18] In Wales a different test was carried out. The parents of children living in Wales were asked to select either an English reading test (BAS II Word Reading) or a Welsh reading test (called 'Our Adventure') for their child. The 'Our Adventure' test, undertaken by 139 cohort members in total, is different and cannot be compared with the English reading test. In our selected sample we disregard the Welsh cohort members undertaking this test.

the ability score and the T-score, we use the ability score that is a transformation of the raw score which takes into account the difficulty of the specific item set administered to the child.[19] Similarly, for the NFER Test we use an adjusted test score which adopts an item response scaling method (Rasch) to scale the results of the easy, medium and hard subtest scores to the equivalent original raw scores. For ease of interpretation all tests are converted into z-scores, with mean 0 and standard deviation of 1.[20] Figure 1A in the Appendix plots the standardized distribution of each of the ability measures by age and Table 1A in the Appendix shows the list of cognitive tests available in our dataset by age of the child.

Since at age 5 and 7 we have more than one cognitive ability measure, rather than using them separately, we combine this information using factor analysis to create a unique and more comprehensive measure of cognitive abilities for these ages. The interpretation of the results would then need to bear in mind this adjustment for which, cognitive abilities at age 5, in addition to the verbal ability measure, include also a measure of solving abilities (Picture Similarity) and a measure of coordination and determination (Pattern Construction). Similarly, the factor of cognitive abilities at age 7 includes the reading abilities, the mathematical abilities which can be related with the picture similarity tested at age 5 given that they both test the problem solving abilities of the child, and the same measure of coordination and determination (pattern construction) tested also at age 5. Table 2A in the Appendix shows the factor loading of each factor created.[21] Figure 1 shows that the distribution of the factors describing cognitive abilities across different ages is approximately normal.

3.2.2 Noncognitive skills

Noncognitive skills are derived from the Strengths and Difficulties Questionnaire (SDQ) which is designed to examine children's behaviours and emotions in a number of settings. In each interview since age 3, the parent is asked to complete the SDQ questionnaire consisting of 25 items on psychological attributes (Goodman, 1997, 2001). The parent is asked whether the item is 'true', 'somewhat true' or 'not true' in respect to the child and, final scores are such that the higher the score the higher the level of behavioural problems. The 25 items are grouped in five sub scales measuring: (i) Emotional Problems; (ii) Conduct Problems; (iii) Hyperactivity; (iv) Peer Relationship Problems and (v) Pro-social Behaviour. These broader subscales are extensively used in the child development literature and have been shown to be valid in the UK

[19] The ability scores however are not age-adjusted so that children of a different ages (in months) take the same BAS tests. Since on average older children tend to score higher, we need to control for age in months in our analysis.

[20] For a more precise description and interpretation of all the tests consider Connelly (2013) and Hansen (2014).

[21] The factor loadings are derived using standard procedures in STATA and retaining only factors with eigenvalues greater than or equal to one (see Fiorini and Keane 2014 for similar application).

setting (e.g., Goodman et al. 2010; Borra et al. 2012; Del Bono et al. 2015). For the sake of comparison with the cognitive measures, the noncognitive scores are expressed as a z-score with mean 0 and standard deviation 1 and are reverse coded, so that positive values mean higher level of noncognitive skills and negative values mean lower level of noncognitive skills.[22] Figure 2A in the Appendix plots the standardized distribution of noncognitive abilities across different ages.

Likewise cognitive abilities at age 5 and 7, rather than using many different measures of noncognitive abilities for each age, we use factor analysis to combine this information and create a unique and more comprehensive measure of socio-emotional behaviour. The factors indeed represent a summarizing measure of psychological attitudes such as anxiety, depression and withdrawal, but also aggression, irritation, disobedience and pro-social behaviour at each age. We take these factors as our measures of behavioural problems for each age (Factor Loadings shown in Table 2A in the Appendix). Figure 2 indicates that the distribution of the factors describing the noncognitive skills across age is left skewed, especially in late childhood.

Table 1 features the descriptive statistics of children attainments by parental separation, considering different timing of separation possibly occurring between 9 months and age 3 or between age 3 and 5 or between age 5 and 7. Regardless the timing of separation and children age, children of separated couples score significantly lower both in terms of cognitive and noncognitive abilities.[23] A potential explanation for the divorce skills gaps is that the characteristics, experiences and environment of children from disrupted families differ systematically from the characteristics, experiences and environment of children of intact families and in ways that are related to children's cognitive skills and behavioural problems. This study aims at understanding how much of this gap can be explained by these differences, and which are the main determinants of these gaps.

3.3 Explanatory variables

3.3.1 Quality of interparental relationship

The quality of interparental relationship, often referred as relationship quality (RQ) or marital conflict, is a key measure in family and child developmental research, especially in the psychology literature. It has been linked to psychological and physical health of the partners (depressive symptoms, eating disorders, male alcoholism), but also with some crucial family outcomes such

[22] The pro-social behaviour subscale, differently from all the other measures, does not need to be reversed to provide a consistent interpretation of higher test score higher behavioural abilities.

[23] Table 3A in the Appendix details the type of assessment by child age available in the dataset, both for cognitive and noncognitive skills.

as domestic violence, lower parenting skills, children's disadvantages, parent-child conflict, and conflict between siblings (Grych and Fincham, 2001; Fincham, 2003). Partners in happy relationship are healthier, they communicate more effectively with each other, have higher parenting skills and tend to raise their children authoritatively, using less harsh discipline, spending more time with their children, and having less risk of marital breakup (Jones, 2010).

Remarkably, MCS provides detailed information about the quality of relationship between parents. It includes a shortened version of the Golombok-Rust Inventory of Marital State (GRIMS, Rust et al. 1986, 1990), a questionnaire for the assessment of the overall quality of a couple's relationship, and retains the content validity of the original version which included 28 items measuring two aspects of the relationship, (1) shared interests, communication, sex, warmth, roles, decision making and coping, and (2) beliefs about and attitudes toward relationships, behaviour in the relationship and agreement with the partner (Chiorri et al., 2014). Specifically, MCS asks separately to each parent to rate several items: (i) Partner sensitive and aware of needs (ii) Partner doesn't listen (iii) Sometime lonely when with partner (iv) Relationship full of joy and excitement (v) Wishes was more warmth and affection (vi) Suspect on brink of separation (vii) Can make up quickly after argument (viii) Frequency go out as a couple (ix) How often disagrees over issues concerning child, (x) Happy/Unhappy with relationship.[24]

In the case of statement (i)-(vii), respondents indicate whether they strongly agree, agree, neither agree nor disagree, disagree or strongly disagree with the statement (5-Point Likert-type agreement scales). In the case of statement (viii) respondents are asked to indicate how frequently they go out as couple on a 4 points scale, ranging from 'once a week' to 'hardly never'. For question (ix) respondents report how frequently they argue with each other on issues concerning child on a 6 point scale, ranging from 'never' to 'more than once a day'. Question (x) about happiness with relationship is a 7 point scale. All in all, we have 10 items providing information on inter-parental relationship with many degrees within each of them.[25]

Given that we expect the quality of parental relationship to have some accounting power in explaining the divorce skills gaps, we might question whether the variable indicating the quality of interparental relationship is measured with errors.If conflicts are under/over-reported then the accounting power of conflicts may be over/under-estimated.

We address this issue by modelling interparental conflicts as latent factors. There may be

[24]These last three items of the quality of interparental relationship are not included in GRIMS but represent additional information on the quality of relationship. Item (x) for example is an overall measure of satisfaction with the relationship widely used in the literature and included also in other surveys such as, the National Child Development Study (NCDS) in the UK.

[25]Notice that items (ii) (iii) (v) and (x) are reverse coded in such a way to have the same interpretation in terms of quality of relationship. The higher the score, the lower the quality of their relationship, the higher the level of conflicts.

several ways to create a measure of the quality of relationship, for example by averaging across components of different items and including this average in the analysis or creating indexes. However, measures of the quality of relationship include a multitude of items asked to the person whose dimensionality needs to be reduced and even more importantly these questions proxy underlying quality of relationship with errors. Here, we consider these features by treating interparental conflicts as unobservables and relying on factor analysis to extract measures of interparental conflicts. This methodology allows us to reduce the dimensionality of the measures explaining the quality of relationship between the two parents without arbitrarily imposing that they all are related to the latent factor with equal weights.

Therefore, rather than using many different measures of inter-parental conflicts, we combine this information using factor analysis. In order to do so, we consider only the information collected from the mother.[26] We find evidence of only one common factor (Factor Loadings showed in Table 3) which explains more than 30% of the total variance. We notice that all the items reported from the mother highly positive loadings on the factor. We interpret this factor as a measure of interparental conflicts perceived from the mother. Figure 3 plots the distributions of the interparental conflicts factors at 9 months, age 3 and age 5.

3.3.2 Other control variables

Our analysis includes a set of child, parental and family variables all time-invariant or observed before separation but the age of the child that is expressed in months and varies for each model considered. A major advantage of MCS is that it includes a large set of background characteristics, which make the assumption of selection on observables, implicit in linear regression models, more credible. The set of variables we include draws partly from the human capital formation literature, that accounts for parental inputs as one of the major determinants of children outcomes, and partly from the literature aimed at establishing the impact of divorce on children outcomes. Indeed, we include also explanatory variables that may be a good predictor of divorce but that may also indirectly affect children's abilities. This set of variables consists of: (i) *child characteristics* such as, child age in months, child sex and birth weight; (ii) *Demographic characteristics* as, number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parent's age, parent's ethnicity and whether parents have the same ethnicity; (iii) *parental education*; (iv) *psychological-health characteristics* such as, parent's general health and whether

[26] Related literature on GRIMS questionnaire implemented in the MCS survey showed that women in MCS perceive a higher relationship quality than men(Chiorri et al., 2014; South et al., 2009; Shapiro et al., 2000).This would suggest that, if interparental conflicts are measured with errors, they are possibly under-reported and therefore we might expect the accounting power of the quality of relationship to be at most underestimated.

children's grandparents were separated; and (v) *family financial resources* as, family income, housing tenure, number of rooms in the house, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification).

The means of the explanatory variables are reported in Table 2 for each of the three samples considered. According to the mean tests, children of divorce are very different from children of intact families. Children of divorce have on average younger, less educated parents and with shorter relationship. Not separated parents have also better health. Parental social class is also dissimilar between the two groups of children, with a higher percentage of parents working in routine and manual occupations among children with separated parents. Family income also varies between the two groups, with an average equivalised OECD income per week significantly higher for intact families than for disrupted families. In general the control variables indicate that children of divorce are more disadvantaged than children of intact families. If children who grew up in more advantaged families are also less likely to experience parental breakup and also perform better at cognitive and noncognitive tests, either because of higher innate ability or because their environmental background improve these outcomes, then the association between separation and cognitive and noncognitive skills shown in Table 1 might well be spurious and likely to be largely explained by these observable differences between the two groups.

