# How Does Parental Divorce Affect Children's Educational Level?

## An Analysis of the 1970 British Birth-Cohort[1]

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## 1.1 Introduction

Research has shown that children from intact families have higher levels of educational achievement than children from divorced families (Amato & Keith, 1991a; Amato & Keith, 1991b; Sigle-Rushton and McLanahan, 2004). However, although the exact pathways that explain the differences between children from different family types remain unclear, most family policies and policy recommendations aimed at divorced families have mainly focused on improving their family income (Breivik and Olweus, 2006). The emphasis of policymakers on the income level of divorced families is not surprising, taking into account the fact that on the one hand, as Mayer (1997) points out, most social scientists consider income to be the most important influence on children and some believe that is the single most important influence on children's life chances; and that on the other hand, as McLanahan and Sandefur (1994) argue, government is in a better position to increase income than other types of family resources that are more intangible, such as the quality of parenting or children's emotional well-being.

However, many policy recommendations for children in divorced families have been largely derived from the perspective of economic deprivation (Breivik and Olweus, 2006), which is based on two assumptions that have not been clearly demonstrated by previous research: 1- family income is the most important factor in explaining differences in educational performance between children from divorced and intact families and 2- the effect of parental divorce is greater among poor families, after divorce, than in rich ones.

Moreover, although family policies pay little or no attention to other possible mediators such as the quality of parenting, some scholars since the 1990s have shown that there is a decline in parenting quality after parental divorce, and this decline might explain some of the differences between intact families and divorced families (McLanahan and Sandefur, 1994; Thomson, Hanson and Mclanahan, 1994; Elder and Russell, 1996). Because the literature has emphasized family income more than parenting quality, more research on this particular mechanism is needed.

In addition to loss of income and quality of parenting, children's psychological problems might also explain some of the differences between children from divorced and intact families in terms of educational achievement, since several studies have shown that there is a decline in children's emotional well-being after parental separation (see Amato, 2001) and it is also well-known that children with psychological problems have lower educational performance (Jadue, 2002; Margalit and Shulman, 1996; Mercer, 1997). However, to my knowledge, no study has considered the possibility that children's psychological problems after divorce might have long term consequences. Biblarz and Raftery (1999) and Jonsson and Gähler (1997), are the only authors to outline the importance of children's psychological well-being as a possible mechanism, although they are unable to measure it in their studies. They only speculate that, after controlling for other possible mechanisms, the net effect of parental divorce might be explained with reference to the adverse psychological consequences of divorce. However, the net effect might be due to other unobserved variables apart from children's psychological problems. The main reason for the lack of studies on the psychological mechanisms is that few surveys provide information about both children's psychological problems before and after parental divorce and have information on long-term outcomes. The longitudinal cohort data from the British Cohort Study 1970 provides a unique opportunity to test whether children's psychological problems in childhood as a consequence of divorce can explain part of the effect of parental divorce on children's educational level.

Moreover, with a few exceptions, past research has investigated only one or two of the explanations at a time. This procedure has major methodological problems because the various factors posited as an explanation for the association between parental divorce and children's educational level are likely to be correlated. It is therefore possible to determine the contribution of a particular hypothesized mechanism only after controlling for the impact of the others (Simons et al., 1999). When proper controls are used, the effects reported for some explanations may turn out to be spurious or indirect through other factors (Simons et al., 1999). For this reason, the analysis in this paper has been carried out using structural equation modeling. This technique allows the three mediating variables - family income, quality of parenting and children's psychological

problems -to be taken into account in the same analysis, together with their indirect effects.

This paper aims to analyze: 1- whether parental divorce has a net effect on children's educational level; 2- to what extent family income, parental supervision, and children's psychological problems after divorce explain this effect; 3- whether the effects of these variables on children's educational level differ by family type (divorced and intact families); 4- whether the effect of parental divorce on children's educational level differ by income level.

## 1.2 Theoretical explanations

### 1.2.1 Selection explanation

One of the most common explanations about the impact of parental divorce on children's well-being is the selection explanation. This perspective argues that the negative outcomes observed among children experiencing parental divorce and children from intact families are due to differences between the kind of people who divorce and the kind of people who remain married (Sigle-Rushton and McLanahan, 2004). Before marital break-up, families who will divorce are different from intact families in some observed and unobserved factors that are important in predicting parental divorce and negative outcomes (Ní Bhrolcháin, 2001). Although testing the selection explanation is methodologically difficult, most studies show that selection appears to account for some, but not all, of the differences in children's well-being (Sigle-Rushton and McLanahan, 2004; Cherlin, 1999).