4 Econometric Methods

4.1 Oaxaca-Blinder decomposition

The existence of a gap in mean outcomes between two groups has been often investigated using decomposition analysis to estimate how much of the gap can be ascribed to differences in observable characteristics between the two groups. The approach, widely used by labour economists, stems from the seminal papers of Oaxaca (1973) and Blinder (1973), with the original 'Oaxaca-Blinder' (O-B) decomposition based on separate linear regressions for the two groups. We use the O-B method to decompose the mean of divorce skills gaps of children into the component explained by differences in observed characteristics (*composition effect*) and the unexplained component (*residual effect*).

Separate regression are estimated for each group, so that the mean regression of the cognitive or noncognitive skills may be expressed as follows:

$$y_{ji} = X_{ji}\beta_j + \epsilon_{ji} \tag{1}$$

where y_{ji} is cognitive or noncognitive skills for child i at age 3(5,7 or 12) in group j, with j= 0 for non-separated (the reference group) or j= 1 for separated parents (the comparison group),

observed when the child is between 9 months and age 3 (between age 3 and 5 or between 5 and 7); X_{ji} is a vector of K explanatory variables and a constant, β_j is a vector of parameters for group j including the intercept, and ϵ_{ji} is an error term with mean zero and homoskedastic. Then, using the O-B approach, we can decompose the difference in mean outcomes (overbars denote means) between children of intact and disrupted families as follows:

$$\overline{y}_0 - \overline{y}_1 = \overline{X}_0\beta_0 - \overline{X}_1\beta_1 \tag{2}$$

where $\overline{X_j}$ is the vector of average characteristics for group j (j=0,1) and $\overline{y}_0 - \overline{y}_1$ is what we call the *divorce skill gap*, expressed as a difference between mean outcomes of children of intact families 'minus' mean outcomes of children of disrupted families. This implies that positive divorce skills gaps indicate skills disadvantages for children of divorce compared to children of intact families. By adding and subtracting a counterfactual conditional mean, for instance $\overline{X}_1\beta_0$, which reflects a situation in which children of intact families have the same mean covariates of children of disrupted families, it is possible to identify the two components of the decomposition:

$$\begin{aligned} \overline{y}_0 - \overline{y}_1 &= \overline{X}_0\beta_0 - \overline{X}_1\beta_1 \\ &= \overline{X}_0\beta_0 - \overline{X}_1\beta_1 + \overline{X}_1\beta_0 - \overline{X}_1\beta_0 \\ &= (\overline{X}_0 - \overline{X}_1)\beta_0 + \overline{X}_1(\beta_0 - \beta_1) \end{aligned} \tag{3}$$

where $(\overline{X}_0 - \overline{X}_1)\beta_0$ represents the composition effect and reflects mean differences in covariates X, between the reference and the comparison group, whereas the second component $\overline{X}_1(\beta_0 - \beta_1)$ represents the residual or the unexplained effect. Moreover, given the additive linearity assumption, we can compute the detailed decomposition to identify the contribution of each covariate K to the explained component:

$$(\overline{X}_0 - \overline{X}_1)\beta_0 = \sum_k (\overline{X}_{0k} - \overline{X}_{1k})\beta_{0k} \tag{4}$$

where β_{0k} is the coefficient for variable X_k for group 0 estimated using OLS, ($\overline{X}_{0k}$ is its corresponding sample mean) and therefore $(\overline{X}_{0k} - \overline{X}_{1k})\beta_{0k}$ is the contribution of the k_{th} covariate to the composition effect. The Oaxaca-Blinder approach therefore allows us to estimate the separate contribution of each explanatory variable (or sets of variables) to explain the mean outcome gap and this is the most appealing property of the O-B methodology.

For ease of interpretation of our results, we partition X_k into 6 different sets as to include: (i)*child characteristics* such as, child age in months, child sex and birth weight; (ii)*demographic characteristics* as, number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parent's age, parent's ethnicity and whether parents have the same ethnicity; (iii)*parental education*; (iv) *parental psychological-health characteristics* such as, parent's general

health and whether children's grandparents were separated; and (v) *family financial resources* as, family income, housing tenure, number of rooms in the house, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification); (vi) and the factor describing the *quality of interparental relationship*, that is the amount of interparental conflicts.[27]

Besides the compositional effects of the divorce skills gaps, ascribed to different observed mediating factors available in our data, there can be also residual skills gaps arising from different sources. Few examples are: (i) detrimental effect of divorce for child development due to the lower time and money investment of the non-residential parent on the child (e.g. Page and Stevens 2004); (ii) failure of cooperative behaviour between parents due to union dissolution[28]; (iii) differences in the return to parents' characteristics between children of separated and non-separated parents such as, parents' education and interparental conflicts[29]; (iv) differences in unobservables potentially correlated with children's outcomes and parental divorce.

In spite of the popularity of the O-B approach and its appealing property of providing the exact contribution of each variable to the explained and unexplained component, its drawbacks are also well-recognized. First of all, O-B provides the decomposition of the mean gap but, in our setting for example, divorce skills gaps may be larger in the lower tail of the children skills distribution because lower skilled children may be more vulnerable. Secondly, it relies on linearity assumptions between dependent and explanatory variables. The follwoing Sections (Section 4.2 and 4.3) explain the econometric extensions of the basic model used to address thse two drawbacks of the O-B methodology.

In addition to that, in Section 6 we also address other two shortcomings of the methodology: (i) the choice of the counterfactual, which may affect the decomposition results and (ii) the common support assumption to avoid out of sample prediction which arises because the estimated coefficients β depend on range of the explanatory variables, and therefore, when it comes to estimate the coefficients for different groups, the difference between them may depend on a different range of covariates between groups.

[27] For description of each of this variable and motivation for their inclusion in the model consider Section 3.

[28] The role of institutions is fundamental to compensate for the lower investment of one of the two parents and for mitigating the conflictual circumstances between the parents after separation (Del Boca, 2003; González and Özcan, 2013). The Child Maintenance Service who has replaced the CSA in the UK since 2014 represents a typical example of institution aimed at this purpose.

[29] For instance, the higher level of education of both parents may be more productive in transmitting abilities when the parents are together rather than when they are separated. Similarly the detrimental effects of interparental conflicts may be exacerbated in non-divorced families because it allows children to perceive them less intensely (Kalil et al., 2011; Barumandzadeh et al., 2016)

4.2 Generalized Oaxaca-Blinder decomposition

To overcome the first limitation of the O-B, i.e. it provides only the decomposition of the mean gap, we apply the decomposition at various quantiles of the children's skills distributions to analyse the divorce skills gaps by identifying the explained and unexplained component across the entire distribution of children's skills. This extension is based on the Recentered Influence Function (RIF) method of Firpo et al. (2009). Specifically, we use the RIF method to estimate the relationship between separation and children skills and then we compute the O-B decomposition of the divorce skills gaps using the RIF regression results as a basis.[30]

More specifically, it can be shown that the RIF for the τth quantile q_τ, of a variable y is given by :

$$RIF(y, q_\tau) = q_\tau + \frac{(\tau - d_\tau)}{f_y(q_\tau)} \tag{5}$$

where $f_y(q_\tau)$ is the density distribution function of y at quantile q_τ, and d_τ is a dummy variable taking value one if $y \leq \tau$.[31]

The RIF satisfies two important properties: (i)$E_y[RIF(y, q_\tau)]$=q_τ that is its mean corresponds to the actual τ_{th} quantile of interest; and (ii) $E_X E_y[RIF(y, q_\tau)|X] = q_\tau$. Given these properties, we compute the RIF for each observation y (after replacing $f_y(q_\tau)$ with its kernel density estimate) and we estimate the conditional expectation of the RIF for each group j by OLS regression (assuming linearity between the RIF and X) considering the RIF as the dependent variable :

$$RIF(y_{ij}, q_\tau) = X_{ij}\beta_j(q_\tau) + \nu_{ij} \tag{6}$$

where, as before j is the group indicator (j=0,1), X_j is a vector of K explanatory variables including the constant, $\beta(q_\tau)$ is the corresponding vector of coefficients for the τth quantile and ν_j is the error term. Specifically, the conditional expectation of the RIF is what Firpo et al. (2009) define as the unconditional quantile regression and therefore we can interpret the coefficient estimated in Eq.(6) $\beta_j(q_\tau)$ as the marginal effect of a change in distribution of covariates X on the unconditional quantile of children outcome. Given the properties of the RIF it can also be

[30] While the mean can be decomposed with O-B using OLS, the quantiles cannot be decomposed using the quantile regressions. Similarly to the mean regression model, a quantile regression model for the τth conditional quantile expressed as $q_\tau(X) = X\beta_\tau$, β_τ can be interpreted as the effect of X on the τth conditional quantile of y given X. However, in the case of quantiles, differently from the mean, we cannot apply the law of iterated expectation so $q_\tau \neq E_X[q_\tau(X)] = E(X)\beta_\tau$ (where q_τ is the unconditional quantile) and therefore β_τ cannot be interpreted as the effect of increasing the mean value of X on the unconditional quantile. Therefore, the RIF offer a linear approximation of the unconditional quantiles of the outcome variable which permits the application of the law of iterated expectations to the approximated quantile used to estimate the marginal effect of a covariate by regressing the RIF on the covariates X.

[31] For estimation of the RIF we use the Stata ado file *rifreg* written by Firpo et al. (2009)

shown that:

$$\begin{aligned} q_{0\tau} - q_{1\tau} &= E_y[RIF(y_0, q_\tau|X_0)] - E_y[RIF(y_1, q_\tau|X_1)] \\ &= [RIF(Y_0, q_{0\tau})] - [RIF(Y_1, q_{1\tau})] \\ &= \overline{X_0}\beta_0(q_\tau) - \overline{X_1}\beta_1(q_\tau) \\ &= (\overline{X}_0 - \overline{X}_1)\beta_0(q_\tau) + \overline{X}_1(\beta_0(q_\tau) - \beta_1(q_\tau)) \end{aligned} \tag{7}$$

where the last equivalence follows the O-B decomposition method and shows that the gap in quantiles can be decomposed into two additive components, the composition effects and the residual effects as in the mean O-B. This decomposition, which we call the *generalized Oaxaca-Blinder* because the RIF of the mean is equal to y, is equivalent to the O-B method which uses as dependent variable the RIF rather than the y. Similarly to what we had in Equation 3, the first term is the differential in children skills that is explained by differences in observed characteristics between the two groups and the second term measures the unexplained component.

The *generalized Oaxaca-Blinder method* can be used similarly to the basic O-B method to derive a detailed decomposition and identify the contribution of each variable as such:

$$q_{0\tau} - q_{1\tau} = \sum_k (\overline{x}_{0k} - \overline{x}_{1k})\beta_{0k}(q_\tau) + \overline{X}_1(\beta_0(q_\tau) - \beta_1(q_\tau)) \tag{8}$$

This method allows us to overcome the first drawback of the O-B method by providing a decomposition of differences of quantile in addition to the mean. Yet despite, the *generalized O-B method*, as well as the basic O-B, relies on a linearity assumption and may consider out of sample counterfactuals when the ranges of the covariates differ between the two groups (Barsky et al., 2002). For this reason, as robustness analysis we implement the reweighted O-B decomposition explained below.

4.3 Reweighted Oaxaca-Blinder decomposition

As already discussed, a limitation of the O-B decompositions (as well as the generalized O-B) is that, if the conditional mean function is not linear the decompositions may not provide consistent estimates of the components. One possible solution to this problem is to compute the decomposition using a reweighting approach as in DiNardo et al. (1996) and Barsky et al. (2002).

Specifically, we use the reweighted decomposition methodology to separate the explained from the unexplained component by constructing a counterfactual sample of children of intact families weighted to have the same characteristics as children of divorce. Once the appropriate counterfactual has been constructed, then the differences between the children's outcomes from this counterfactual sample of children of divorce represent the true divorce skills gaps, instead of

misspecification error due to the nonlinearity of the underlying conditional expectation.(Fortin et al., 2011)

One drawback of this decomposition however, is that it does not offer a simple way of performing a detailed decomposition of the difference in mean and quantiles. For this reason, we combine weights and the generalized O-B methods to appropriately compute counterfactual of the statistic of interest. More precisely, we use weighted least squares estimation of the linear regression of the RIF for the children of intact families as:

$$RIF(y_0) = X_0\beta_0^{WR} + u_0 \tag{9}$$

with weights given by

$$w(X) = \frac{P(j=1|X)P(j=0)}{P(j=0|X)P(j=1)} \tag{10}$$

where j takes value 0 for children of intact families (reference group) and value 1 for children of disrupted families, and $P(j=0|X)$ is the conditional probability of being a child of intact family estimated with a logit model. In other words, we reweight the sample of children of intact families so that the distribution of their characteristics (X) is similar to that of children of divorce. As noted by Roams and Rotnitzky (1995), this method is double-consistent because the estimation of the weighted regression is consistent if either the weights (i.e. the logit model) are correctly estimated *or* if the linear regression model is correctly specified.

Then, we consider as counterfactual children of intact families (reference group) as if they had the same distribution of characteristics of children of divorce (comparison group), as $\overline{X_1}\hat{\beta}_0^{WR}$ and finally compute the reweighted decomposition of the mean gap as follows:

$$\begin{aligned} \overline{y}_0 - \overline{y}_1 &= \overline{X_0}\hat{\beta}_0 - \overline{X_1}\hat{\beta}_1 + \overline{X_1}\hat{\beta}_0^{WR} - \overline{X_1}\hat{\beta}_0^{WR} \\ &= [\overline{X_1}(\hat{\beta}_0^{WR} - \hat{\beta}_1)] + [(\overline{X_0}\hat{\beta}_0 - \overline{X_1}\hat{\beta}_0^{WR}] \end{aligned} \tag{11}$$

where the two terms in the square brackets represent respectively the composition effect and the residual effect. According to Firpo et al. (2007) and Fortin et al. (2015) the composition effect consists of two parts, i.e. the pure composition effect and the specification error in the linear model. Therefore, if the model is linear, the specification error should be zero. When the composition effect computed with the reweighting approach and the composition effects computed with the generalized O-B are similar, we can rely on the detailed decomposition results provided by the generalized O-B.

As pointed out by Firpo et al. (2007), the weighting approach requires the assumption of common support (i.e. the range of the predicted probability of divorce must be the same for children of divorce and children of intact families). To include also this aspect, we repeat the analysis on a restricted sample where the common support is imposed and we obtain very similar results.

Th empirical results described in the following section are based on the mean and the generalized O-B decomposition to estimate compositional and residual effects, but we use the reweighting approach as robustness analysis.

5 Empirical Results

5.1 Decomposing the mean divorce skills gaps

Table 4 summarises the results of the decomposition at the mean of the explained and unexplained components. The first column shows what we call the *divorce skill gap*, i.e. the raw gap of cognitive (top panel) and noncognitive (bottom panel) skills between children of intact and disrupted families with correspondent standard errors in the second column. The third column indicates the amount of the divorce skill gap that is explained according to O-B decomposition method which represents the difference between the actual mean and the counterfactual, i.e. the outcomes that the children of intact families would have if they had the same characteristics as the children of divorce. The fifth column shows the unexplained part, which is the difference between the mean skill gap and the explained component.

With regard of cognitive skills gaps (top panel of Table 4), results show that a 3 years old child whose parents divorced during his early childhood (between 9 months and age 3), has on average 22.1% of a standard deviation lower cognitive skills compared to a child of intact families. Of this gap, 8 percentage points (column 3) are explained by differences in observed characteristics, whilst 14.1 percentage points (column 5) are left unexplained. At age 5 however, the divorce cognitive skill gap is 0.173, i.e. children of divorce have on average 17.3% of a standard deviation lower cognitive skills, and this gap is almost entirely explained by observed characteristics, which account for 14.3 percentage points of the gap and the residual unexplained component (2.9 percentage points) is not statistically significant. Similar results can be found for the divorce skills gaps at age 7, with children of divorce having 26.3% of a standard deviation lower skills compared to children of intact families; of this gap 22 percentage points can be explained by differences in observed characteristics between the two groups with no significant explained component. Likewise, the divorce skill gap at age 12 is 0.276 with 0.237 of this gap explained by observed characteristics and insignificant unexplained component.

The rest of the table can be interpreted in the same vein, with an overall pattern indicating that, regardless the timing of parental separation and the age of the child, the gaps largely reflect compositional differences in the covariates between the two groups of children with residual components rarely statistically significant.[32] The results seem also to suggest that the divorce

[32]There are only few cases in which instead some of this gap is left unexplained, this is the case for separation

cognitive skills gaps, and consequently the explained components, decrease for separation in late childhood. Indeed, a child who experience parental separation between age 5 and 7 has much lower gap of 12.6% standard deviation at age 7 and 11.3% standard deviation at age 12. The correspondent explained components are larger than the raw gaps, respectively 16.4% and 15.7% suggesting that given their observed characteristics children of intact families should have even larger cognitive outcomes, as their characteristics over-explain the mean gap.[33]

To understand how important are these gaps, we can compare our divorce skill gaps with the results of other studies using MCS analyising child development. For instance, Del Bono et al. (2015) find that a standard deviation increase in maternal time investment increases cognitive outcomes significantly by 13% of a standard deviation at age 3. Similarly, they show that having a mother with at least a university degree is associated with an increase of cognitive abilities of 33% of sd compared to having a mother without qualification. Therefore the magnitude of the divorce cognitive skills gaps found in our analysis which range from 11.3% to 27.6% is substantial.

The bottom panel of Table 4 features the mean noncognitive skills gaps by age and timing of separation which appear to be larger than the cognitive skills gaps.[34] The noncognitive skills gaps at age 3 for separation occurred between 9 months and age 3 is 0.260. This means that on average a 3 years old child with divorced parents has 26% of a standard deviation lower noncognitive skills compared to his counterpart from an intact family. Of this gap, the differences in observed characteristics over-explain (27.4 pp) the mean gap, suggesting that, given their covariates, children from intact families should have even higher noncognitive skills compared to children of divorce. At age 5 the noncognitive skills gap is of 0.368 with an explained component corresponding to 0.281 and no significant unexplained component. Overall, similarly to what we found for cognitive skills, the divorce noncognitive skills gaps appear to be largely explained by compositional differences.[35] In addition to that, noncognitive skills gaps also present other interesting figures. Noncognitive skills gaps appear to increase in the long run, but to be lower the later the separation occurs. For instance, for separation between 9 months and age 3 the

between 9 months and age 3 on children cognitive skills at age 3 and for separation between age 3 and 5 on children cognitive outcome at age 7. However, it is clear that the observed characteristics play a major role in explaining the gap between the two groups.

[33]Notice that we consider a balanced panel in the three different samples for separation at different stages of childhood (5251 observations for separation between 9 months and age 3; 5351 for separation between age 3 and 5; and 5671 for separation between age 5 and 7), so that the results across ages are comparable within each set of observations

[34]Both cognitive and noncognitive skills have been standardised to have mean 0 and standard deviation of 1, hence these results are directly comparable.

[35]However, some unexplained gap is found in the medium term (at age 7 and 12) for separation in early childhood (9 months) and at age 7 for separation between age 3 and 5.

skills gaps increases from 0.260 at age 3 to 0.468 at age 12. However, separation in late childhood between age 5 and 7 is associated with lower skill gaps of 0.234 and 0.292 respectively at age 7 and 12. This suggests that experiencing divorce in early childhood is associated with higher noncognitive disadvantages for the child, which tent to be exacerbated in the long run. The explained components of the noncognitive skills gap follow the same pattern.

It is important to remark that our aim is to describe the divorce skills gaps rather than to provide a causal interpretation of the results. However, according to Słoczyński (2015) the presence of some significant residual components both in explaining the cognitive and noncognitive skills gaps is consistent with significant treatment effect of divorce. Those results are in line with the related empirical literature finding a negative impact of divorce on both children's (Amato and Anthony, 2014) and adolescent/adult's outcomes (Frimmel et al., 2016). More importantly, our results on the detailed decomposition described below (Section 5.2) show how some differences in the set of factors accounting for the divorce gaps in cognitive and noncognitive skills may provide some insights in explaining the disparity in the literature.

5.2 What accounts for the mean divorce skills gaps?

Given the major role played by the *compositional effects* in explaining the divorce skills gaps, appropriate policy responses to narrow the gaps potentially depend on the factors that mainly contribute to explain these differences. We consider six sets of factors such as child characteristics, demographic characteristics, parents' education, parent's health, family financial resources and quality of parental relationship and we identify the relative importance of some of these factors in explaining the divorce skills gaps.

We begin by discussing the detailed decomposition of the explained divorce cognitive skills gaps by age and timing of separation reported in Table 5. Here we indicate the contribution of each of the group of variables to the difference between the two groups of children. Most notable is the fact that, regardless the timing of separation and the age at which the gap is observed, the two groups of variables that appear to contribute mostly to the explained cognitive skills gaps are parents' education and the financial resources of the family. The detailed decomposition of the divorce cognitive skills gaps for separation in early childhood is showed in Panel A of Table 5. For cognitive skills at age 3 (column 1), differences in parents' education between children of intact and disrupted families account for 5.9 out of 8 percentage points of the explained divorce gap. This would mean that if the average differences in parental education between children of intact and disrupted families was removed, the divorce skill gap would be associated with a reduction of 26.7% (0.059/0.221= 0.267, other things being equal). Parental education contributes 0.05 out of 0.143, 0.076 out of 0.220 and 0.084 out of 0.237 of the explained gaps

in cognitive skills, respectively at ages 5, 7 and 12 (columns 2,3 and 4). Similar figures can be found when looking at separation between age 3 and age 5 (Table 4, panel B) and at separation between age 5 and 7 (Table 4, panel B). Overall, the contribution of parental education to the explained gap is around 35%.

With regard to financial resources variables, at age 3 differences in financial resources over-explain the differences in cognitive skills gaps (0.119 out of 0.080). This means that removing the differences in financial resources between the two groups the divorce skill gap would be associated with a reduction of 53% (0.119 / 0.221, other things being equal). For the cognitive skills gap at age 5, financial resources contribute 0.09 out of 0.143, at age 7 for 0.133 out of 0.220 and finally at age 12 for 0.126 out of 0.237. The same pattern can be found when looking at separation in later childhood (Panel B and C of Table 5) In general, differences in financial resources accounts for around 50% of the explained divorce differences in cognitive skills.