The literature includes three main selection explanations: socio-economic selection (Jonsson and Gähler, 1997), conflict selection (Amato, 2001) and genetics selection. Family socio-economic factors are related to both children's educational outcomes and parental divorce (Härkönen and Dronkers, 2006; Lyngstad, 2004). In fact, Chan and Halpin (2008) find that in the United Kingdom, better educated women used to have a higher risk of divorce, but since the late 1970s their marriages have been more stable than those of women without qualifications. For this reason, the relationship between

parental divorce and children's educational outcomes might be spurious for the youngest generations, since the difference in levels of educational achievement between children from divorced families and intact families might be not due to divorce per se, but to the poorer socio-economic conditions of families that subsequently divorce compared with those of intact families. Studies by Furstenberg and Kiernan (2001) and Kiernan (1997) on British children born in 1958 (using the National Child Development Study) show that adults whose parents divorce during their childhood have a lower educational level than their counterparts in intact families, but these differences are attenuated when pre-divorce socio-economic factors, such as parental education and family financial hardship and other control variables are taken into account. The findings of these studies suggest that selection may be an important factor, but not an exclusive one, in the interplay between the divorce process and children's educational achievement. Furthermore, Sigle-Rushton, Hobcraft and Kiernan (2005) find that for British children born in 1970 (British Cohort Study 1970 data), parental divorce also has a negative effect on children's educational level even when socio-economic controls are included in the models. Moreover, American and Swedish studies also show that the effect of parental divorce on children's educational level remains significant when family income, parental education and other socio-economic factors prior to the parental divorce are taken into account (McLanahan and Sandefur, 1994; Jonsson and Gähler, 1997).

Meanwhile, the genetic selection explanation stresses that some parental characteristics have a genetic component, and these might be direct causes of dysfunctional family patterns and divorce, as well as children's problems. Studies comparing adoptive and biological children are scarce, but show that in adopted and biological children, the effect of parental divorce on behaviour problems is similar, but this effect is different for academic achievement and social adjustment (Brodzinsky, Hitt and Smith, 1993; O'Connor et al., 2000; Amato and Cheadle, 2008) which means that some genetic selection might exist. Finally, the conflict selection explanation emphasizes that the association between parental divorce and children's outcomes is explained by the conflict experienced before this event, since family conflict is associated with parental divorce and with children's well-being. Nevertheless, Hanson (1999) finds that parental

conflict is partly but by no means completely responsible for the association between divorce and children's school performance.

### 1.2.2 Loss of family income

Divorce is often associated with a decline in material well-being. The economic resources of a household have to be divided in half, and both new households lose the advantage of economies of scale (McLanahan and Sandefur, 1994). Research has shown that most women suffer a substantial loss of income after marital break-up, whereas men's economic circumstances appear to be relatively unaffected or even improve slightly in some cases (Jarvis and Jenkins, 1999; Aassve et al., 2007). Children also experience a substantial fall in material well-being, since most of them live with their mothers after divorce. The negative association between parental divorce and children's educational achievement may therefore simply be a consequence of the economic hardship that often follows marital disruption. Mayer (1997) note that income can affect children's outcomes in many ways. The decline in the standard of living may lead to a reduction in children's access to enrichment activities, such as tutoring, after-school classes, or camp and a decrease in children's perceptions that their family can afford university. A poor family might not be able to afford university fees and other costs of university, such as campus accommodation. Furthermore, limited means may bring about a move to neighbourhoods with inadequate schools (McLanahan and Booth, 1989).

Even if economic decline following divorce is a relatively universal phenomenon for single parents, there are certainly great differences in how the state tries to cushion this deterioration. Andreß et al., (2006) in a comparison of Belgium, Germany, Italy, Great Britain and Sweden find that due the limited development of the British welfare state, British mothers are particularly vulnerable, and are considerably more dependent on the labour market as a means to maintain a reasonable level of economic self-sufficiency. The importance of family income as a mediating factor of parental divorce effect varies by country. In Sweden, the decline in family income accounts for a small proportion of the effect of family disruption on children's educational attainment (Jonsson and Gähler, 1997). In contrast, in the United States previous investigations have concluded

that income differentials account for between 15 to 50 percent of the difference in high school graduation rates among children living in one- and two-parent families (McLanahan, 1985; McLanahan and Sandefur, 1994; Thomson, Hanson and McLanahan, 1994). Painter and Levine (2004), using an improved measure of income, show that lower income accounts for most of the disadvantages of youths in single-parent families, but not for the disadvantages of youths in families with stepfathers in the U.S.A. Moreover, due to the limited development of the welfare state in the United Kingdom, Kiernan (1997) shows that family income mediates part of the negative effect of parental separation on children's educational attainment in that country. Nevertheless, it is important to note that even considering the generosity of the Norwegian welfare state, Breivik and Olweus (2006) find that in Norway, the role of the family's economic resources in mediating the effect of parental divorce on children's educational achievement is similar to the findings in a number of studies in United States. However, in assessing the influence of family income, it is necessary to separate the effects of family income from the effects of the decline in the mother's quality of parenting involvement, as well as from involvement by a non-residential father or other family characteristics. Most previous studies (McLanahan, 1985; McLanahan and Sandefur, 1994; Thomson, Hanson and McLanahan, 1994; Painter and Levine, 2004, Jonsson and Gähler, 1997) evaluating the mediating role of family income do not control for quality of parenting. It is therefore possible that the effect of family income might be upwardly biased if other mediating variables are not included in the analysis. Moreover, family income can have an indirect effect through the mother's parenting. Kiernan and Huerta (2008) show that financial hardship often leads to maternal psychological distress and disrupted parenting practices in both single-parent and intact families. The impact of reduced family income on the adjustment of children of divorce might therefore be expressed indirectly by its negative effect on the emotional well-being and quality of parenting of the custodial parent (Simons et at., 1999).

### 1.2.3 Quality of parenting

Authoritative parenting is positively correlated with adolescent school performance, whereas authoritarian and permissive parenting is negatively so (Dornsbusch et al., 1987). Authoritative parents give warmth and support to their children but they also control and supervise them. Although a few studies have reported an association

between family structure and the level of parental warmth and support, the dimension of parenting most consistently linked to number of parents in the home is that of control and supervision (Simons, 1999). Divorced mothers control and supervise their children less than married mothers (Astone and McLanahan, 1991; Simons and Associates, 1996). Moreover, divorce is associated with a decline in the quantity and quality of the relationship between the children and the non-custodial parent (Amato and Gilbreth, 1999) which is usually the father, which means that the non-custodial parent has less chance to supervise the child. Moreover, Simons and Conger (2007) find that mothers and fathers have different parenting styles, since mothers are more likely than fathers to parent in an authoritative manner.

However, is the decline in quality of parenting after parental divorce the reason for the lower educational attainment of the children of divorce? I have found mixed evidence. Astone and McLanahan (1991) show that differences in parental behaviour account for only about 10 percent of the difference in dropout rates between children from single-parent and two-parent families. Similarly, Thomson Hanson and McLanahan (1994) find that parenting practices account for practically none of the difference in educational attainment between children from intact and non-intact families. Painter and Levine (2004) show that parental involvement explains a small part of the association between family structure and dropping out of high school. By contrast, Simons et al., (1999) find that the quality of mothers' parenting partly explains the relationship between divorce and conduct problems among adolescents. Moreover, McLanahan and Sandefur (1994) show that parenting practices account for over half of the difference in high school dropout rates between children in single-parent families and children in two-parent families. Similarly, King and Sobolewski (2004) show that adolescents from divorced families are worse off in a range of outcomes when they have weak ties with both their mothers and non-resident fathers. Due to this lack of consensus, I therefore consider that it is important to focus on this particular explanation of the effect of parental divorce on children's educational achievement.