None of the other groups of variables seems to play any role in accounting for the explained divorce cognitive gaps. If significant their contribution is very little in proportion to the contribution of parental education and family financial resources. For separation occurred between age 3 to 5 (Panel B, Table 5) or between age 5 to 7 (Panel C, Table 5) we find similarly impressive results in the accounting power of parents' education and financial resources.

There are several mechanisms through which we might explain how these two sets of factors, i.e. parental education and finanical resources, are strongly correlated with children's cognitive development and how they account for most of the divorce skills gaps, for example: (i) better financial circumstances may imply higher financial investment on child development; (ii) an higher level of parental education may increase investments in child's human capital in terms of access to additional resources or networks; (iii) parents with higher level of education may have higher parenting skills and therefore may invest more or more effectively in child's development; (iv) parental education is likely to be correlated with parental cognitive abilities: if cognitive abilities are transmitted from parents' to children, then parental education is likely to be correlated with children's cognitive skills. This conveys a pattern of intergenerational transmission of cognitive abilities which account for a substantial part of the gap.

In Table 6, we present the detailed decompositions of the explained divorce noncognitive skills gaps by age and timing of separation. As already pointed out, the gap in noncognitive skills are larger and, differently from the cognitive skills but consistently with the higher malleability of noncognitive skills (Heckman, 2000), almost all the group of variables contribute significantly in explaining the gap. However, it appears that different dimensions of skills have also different factors contributing in their corresponding divorce gaps. In contrast with the cognitive gaps, the sets of factors that mostly contribute to the noncognitive gaps are the interparental conflicts and the financial resources of the family.

Panel A of Table 6 shows the contribution of each set of variables to the divorce noncognitive skills gaps for divorce occurred in early childhood (between 9 months and age 3 of the child). For 3 years old children's noncognitive skills (column 1), differences in interparental conflicts account for 0.108 out of 0.274 of the explained gap. This suggests that if the average differences in interparental conflicts between the two groups of children was removed, then the divorce noncognitive skills gap would be narrowed by 41.5% (0.108/0.260= 0.415, other things being equal). For 5 years old children (column 2), the interparental conflicts account for 0.121 out of 0.281 of the explained gap, for 7 years old children of 0.098 out of 0.263 and finally, for 12 years old children for 0.099 out of 0.307 of the explained gap. It therefore appears that interparental quality of relationship not only matters but it is able to mostly explain the difference in behavioural problems between children of disrupted and intact families and indeed is the biggest factor contributing to the gap. Specifically, interparental conflicts explain a range of 32% (at age 12 for separation in early childhood, 0.099/0.307) to 66% (at age 7 for separation in late childhood 0.157/0.239), with an overall explanatory power of around 50% of the explained gap.

What may be the mechanisms that drive these correlations between interparental conflicts and children's noncognitive development? Few examples are (i) couples with higher partnering skills may have higher parenting skills, whereas the quality of parenting of high conflictual couples may reflect these factors (Carlson and Magnuson, 2011); (ii) families with better interparental relationship can collaborate in parenting activities more easily and effectively and this is likely to influence parent-child relationship quality and in turn child wellbeing. (Adamsons et al., 2007; Fine and Kurdek, 1995; Hanson et al., 1996; Carlson and Magnuson, 2011); (iii) interparental conflicts is likely to be correlated with parental noncognitive abilities, such as personality traits and psychological distress. If noncognitive abilities are intergenerationally transmitted either directly or indirectly, then interparental relationship is likely to be correlated with children's noncognitive skills.[36]

Financial resources are another set of variables that has consistent explanatory power, regardless the timing of separation and the age of the child, for why children of intact families have higher noncognitive skills than children of divorce. For divorce occurred in early childhood (Panel A, Table 6) they account for 0.095 to 0.101 of the divorce skills gaps. We find that differences between the two groups of children in financial resources are the second most important factor contributing to the explained divorce noncognitive skills gap accounting for about 30%

[36]The related psychological literature shows that the channels through which conflicts may affect children noncognitive outcomes are various. Specifically, conflicts may affect children internalising behaviour directly because in case of interparental conflicts children can more easily develop problems such as anxiety and depression if they also perceive threat and self-blame(Grych et al., 2000). On the other hand, externalizing behaviour may be affected by interparental conflicts more indirectly, and the intergenerational transmission of socio-emotional skills may be one explanation.

of it. Overall this implies that, about 80% of the explained divorce noncognitive skills gaps are accounted for by the quality of parental relationship that the child is exposed to and the financial circumstances of the family before divorce.

Differently from the results for cognitive development, parents' education does not seem to play an important role in explaining the noncognitive skills gaps, or at least much smaller than the role played in explaining the cognitive skills gaps. In contrast, the quality of relationship between parents is the key variable to account for the divorce noncognitive gaps. Therefore, our results point out that neglecting to account for interparental conflicts when establishing the impact of separation on children or adolescent outcomes may bias the results upward. This is because, although conflicts appear to impact only on children noncognitive outcomes, it is well established that both cognitive and noncognitive skills are determinants of later outcomes (Cunha et al., 2010). This finding may offer an explanation for the mixed results provided by the literature so far.

Taken together, our results indicate that different dimensions of skills have different factors contributing to the corresponding divorce gaps and convey an interesting pattern for which, when comparing children cognitive and noncognitive abilities between children of intact and disrupted families, a common factor between the two kind of skills is the role played by the financial resources, although more relevant for cognitive skills. More interestingly instead, a large part of the gap in cognitive skills is explained by parental education, whilst a large part of the gap in noncognitive development is explained by the interparental quality of relationship. Acknowledging that on the one hand, parental education is highly correlated with parental cognitive abilities and, on the other hand the interparental conflicts is correlated with parents' noncognitive skills, there is room for interpreting our results in terms of intergenerational transmission of abilities as one of the most important mechanisms behind the divorce skills gaps.

5.3 Divorce skills gaps across the children's skills distributions

Tables 7 and 8 feature the results of the Oaxaca-Blinder decomposition at the 25th, 50th, 75th, 90th percentile distribution of cognitive and noncognitive skills and include total differences (column 1), the explained (column 3) and the unexplained part (column 5) and their corresponding standard errors.

Table 7 indicates that children of intact families score higher on cognitive tests at all quantiles of cognitive skills distribution consistently with our previous analysis. Although the differentials and the explained components are not homogenous across the entire distribution of cognitive skills, there does not seem to be any clear pattern of pronounced inequalities across children cognitive skills' distributions. In contrast with our expectations, children with lower cognitive

skills do not seem to be more vulnerable to parental divorce compared to higher skilled children. These results therefore provide a robustness analysis of the mean decomposition suggesting that the average decomposition of the divorce cognitive skills gaps is able to capture the main elements of our analysis. Consistently with our decomposition results at the mean, the third and fifth column of Table 7 show that the raw gap is mostly explained by compositional differences in covariates with residual component rarely different from zero at standard significance levels.[37]

Table 8 instead shows the results for the decomposition across the noncognitive skills distribution by the timing of separation. Similarly to the decomposition across the cognitive skills distribution, differentials are always statistically significant regardless the age and the timing of separation but their statistical significance becomes less strong when looking at separation in late childhood (Panel C, Table 8). As already noticed when analysing the decomposition at the mean, the divorce noncognitive gaps are much higher than the cognitive skills gaps. In addition to that, exploiting inequalities across the children's skills distributions we discover another difference between divorce gaps in cognitive and noncognitive skills. Consistently with the dynamic complementarities characterizing skills (Cunha et al., 2010), we find a pronounced pattern of decreasing differentials across the distribution of noncognitive abilities. For example, the divorce noncognitive skills gaps for separation in early childhood (Panel A, Table 8) decreases from 0.273 at the 25th quantile to 0.117 at the 90th quantile at age 3, and from 0.499 at the 25th to 0.158 at the 90th at age 5.[38] Very similar figures can be found in Panels B and C of Table 8 revealing inequalities in the divorce gaps across children's skills also when looking at divorce between age 3 and 5 and between 5 and 7 of the child. Accordingly, focusing on the explained part showed in column 3, we notice that the explained proportion visibly decreases on average of 2/3 when comparing the 25th quantile with the 90th quantile.[39]

Overall, looking beyond the mean, the decomposition reveals that whilst there are no evident inequalities in the divorce gap across the children's cognitive skills distributions, the divorce noncognitive skills gaps are more pronounced at the lower tail of the distribution rather than at the upper tail. This result is coherent with the higher plasticity of noncognitive skills compared with cognitive skills. In light of the dynamic-complementarity which characterizes children skills, this result highlights that, policy responses should target children with larger noncognitive disadvantages.

[37] Considering the detailed decomposition across the distribution we find that each group of covariates in proportion contributes equally across the distribution. Results are available upon request.

[38] When comparing the divorce skills gap across ages at the 25th quantile (Panel A, Table 7) we notice that, consistently with the results at the mean, the divorce gap increases in the long run, from 0.273 at age 3 to 0.628 at age 12. This sharp increase however, is not entirely reflected in the explained component (column 3). Indeed, at the lower tail of the distribution there is some significant residual part left unexplained.

[39] Considering the detailed decomposition across the distribution we find that each group of covariate in proportion contributes equally across the distribution. Results are available upon request.

6 Sensitivity Analyses

We carry out several robustness checks and sensitivity analyses to address some of the discussed drawbacks of our methodology: (i) robustness check of generalized O-B method by considering a reweighted O-B decomposition, (ii) common support problem, (iii) the choice of the counterfactual (iv) measurement error on the variable explaining interparental conflicts.

6.1 Reweighted Oaxaca-Blinder decomposition

As discussed in Section 4, the detailed decomposition of the explained part provided by the generalised O-B method is reliable only if the composition effects estimated with a reweighted O-B method are similar to the composition effects estimated with the unweighted O-B method. We decompose the divorce skills gaps at the mean using the more robust reweighted decomposition methodology (Fortin et al., 2011) to separate composition effects from residual effects. More precisely, we construct a counterfactual sample of children of intact families reweighted to have the same characteristics of children of divorce. Then differences between skills from this counterfactual sample and those of children of intact families represents the true divorce skills gaps, with no misspecification error due to the nonlinearity of the underlying conditional expectation. As explained in Section 4, we use a logit model to compute the appropriate weights with the same explanatory variables used in the rest of our analysis.

Table 9 reports the results for the mean divorce skills gaps using the reweighted method.[40] Overall, composition effects are quite similar comparing the two methodologies, assessing the reliability of our detailed decomposition analysis provided in Table 6 and 7. If something, there are few cases in which the composition effects computed with the unweighted methodology are underestimated, which would suggest that the accounting power of the factors that mainly explain the divorce skills gap may be underestimated as well. However, this would not change the insights provided in our analysis, indeed this would suggest that the accounting power of some of the factors may be stronger.

6.2 Common support

To address the common support issue we repeat our analysis following Dehejia and Wahba (2002) and Słoczyński (2015) and we adopt two different rules in order to improve overlap. First, we delete from our sample all children of divorce whose estimated propensity score is less than the minimum or greater than the maximum estimated propensity score for children of intact families. With this rule we want to avoid that decomposition is provided for those children

[40] The same analysis is provided across quantiles. Results are available upon request

of divorce who have no counterparts among children of intact families. Second, we restrict our sample by deleting all children of intact families whose estimated propensity score is less than the minimum or greater than the maximum estimated propensity score for the children of divorce. This is to guarantee that none of the dissimilar children of intact families is used to calculate the counterfactual outcome of the children of divorce. Implementing both strategies we find no statistical significant differences in the decomposition results.[41]

6.3 Choice of the counterfactual

Another limitation of the Oaxaca–Blinder decompositions is that the decomposition may be sensitive to the choice of the reference group. Our choice of the counterfactual, children of intact families looking as children of divorce, depends on our economic question of interest. Since we want to establish the factors that account for the divorce skills gaps, we ask what would have been the skills of children of intact families if they had the same characteristics of children of divorce. We argue that the children of intact families' skills represent the appropriate counterfactual for the children of divorce's skills in absence of causal impact of divorce on children outcomes.We therefore assume that the model for children of intact families represents the true model and that ideally the return to the characteristics of children of divorce would be equivalent to those for children of intact families.

To test for the robustness of our results that may depend on the choice of the counterfactual, we consider an alternative counterfactual of children of divorce with children of intact families' characteristics. Results are shown in Table 10 and are consistent with those from our primary decomposition provided in Table 4.

7 Conclusion

Using a longitudinal cohort member survey from the UK, which contains a large set of variables characterising the environment where the child grows, this paper investigates which factors among a set of plausible suspects — child characteristics, demographic characteristics, parents' education and health, family financial resources and interparental conflicts — are relatively more important in accounting for divorce cognitive and noncognitive skills gaps of children, also allowing for inequalities across children's outcomes distributions. Differently from other studies that aim at establishing the impact of divorce on children later outcomes, we aim at determining the drivers of the divorce skills gaps in the short and medium term up until age 12. Given the malleability of skills in early childhood and the higher effectiveness of early intervention in filling

[41] Results available upon request.

the gap arising in early childhood, understanding the channels through which the divorce skills gaps may be explained is crucial, and our analysis turns out to be very informative in terms of potential policies aimed at narrowing the well-established divorce skills gaps.

Our findings show that the divorce gaps in cognitive and noncognitive skills are mostly explained by compositional differences in the covariates that characterise children of intact and disrupted families, indicating a marginal role of separation *itself*. By comparing different dimension of skills, as cognitive and noncognitive, our results indicate that the divorce gaps in cognitive and noncognitive skills have different mediating factors. Cognitive skills gaps are explained by parental education and family financial resources, but they are almost insensitive to any other family characteristics including interparental conflicts. Conversely, noncognitive skills gap are mostly explained by interparental conflicts and family financial resources. Adding this measure of interparental conflicts to the set of conditioning variables that is commonly used in the literature make no differences in explaining the gap in cognitive skills but strongly explains the noncognitive gap, therefore providing a meaningful insight to reconcile the ambiguous evidence obtained so far in the literature on the impact of separation on children, adolescent or adult outcomes. Our results contribute further to the empirical literature showing strong differences in the production functions of these two important dimensions of skills, as cognitive and noncognitive (e.g. similar results are found in Fiorini and Keane (2014)). We also provide the first evidence beyond the mean of the divorce skills gaps by exploring the outcome differentials across the entire distribution of children outcomes, finding a wider gap in noncognitive skills –although almost entirely explained by observable characteristics- among children in the lower tail of the distribution. Our results are also robust to a set of sensitivity analysis aimed at addressing the drawbacks of the Oaxaca-Blinder methodology.

In the political, economic and public debate about the relationship between divorce and child development where the attempt is either to evaluate divorce reforms or to justify pro-marriage policies, this paper offers a more comprehensive view of the children of divorce skills gaps highlighting the role of parent's education, interparental conflicts and financial resources as the main factors accounting for the gaps. Digging deeper in the interpretation of our results and comparing the determinants of the cognitive and noncognitive gap, our results indicate that the intergenerational transmission of skills is one of the main mechanisms for the lower achievements of children of divorce.

On the basis of this evidence, our findings suggest that interventions aimed at addressing poverty, interparental conflicts and parental education are potential policy instruments to narrow the skills gaps arising between children of intact and disrupted families. Given the crucial role played by the quality of parental relationship in explaining the divorce noncognitive skills gaps, our results emphasize that any interventions intended at encouraging parental cooperation and

making parents aware of the potential negative impact of conflicts, before, during and after divorce, may represent an effective response to reduce the divorce noncognitive skills gaps, especially if targeted to more disadvantaged children.

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Table 1: Mean of the outcome variables by parental separation

	Separation 9 months-age 3			Separation age 3-5			Separation age 5-7		
	Not Separated	Separated		Not Separated	Separated		Not Separated	Separated	
Outcome variables									
Cognitive skills age 3	0.188	-0.033	*						
Cognitive skills age 5	0.146	-0.026	*	0.142	0.005	*			
Cognitive skills age 7	0.144	-0.120	*	0.140	-0.113	*	0.123	-0.003	*
Cognitive skills age 12	0.144	-0.132	*	0.131	-0.119	*	0.116	0.003	*
Noncognitive skills age 3	0.111	-0.149	*						
Noncognitive skills age 5	0.150	-0.218	*	0.139	-0.159	*			
Noncognitive skills age 7	0.166	-0.240	*	0.156	-0.209	*	0.138	-0.096	*
Noncognitive skills age 12	0.154	-0.313	*	0.143	-0.159	*	0.134	-0.157	*
Observations	4907	344		5013	338		5365	306	

Sources: UK Millennium Cohort Study

Notes: Sample includes all singleton children interviewed at 9 months and age 3-5-7 and 12, for whom the main respondent is the natural mother and the partner respondent is the natural father, who are either married or cohabiting and that have no missing observations in our set of relevant variables. Asterisk indicates statistically significant difference in the two groups at the 5 percent level.

Table 2: Mean of the explanatory variables by parental separation

	Separation 9 months-age 3			Separation age 3-5			Separation age 5-7		
	Not Separated	Separated		Not Separated	Separated		Not Separated	Separated	
Explanatory variables									
Child characteristics									
Age 3 in months	37.286	38.497	*						
Age 5 in months	62.450	62.709		62.449	63.059	*			
Age 7 in months	86.552	86.733		86.554	86.941	*	86.580	86.631	
Age 12 in months	133.849	134.311	*	133.835	134.414	*	133.866	133.765	
Female	0.507	0.503		0.500	0.512		0.500	0.516	
Birth Weight	3.447	3.373	*	3.444	3.354	*	3.435	3.379	
Demographic characteristics									
Number of Siblings	0.845	0.762		1.135	1.145		1.366	1.500	*
Cohabiting	0.200	0.578	*	0.202	0.396	*	0.200	0.314	*
Duration of relationship	5.699	3.701	*	5.685	4.589	*	5.700	4.974	*
Planned pregnancy	0.713	0.497	*	0.713	0.571	*	0.709	0.605	*
Mother religious	0.620	0.422	*	0.617	0.518	*	0.623	0.497	*
Mother age	30.657	26.166	*	30.667	27.722	*	30.599	28.670	*
Father age	32.988	29.209	*	33.000	31.186	*	32.979	31.935	*
Mother Ethnicity: White	0.927	0.965	*	0.931	0.944		0.911	0.951	*
Father Ethnicity: White	0.926	0.942		0.931	0.938		0.911	0.938	
Parents etnical difference	0.031	0.047		0.030	0.044		0.030	0.016	
Parents' education									
Mother's education									
GCSE/O-level(or eq)	0.313	0.462	*	0.313	0.459	*	0.314	0.418	
A level or more but below uni	0.154	0.183		0.155	0.157		0.151	0.160	
University degree or higher	0.487	0.235	*	0.486	0.305	*	0.481	0.327	*
No qualification	0.046	0.119	*	0.046	0.080	*	0.053	0.095	*
Father's education									
GCSE/O-level(or eq)	0.310	0.430	*	0.313	0.417	*	0.311	0.422	
A level or more but below uni	0.160	0.189		0.160	0.195		0.156	0.190	
University degree or higher	0.465	0.212	*	0.465	0.263	*	0.465	0.291	*
No qualification	0.065	0.169	*	0.063	0.124	*	0.069	0.098	*
Psychosocial/Health Characteristics									
Mother Health:Good	0.876	0.788	*	0.878	0.822	*	0.644	0.601	*
Father Health: Good	0.881	0.808	*						
Grandparents separation	0.364	0.642	*	0.365	0.550	*	0.360	0.526	*
Financial Resources									
OECD eq income	398.949	276.297	*	431.131	329.880	*	446.109	369.077	*
House tenure: Own House	0.847	0.488	*	0.872	0.683	*	0.880	0.706	*
House tenure: Rent house	0.131	0.468	*	0.112	0.302	*	0.105	0.278	*
House tenure: Other	0.022	0.044	*	0.017	0.015		0.015	0.016	
Number of rooms	5.841	5.041	*	6.328	5.609	*	6.511	5.941	*
Mother's occupation									
Manag and profl	0.441	0.186	*	0.418	0.281	*	0.397	0.268	*
Intermediate	0.252	0.195	*	0.287	0.222	*	0.296	0.291	
Routine and manual	0.283	0.555	*	0.279	0.464	*	0.286	0.402	*
Never worked	0.024	0.064	*	0.016	0.033	*	0.021	0.039	*
Father's occupation									
Manag and profl	0.492	0.227	*	0.489	0.284	*	0.492	0.304	*
Intermediate	0.181	0.157		0.206	0.201		0.211	0.248	
Routine and manual	0.317	0.599	*	0.304	0.503	*	0.292	0.444	*
Never worked	0.010	0.017		0.002	0.012	*	0.005	0.003	
Quality of relationship									
Interparental Conflicts	-0.150	0.564	*	-0.127	0.772	*	-0.103	0.893	*
Observations	4907	344		5013	338		5365	306	

Sources: UK Millennium Cohort Study

Notes: Sample includes all singleton children interviewed at 9 months and age 3-5-7 and 12, for whom the main respondent is the natural mother and the partner respondent is the natural father, who are either married or cohabiting and that have no missing observations in our set of relevant variables. Asterisk indicates statistically significant difference in the two groups at the 5 percent level.