### 1.2.4 Psychological perspective

Besides the decline in income and quality of parenting, children's psychological adjustment might explain some of the differences between children of divorced and intact families on their educational attainment. On the one hand, as mentioned above, children's psychological problems have a negative impact on their educational performance (Mercer, 1997). Abundant research shows that children from intact families have better psychological well-being than children from divorced families (see Amato, 2001). However, Cherlin et al., (1991), in their famous longitudinal study, do not find that parental divorce has a negative impact on children's psychological well-being when pre-divorce family and children's characteristics are taken into account. In contrast, other longitudinal studies show that parental divorce has a negative effect on children's psychological well-being even when pre-divorce factors are considered (Hanson, 1999; Jekielek, 1998; Morrison and Coiro, 1999; Strohschein, 2005). Besides, Sigle-Rushton, Hobcraft and Kiernan (2005), using the same data that is used in this study (British Cohort Study 70), find that compared with children from intact families, children experiencing a parental divorce are significantly more likely to have a high anxiety and aggression score at age 10. Moreover, other studies show that parental divorce has negative effects on the adult children's psychological well-being (Sigle-Rushton, Hobcraft and Kiernan, 2005; Furstenberg and Kiernan, 2001; Chase-Lansdsle, Cherlin and Kiernan, 1995). However, why do children of divorced families have lower levels of psychological well-being than children in intact families?

The pathways that explain the differences between family types on this specific dimension are unclear, and more research is needed. Some explanations have focused on the effect that divorce has on several aspects of a parent's life and which in turn affect children's psychological well-being. Some studies show that family income explains part of the effect of parental divorce on children's psychological well-being (Thomson, Hanson and McLanahan, 1994; Morrisson and Cherlin, 1995; Asetline, 1996; Carlson and Corcaran, 2001; Wu, Hou and Schimmle, 2008), while others show that this variable is not a mediating factor (Simons et al., 1999). Second, as mentioned above, parental divorce affects parental practices, and some evidence suggests that these are related to children's psychological well-being (Kiernan and Huerta, 2008). Few studies have focused on this particular mediating variable. Simons et al., (1994) show

that among children from divorced families, the quality of the mother's parenting is associated with externalising problems of boys and girls, and is also related to internalizing problems for boys. In contrast, Thomson, Hanson and McLanahan (1994) show that quality of parenting explains part of the effect of growing up in a stepfather family on children's internalizing problems, but this factor does not mediate the effect of growing up in a single mother family. Moreover, post-divorce conflict, non-residential father involvement and the mother's psychological well-being after divorce also affect children's emotional health (Simons et al, 1999 and King and Sobolewski, 2004).

On the other hand, parental divorce might have a direct effect on children's emotional health, regardless of family and parental characteristics and involvement. Pryor and Rodgers (2001) define "trauma theories" as those theories which argue that parental divorce has a negative impact per se on psychological outcomes, notwithstanding other family and parental characteristics and involvement. Some "trauma theories" argue that the feelings of loss and abandonment that children might experience after parental divorce explain the decline of children's emotional well-being after this event (Pryor and Rodgers, 2001). In addition, another well-known argument is the so-called "attachment" theory (Bowlby, 1973, 1980), which stresses the fact that children have a need for a secure relationship with adult caregivers, without which normal social and emotional development might not occur. Parental divorce may lead to an insecure attachment by children to their parents (Waters et al., 2000) and this might explain the negative effect of parental divorce on children's psychological outcomes.

## 1.3 Data and sample selection

This study uses data from the British Cohort Study (BCS), a nationally representative, longitudinal study of a birth cohort in Great Britain. The BCS study follows the life of a cohort of children born in one week of April in 1970. The original sample provides information on over 17,000 births. Later waves are similarly designed, and include a wide range of socio-economic, demographic, psychological, health, and attitudinal measures of the children and their parents (Despotiduou and Shepherd, 1998). With each successive wave, the scope of enquiry has broadened from a strictly medical focus

at birth, to encompass physical and educational development at the age of five, physical, educational and social development at the ages of ten and then to include economic development and other factors at 30 years. Few longitudinal surveys are as multidisciplinary as the BCS. Compared with many other studies, the multidisciplinary character of the survey allows a range of factors to be taken into account that might explain the association between parental divorce and children's educational level, such as psychological well-being during the childhood.

I restrict the sample to children whose parents remained together until they were 21 years old (inclusive) and to children whose parents divorced or separated[2] between wave 1 (age 5) and wave 2 (age 10). I do not distinguish between children whose parents were cohabiting and those whose parents were married, since including only those that were married could produce a bias in the analysis. Among children living in divorced families at age 10 I only include those who lived with their mothers at age 10. I exclude children who were born to a single-parent family at birth or whose parent or parents died or if they were living in foster care and whose parents separated before age 5 or between 11 years and 21 years old. In order to create this sample, I use information on family structure collected at the waves when the children were 5, 10 and 30 years old.