Table 3: Interparental Conflicts: Factor Loadings

	Variable	Factor Loadings
9 months	Partner sensitive and aware of needs	0.6736
	Partner doesn't listen	0.6647
	Sometime lonely when with partner	0.6809
	Relationship full of joy and excitement	0.6360
	Wishes was more warmth and affection	0.6778
	Suspect on brink of separation	0.5351
	Can make up quickly after argument	0.4156
	Frequency go out as a couple[a]	0.2095
	Happy/Unhappy with relationship[c]	0.5422
	% Total variance explained by the factor	33.55
Age 3	Partner sensitive and aware of needs	0.6532
	Sometime lonely when with partner	0.7003
	Suspect on brink of separation	0.6518
	Frequency go out as a couple[a]	0.2630
	How often disgree over issue on child[b]	0.3532
	Happy/Unhappy with relationship [c]	0.6130
	% Total variance explained by the factor	31.86
Age 5	Partner sensitive and aware of needs	0.6874
	Partner doesn't listen	0.7239
	Sometime lonely when with partner	0.7399
	Suspect on brink of separation	0.6577
	Frequency go out as a couple[a]	0.2451
	How often disagree over issue on child	0.2820
	Happy/Unhappy with relationship[c]	0.6283
	% Total variance explained by the factor	35.87

Source: UK Millennium Cohort Study.

Notes: Respondents were asked whether they strongly agree, agree, neither agree nor disagree, disagree or strongly disagree with the statement (5-Point Likert-type agreement scales). See subsection 3.3.1 for details.

a Respondents are asked to indicate how frequently they go out as couple on a 4 points scale, ranging from 'once a week' to 'hardly never'.

b Respondents report how frequently they argue with each other on issues concerning child on a 6 point scale, ranging from 'never' to 'more than once a day'.

c it is a 7 point scale item.

Table 4: Mean divorce skills gaps by age and timing of separation

	(1) Difference	(2) se	(3) Explained	(4) se	(5) Unexplained	(6) se	(7) Observations
Cognitive skills							
Separation 9 months-age 3							
Age 3	0.221***	(0.054)	0.080***	(0.030)	0.141**	(0.055)	5251
Age 5	0.173***	(0.039)	0.143***	(0.019)	0.029	(0.040)	5251
Age 7	0.263***	(0.045)	0.220***	(0.024)	0.043	(0.046)	5251
Age 12	0.276***	(0.058)	0.237***	(0.026)	0.039	(0.061)	5251
Separation age 3-5							
Age 5	0.137***	(0.037)	0.097***	(0.019)	0.039	(0.037)	5351
Age 7	0.252***	(0.045)	0.157***	(0.023)	0.096**	(0.047)	5351
Age 12	0.250***	(0.054)	0.159***	(0.024)	0.090	(0.055)	5351
Separation age 5-7							
Age 7	0.126**	(0.050)	0.164***	(0.023)	-0.038	(0.049)	5671
Age 12	0.113*	(0.059)	0.157***	(0.026)	-0.045	(0.059)	5671
Noncognitive skills							
Separation 9 months-age3							
Age 3	0.260***	(0.053)	0.274***	(0.025)	-0.014	(0.054)	5251
Age 5	0.368***	(0.053)	0.281***	(0.024)	0.087	(0.054)	5251
Age 7	0.406***	(0.054)	0.263***	(0.023)	0.143**	(0.056)	5251
Age 12	0.468***	(0.059)	0.307***	(0.025)	0.160***	(0.059)	5251
Separation age 3-5							
Age 5	0.298***	(0.050)	0.261***	(0.023)	0.037	(0.051)	5351
Age 7	0.364***	(0.057)	0.241***	(0.022)	0.123**	(0.057)	5351
Age 12	0.302***	(0.050)	0.276***	(0.024)	0.026	(0.050)	5351
Separation age 5-7							
Age 7	0.234***	(0.052)	0.239***	(0.023)	-0.006	(0.054)	5671
Age 12	0.292***	(0.052)	0.274***	(0.023)	0.018	(0.054)	5671

Source: UK Millennium Cohort Study.

Notes: Dependent variable is children cognitive and noncognitive outcomes, respectively in the top and bottom panel. Explanatory variables are: (i) *child characteristics* such as, child age in months, child sex and birth weight; (ii)*Demographic characteristics* as, number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parent's age, parent's ethnicity and whether parents have the same ethnicity; (iii)*parental education*; (iv) *psychological-health characteristics* such as, parent's general health and whether children's grandparents were separated; and (v) *family financial resources* as, family income, housing tenure, number of rooms in the house, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification); (vi)*interparental conflicts*. Statistical significance at the 1 - 5 and 10 percent indicated by ***, ** and *.

Table 5: Detailed decomposition of explained cognitive gaps

	(1) Cognitive skills age 3	(2) Cognitive skills age 5	(3) Cognitive skills age 7	(4) Cognitive skills age 12
Panel (a):Separation 9 months-Age 3				
Total Difference	0.221***	0.173***	0.263***	0.276***
Total Explained	0.080***	0.143***	0.220***	0.237***
	(0.030)	(0.019)	(0.024)	(0.026)
Child characteristics	-0.088***	-0.005	0.000	-0.004
	(0.018)	(0.009)	(0.008)	(0.005)
Demographic characteristics	-0.024	-0.004	-0.007	0.017
	(0.020)	(0.013)	(0.015)	(0.020)
Parents' education	0.059***	0.050***	0.076***	0.084***
	(0.012)	(0.009)	(0.012)	(0.014)
Psychosocial/Health Characteristics	-0.009	0.005	0.006	-0.000
	(0.008)	(0.006)	(0.007)	(0.009)
Financial Resources	0.119***	0.090***	0.133***	0.126***
	(0.021)	(0.014)	(0.018)	(0.021)
Interparental conflicts	0.022**	0.007	0.011	0.015
	(0.010)	(0.008)	(0.009)	(0.011)
Panel (b):Separation Age 3- 5				
Total Difference		0.137***	0.252***	0.250***
Total Explained		0.097***	0.157***	0.159***
		(0.019)	(0.023)	(0.024)
Child characteristics		-0.021**	-0.007	-0.005
		(0.009)	(0.008)	(0.005)
Demographic characteristics		-0.002	-0.007	0.005
		(0.008)	(0.009)	(0.012)
Parents' education		0.041***	0.051***	0.063***
		(0.007)	(0.009)	(0.011)
Psychosocial/Health Characteristics		0.005	0.008	0.006
		(0.004)	(0.005)	(0.005)
Financial Resources		0.063***	0.107***	0.075***
		(0.011)	(0.014)	(0.016)
Interparental conflicts		0.011	0.006	0.015
		(0.011)	(0.013)	(0.015)
Panel (c):Separation Age 5- 7				
Total Difference			0.126**	0.113*
Total Explained			0.164***	0.157***
			(0.023)	(0.026)
Child characteristics			0.003	0.005
			(0.008)	(0.005)
Demographic characteristics			0.003	0.014
			(0.007)	(0.011)
Parents' education			0.045***	0.051***
			(0.009)	(0.011)
Psychosocial/Health Characteristics			0.001	0.005
			(0.004)	(0.005)
Financial Resources			0.078***	0.060***
			(0.013)	(0.014)
Interparental conflicts			0.033***	0.023
			(0.013)	(0.016)

Notes: Dependent variable is children cognitive outcomes. Explanatory variables are: (i) *child characteristics* such as, child age in months, child sex and birth weight; (ii)*Demographic characteristics* as, number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parent's age, parent's ethnicity and whether parents have the same ethnicity; (iii)*parental education*; (iv) *psychological-health characteristics* such as, parent's general health and whether children's grandparents were separated; and (v) *family financial resources* as, family income, housing tenure, number of rooms in the house, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification); (vi)*interparental conflicts.* Statistical significance at the 1 - 5 and 10 percent indicated by ***, ** and *.

Table 6: Detailed decomposition of explained noncognitive gaps

	(1) Noncognitive skills Age 3	(2) Noncognitive skills Age 5	(3) Noncognitive skills Age 7	(4) Noncognitive skills Age 12
Panel (a):Separation 9 months- Age 3				
Total Difference	0.260***	0.368***	0.406***	0.468***
Total Explained	0.274***	0.281***	0.263***	0.307***
	(0.025)	(0.024)	(0.023)	(0.025)
Child characteristics	-0.014*	-0.000	0.001	-0.000
	(0.009)	(0.006)	(0.007)	(0.006)
Demographic characteristics	0.028*	0.030**	0.025*	0.047***
	(0.015)	(0.015)	(0.015)	(0.016)
Parents' education	0.037***	0.019**	0.013	0.033***
	(0.010)	(0.009)	(0.009)	(0.010)
Psychosocial/Health Characteristics	0.020**	0.011	0.019**	0.028***
	(0.008)	(0.008)	(0.008)	(0.009)
Financial Resources	0.095***	0.101***	0.108***	0.101***
	(0.017)	(0.017)	(0.017)	(0.017)
Interparental conflicts	0.108***	0.121***	0.098***	0.099***
	(0.013)	(0.013)	(0.012)	(0.012)
Panel (b):Separation Age 3- 5				
Total Difference		0.298***	0.364***	0.302***
Total Explained		0.261***	0.241***	0.276***
		(0.023)	(0.022)	(0.024)
Child characteristics		-0.005	-0.004	-0.004
		(0.006)	(0.007)	(0.006)
Demographic characteristics		0.024***	0.023**	0.038***
		(0.009)	(0.009)	(0.010)
Parents' education		0.012*	0.008	0.022***
		(0.007)	(0.007)	(0.008)
Psychosocial/Health Characteristics		0.003	0.011*	0.013**
		(0.005)	(0.006)	(0.007)
Financial Resources		0.062***	0.071***	0.065***
		(0.012)	(0.012)	(0.012)
Interparental conflicts		0.164***	0.133***	0.141***
		(0.018)	(0.016)	(0.016)
Panel (c):Separation Age 5- 7				
Total Difference			0.234***	0.292***
Total Explained			0.239***	0.274***
			(0.023)	(0.023)
Child characteristics			-0.003	0.000
			(0.007)	(0.006)
Demographic characteristics			0.021***	0.032***
			(0.007)	(0.007)
Parents' education			0.004	0.014**
			(0.006)	(0.007)
Psychosocial/Health Characteristics			0.007	0.009
			(0.006)	(0.006)
Financial Resources			0.053***	0.051***
			(0.011)	(0.011)
Interparental conflicts			0.157***	0.168***
			(0.018)	(0.018)

Notes: Dependent variable is children noncognitive outcomes. Explanatory variables are: (i) *child characteristics* such as, child age in months, child sex and birth weight; (ii)*Demographic characteristics* as, number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parent's age, parent's ethnicity and whether parents have the same ethnicity; (iii)*parental education*; (iv) *psychological-health characteristics* such as, parent's general health and whether children's grandparents were separated; and (v) *family financial resources* as, family income, housing tenure, number of rooms in the house, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification); (vi)*interparental conflicts*. Statistical significance at the 1 - 5 and 10 percent indicated by ***, ** and *.

Table 7: Decomposition across the cognitive skills distribution

	(1) Difference	(2) se	(3) Explained	(4) se	(5) Unexplained	(6) se
Separation 9 months- Age 3						
Cognitive skills age 3						
25th quantile	0.311***	0.073	0.202***	0.053	0.109	0.085
50th quantile	0.333***	0.072	0.116***	0.041	0.217***	0.078
75th quantile	0.040	0.071	0.031	0.028	0.010	0.071
90th quantile	0.377***	0.098	-0.002	0.054	0.379***	0.105
Cognitive skills age 5						
25th quantile	0.179***	0.054	0.172***	0.026	0.007	0.057
50th quantile	0.146***	0.045	0.119***	0.020	0.027	0.047
75th quantile	0.169***	0.047	0.128***	0.019	0.042	0.048
90th quantile	0.105*	0.063	0.115***	0.021	-0.009	0.063
Cognitive skills age 7						
25th quantile	0.245***	0.063	0.272***	0.034	-0.027	0.068
50th quantile	0.280***	0.058	0.187***	0.026	0.093	0.060
75th quantile	0.270***	0.056	0.167***	0.025	0.103*	0.058
90th quantile	0.197***	0.076	0.155***	0.026	0.042	0.077
Cognitive skills age 12						
25th quantile	0.172***	0.062	0.213***	0.028	-0.041	0.067
50th quantile	0.229***	0.064	0.238***	0.030	-0.008	0.068
75th quantile	0.142***	0.066	0.159***	0.020	-0.017	0.068
90th quantile	0.265***	0.101	0.262***	0.047	0.003	0.108
Separation Age 3-5						
Cognitive skills age 5						
25th quantile	0.146***	0.054	0.126***	0.026	0.020	0.056
50th quantile	0.110**	0.047	0.070***	0.019	0.040	0.046
75th quantile	0.137***	0.044	0.085***	0.019	0.052	0.045
90th quantile	0.115***	0.054	0.075***	0.020	0.040	0.055
Cognitive skills age 7						
25th quantile	0.305***	0.078	0.199***	0.031	0.106	0.081
50th quantile	0.249***	0.060	0.144***	0.025	0.105*	0.061
75th quantile	0.220***	0.060	0.119***	0.024	0.101	0.061
90th quantile	0.200***	0.067	0.097***	0.024	0.103	0.069
Cognitive skills age 12						
25th quantile	0.163**	0.071	0.137***	0.026	0.026	0.073
50th quantile	0.153**	0.062	0.171***	0.028	-0.017	0.064
75th quantile	0.130**	0.060	0.116***	0.019	0.014	0.061
90th quantile	0.358**	0.096	0.170***	0.043	0.188*	0.103
Separation Age 5-7						
Cognitive skills age 7						
25th quantile	0.169**	0.071	0.185***	0.031	-0.016	0.072
50th quantile	0.154**	0.070	0.151***	0.025	0.004	0.070
75th quantile	0.035	0.068	0.135***	0.024	-0.100	0.069
90th quantile	0.048	0.069	0.121***	0.024	-0.073	0.070
Cognitive skills age 12						
25th quantile	0.037	0.070	0.122***	0.026	-0.085	0.071
50th quantile	0.078	0.061	0.154***	0.028	-0.075	0.063
75th quantile	0.025	0.065	0.107***	0.020	-0.083	0.065
90th quantile	0.134	0.117	0.178***	0.042	-0.044	0.122

Notes: Statistical significance at the 1 - 5 and 10 percent indicated by ***, ** and *.

Table 8: Decomposition across the noncognitive skills distribution

	(1) Difference	(2) se	(3) Explained	(4) se	(5) Unexplained	(6) se
Separation 9 months- Age 3						
Noncognitive skills age 3						
25th quantile	0.273***	0.090	0.380***	0.037	-0.106	0.092
50th quantile	0.133**	0.067	0.265***	0.028	-0.132	0.068
75th quantile	0.124**	0.056	0.190***	0.024	-0.065	0.057
90th quantile	0.117**	0.058	0.138***	0.024	-0.021	0.060
Noncognitive skills age 5						
25th quantile	0.499***	0.095	0.340***	0.033	0.160*	0.097
50th quantile	0.272***	0.065	0.273***	0.026	-0.001	0.066
75th quantile	0.204***	0.056	0.175***	0.019	0.029	0.057
90th quantile	0.158***	0.052	0.119***	0.018	0.039	0.054
Noncognitive skills age 7						
25th quantile	0.548***	0.089	0.334***	0.035	0.214**	0.092
50th quantile	0.369***	0.068	0.258***	0.025	0.110	0.069
75th quantile	0.231***	0.058	0.155***	0.018	0.076	0.058
90th quantile	0.107***	0.052	0.087***	0.014	0.021	0.053
Noncognitive skills age 12						
25th quantile	0.628***	0.124	0.381***	0.038	0.248**	0.123
50th quantile	0.354***	0.068	0.296***	0.025	0.058	0.068
75th quantile	0.222***	0.054	0.186***	0.018	0.036	0.054
90th quantile	0.198***	0.051	0.112***	0.015	0.086*	0.051
Separation Age 3-5						
Noncognitive skills age 5						
25th quantile	0.353***	0.099	0.327***	0.032	0.025	0.098
50th quantile	0.198***	0.052	0.259***	0.025	-0.061	0.055
75th quantile	0.276***	0.046	0.149***	0.018	0.128**	0.047
90th quantile	0.218***	0.050	0.118***	0.017	0.100**	0.051
Noncognitive skills age 7						
25th quantile	0.352***	0.098	0.295***	0.032	0.058	0.099
50th quantile	0.225***	0.057	0.240***	0.024	-0.016	0.059
75th quantile	0.223***	0.047	0.148***	0.016	0.076	0.048
90th quantile	0.107***	0.051	0.087***	0.013	0.020	0.051
Noncognitive skills age 12						
25th quantile	0.310***	0.077	0.349***	0.036	-0.039	0.081
50th quantile	0.306***	0.063	0.271***	0.023	0.036	0.063
75th quantile	0.185***	0.049	0.173***	0.016	0.012	0.050
90th quantile	0.197***	0.045	0.116***	0.014	0.081*	0.045
Separation Age 5-7						
Noncognitive skills age 7						
25th quantile	0.326***	0.111	0.294***	0.032	0.032	0.112
50th quantile	0.245***	0.061	0.222***	0.023	0.023	0.063
75th quantile	0.122**	0.059	0.139***	0.016	-0.018	0.059
90th quantile	0.012	0.056	0.089***	0.014	-0.077	0.057
Noncognitive skills age 12						
25th quantile	0.454***	0.096	0.347***	0.035	0.107	0.100
50th quantile	0.294***	0.071	0.267***	0.023	0.026	0.071
75th quantile	0.125**	0.056	0.165***	0.016	-0.040	0.056
90th quantile	0.184***	0.050	0.102***	0.014	0.082	0.050

Notes: Statistical significance at the 1 - 5 and 10 percent indicated by ***, ** and *.

Table 9: Mean divorce skills gaps using reweighted decomposition

	(1) Difference	(2) se	(3) Explained	(4) se	(5) Unexplained	(6) se
Cognitive skills						
Separation 9 months-age 3						
Age 3	0.221***	(0.054)	0.209***	(0.059)	0.012	(0.024)
Age 5	0.173***	(0.039)	0.181***	(0.041)	-0.008	(0.013)
Age 7	0.263***	(0.045)	0.353***	(0.076)	-0.090	(0.062)
Age 12	0.276***	(0.058)	0.234***	(0.081)	0.042	(0.057)
Separation age 3-5						
Age 5	0.137***	(0.037)	0.091	(0.058)	0.046	(0.045)
Age 7	0.252***	(0.045)	0.157**	(0.078)	0.095	(0.064)
Age 12	0.250***	(0.054)	0.066	(0.077)	0.184***	(0.057)
Separation age 5-7						
Age 7	0.126**	(0.050)	0.068	(0.085)	0.058	(0.069)
Age 12	0.113*	(0.059)	0.173*	(0.101)	-0.060	(0.082)
Noncognitive skills						
Separation 9 months-age 3						
Age cog3	0.260***	(0.053)	0.276***	(0.055)	-0.016	(0.015)
Age 5	0.368***	(0.053)	0.400***	(0.077)	-0.032	(0.056)
Age 7	0.406***	(0.054)	0.370***	(0.081)	0.036	(0.060)
Age 12	0.468***	(0.059)	0.501***	(0.080)	-0.033	(0.053)
Separation age 3-5						
Age 5	0.298***	(0.050)	0.236***	(0.072)	0.062	(0.052)
Age 7	0.364***	(0.057)	0.215***	(0.081)	0.149**	(0.057)
Age 12	0.302***	(0.050)	0.213***	(0.076)	0.089	(0.058)
Separation age 5-7						
Age 7	0.234***	(0.052)	0.173**	(0.080)	0.061	(0.060)
Age 12	0.292***	(0.052)	0.204**	(0.091)	0.088	(0.075)

Source: UK Millennium Cohort Study.

Notes: Dependent variable is children cognitive and noncognitive outcomes, respectively in the top and bottom panel. Explanatory variables are: (i) *child characteristics* such as, child age in months, child sex and birth weight; (ii)*Demographic characteristics* as, number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parent's age, parent's ethnicity and whether parents have the same ethnicity; (iii)*parental education*; (iv) *psychological-health characteristics* such as, parent's general health and whether children's grandparents were separated; and (v) *family financial resources* as, family income, housing tenure, number of rooms in the house, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification); (vi)*interparental conflicts*. Statistical significance at the 1 - 5 and 10 percent indicated by ***, ** and *.

Table 10: Mean divorce skills gaps changing the counterfactual

	(1) Difference	(2) se	(3) Explained	(4) se	(5) Unexplained	(6) se	(7) Observations
Cognitive skills							
Separation 9 months-age 3							
Age 3	0.221***	(0.054)	0.029	(0.071)	0.191**	(0.081)	5251
Age 5	0.173***	(0.039)	0.151***	(0.055)	0.022	(0.060)	5251
Age 7	0.263***	(0.045)	0.269***	(0.059)	-0.006	(0.065)	5251
Age 12	0.276***	(0.058)	0.209***	(0.069)	0.068	(0.075)	5251
Separation age 3-5							
Age 5	0.137***	(0.037)	0.085**	(0.042)	0.052	(0.049)	5351
Age 7	0.252***	(0.045)	0.159***	(0.049)	0.094	(0.061)	5351
Age 12	0.250***	(0.054)	0.145**	(0.060)	0.104*	(0.062)	5351
Separation age 5-7							
Age 7	0.126**	(0.050)	0.063	(0.061)	0.063	(0.075)	5671
Age 12	0.113*	(0.059)	0.101	(0.073)	0.012	(0.086)	5671
Noncognitive skills							
Separation 9 m-age 3							
Age 3	0.260***	(0.053)	0.331***	(0.070)	-0.071	(0.065)	5251
Age 5	0.368***	(0.053)	0.294***	(0.067)	0.074	(0.065)	5251
Age 7	0.406***	(0.054)	0.235***	(0.064)	0.171**	(0.074)	5251
Age 12	0.468***	(0.059)	0.325***	(0.071)	0.142*	(0.080)	5251
Separation age 3-5							
Age 5	0.298***	(0.050)	0.254***	(0.057)	0.044	(0.060)	5351
Age 7	0.364***	(0.057)	0.303***	(0.064)	0.061	(0.067)	5351
Age 12	0.302***	(0.050)	0.277***	(0.059)	0.025	(0.064)	5351
Separation age 5-7							
Age 7	0.234***	(0.052)	0.186***	(0.068)	0.048	(0.070)	5671
Age 12	0.292***	(0.052)	0.203***	(0.064)	0.089	(0.076)	5671

Source: UK Millennium Cohort Study.

Notes: Dependent variable is children cognitive and noncognitive outcomes, respectively in the top and bottom panel. Explanatory variables are: (i) *child characteristics* such as, child age in months, child sex and birth weight; (ii)*Demographic characteristics* as, number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parent's age, parent's ethnicity and whether parents have the same ethnicity; (iii)*parental education*; (iv) *psychological-health characteristics* such as, parent's general health and whether children's grandparents were separated; and (v) *family financial resources* as, family income, housing tenure, number of rooms in the house, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification); (vi)*interparental conflicts*. Statistical significance at the 1 - 5 and 10 percent indicated by ***, ** and *.

Figure 1: Distribution of cognitive abilities across ages

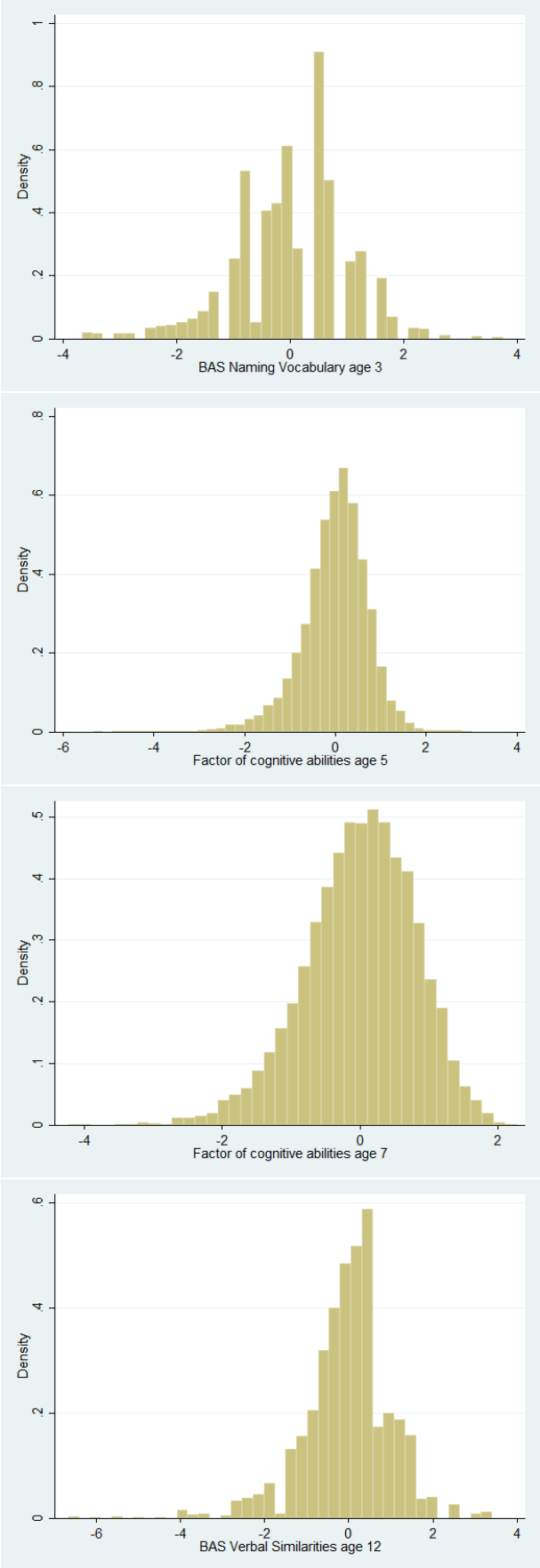


Figure 2: Distribution of noncognitive abilities across ages

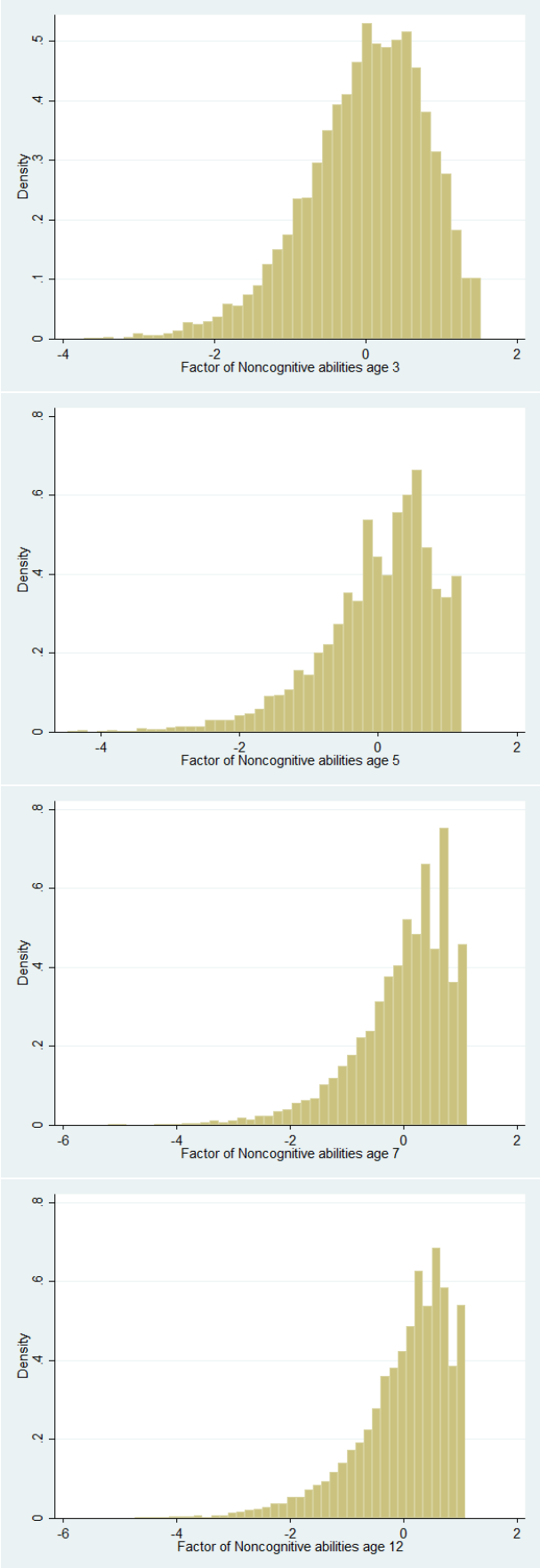
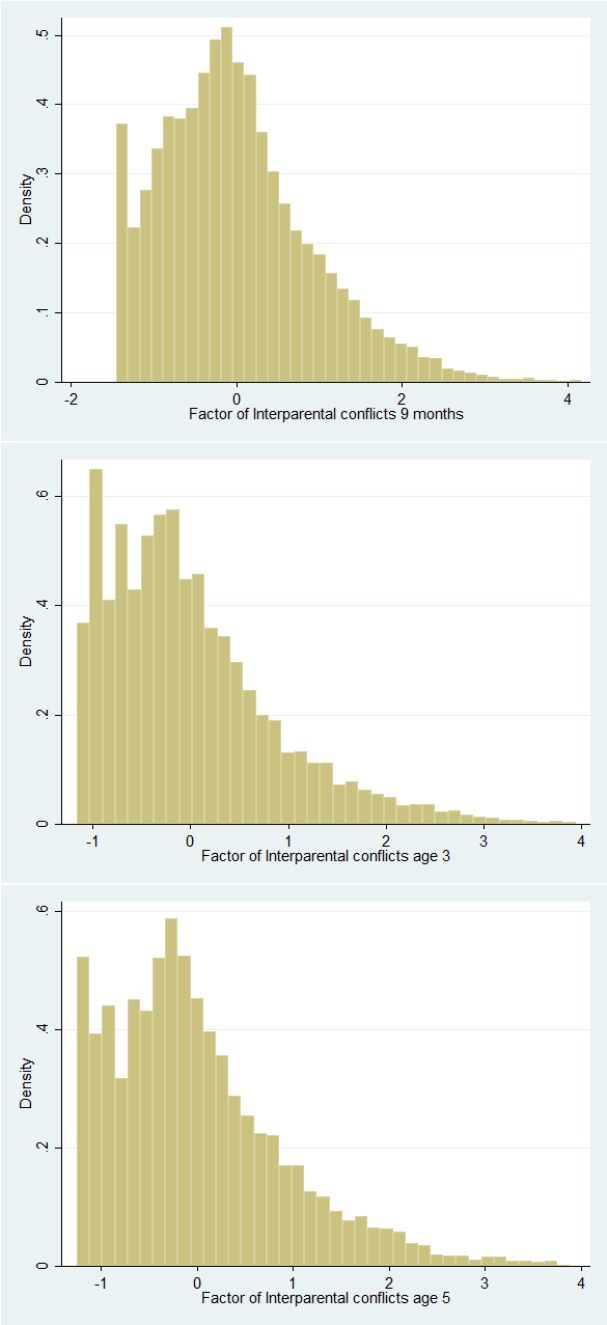


Figure 3: Distribution of factors of interparental conflicts across ages



Appendix

Table 1A: Cognitive skills: Factor Loadings

	Variables	Factor Loadings
Age 5	BAS naming vocabulary	0.5437
	Picture Similarity	0.5623
	Pattern Construction	0.5488
	% Total variance explained by the factor	30.43
Age 7	BAS Word Reading	0.6027
	Mathematical Skills	0.7202
	Pattern Construction	0.5668
	% Total variance explained by the factor	40.10

Table 2A: Noncognitive skills: Factor Loadings

	Variables	Factor Loadings
Age 3	Emotional Symptoms	0.4216
	Peer Problems	0.4879
	Conduct Problems	0.6208
	Hyperactivity Problems	0.5705
	Pro-social Behaviour	0.4500
	% Total variance explained by the factor	26.58
Age 5	Emotional Symptoms	0.4539
	Peer Problems	0.5062
	Conduct Problems	0.6614
	Hyperactivity Problems	0.6144
	Pro-social Behaviour	0.4986
	% Total variance explained by the factor	30.52
Age 7	Emotional Symptoms	0.4948
	Peer Problems	0.5428
	Conduct Problems	0.6925
	Hyperactivity Problems	0.6427
	Pro-social Behaviour	0.5163
	% Total variance explained by the factor	33.97
Age 12	Emotional Symptoms	0.5483
	Peer Problems	0.5765
	Conduct Problems	0.6850
	Hyperactivity Problems	0.6560
	Pro-social Behaviour	0.5022
	% Total variance explained by the factor	35.69

Table 3A: Assessment by child age

Assessment	Age 3	Age 5	Age 7	Age 12
Cognitive skills				
BAS Naming Vocabulary	X	X		
BAS Picture Similarity		X		
BAS Pattern Construction		X	X	
BAS Word Reading			X	
BAS Verbal Similarities				X
NFER Number Skills			X	
Noncognitive skills				
SDQ (Strenght and Difficulties Questionnaire)	X	X	X	X