Due to data constraints, my analysis is limited to those children who experienced parental divorce between 5 and 10 years old and those whose parents remained together until they were 21. Relevant information on the controls and mediating variables is only available in the first and the second BCS follow-up interviews at age 5 and 10. The sweep 0, when the child was born, does not provide any information on the most important control variables needed. There was a large non response rate to the third follow-up interview at age 16. Moreover, I only include in the analysis those children who lived with their mothers after divorce since as mentioned above, custodial mothers and custodial fathers have different parenting styles (Simons and Conger, 2007;

[2] I do not distinguish between those children whose parents were cohabiting and those whose parents were married, because the number of children whose parents were cohabiting and then separate is low. For this reason, in the analysis, "parental divorce" also refers to parental separation and "parental separation" also refers to parental divorce.

Hetherington and Kelly, 2002). I would have liked to include children who lived with their father after the divorce in a separate analysis, but too few children had these living arrangements. The number of cases (n=150) is not big enough to undertake the analysis, when missing cases of meditating and control variables are taken into account. Furthermore, I restrict the sample to children whose parents remained together from birth until the age 21 (inclusive) since this age is around the time that most young people finish their university degree in the United Kingdom. However, I tried different cut-off points from 16 to 25 years old, and there was no substantial change in the results.

For the divorce group, I use the family structure variables from the first and second follow-up interviews (wave 1 and 2). All longitudinal studies lose individuals between waves and the BCS is not an exception. The target sample [3]in the first wave (at age 5) was 16,181, 13,135 of whom were successfully interviewed –which means a response rate[4] of 78.9%-. There was information on the family structure for all of them, and 11,752 (90.1%) were living with both natural parents from the birth to age 5. Of these, 1,499 had missing information on their family structure at the second follow-up (at age 10): this is mostly due to the fact that their families were not interviewed in this wave[5]. Combining information of both sweeps, I find that 437 children experienced parental separation between the first and the second follow-up interviews, and were living with their mother by the second one. Meanwhile, in order to create the group of children from intact families, I use information from the fifth follow-up interview, at age 30. The length of time between the waves means that sample attrition is inevitable, particularly at older ages. In wave 5 (at age 30), the non-response rate was 69.9%. Out of a target sample of 15,503, 10,833 were successfully interviewed, and 9,997 provided information about their family structure in childhood. The parents of these 767 cohort members remained together from birth to age 21.

[3] The target sample in the first interview was 17,287 babies at birth and then declined because of death of the cohort members or because they emigrated.
[4] The response rate is defined as the number of interviews achieved divided by the initial sample of cohort members.
[5] For the second BCS follow-up at age 10, the target sample was 16,586 cohort members, of which 14,350 were interviewed. Of those, there was information on the family structure of 13,715 children.

## 1.4 Variables

### 1.4.1 The dependent variable

The main dependent variable is the highest level of academic or vocational qualifications attained at age 30. Most people have obtained their final level of education by this age. When information on this variable is unavailable at age 30 (wave 5), I use information at age 26 (wave 4). The academic qualifications, in order of increasing attainment, are: the Certificate of Secondary Education (CSE) grades 2 to 5 (normally taken at the minimum school leaving age); the ordinary level General Certificate of Education (O level) normally taken at the minimum school leaving age); the advanced level General Certificate of Education (A level), normally taken at 18 years old; a degree or diploma (bachelor's degree or higher education diploma); or a higher degree (master's degree or doctorate). The vocational qualifications consist of National Vocational Qualifications (NVQs) and other vocationally based credentials of an equivalent standard. NVQs are based on national occupational standards, and are awarded for evidence of competency in work-based situations at 5 levels, reflecting increasing job complexity and personal responsibility. These academic and vocational qualifications are subsequently collapsed into 6 categories, reflecting increasing attainment: no qualifications, CSE grades 2 to 5/NVQ level 1 and equivalent, O levels/NVQ level 2 and equivalent, A levels/NVQ level 3 and equivalent, degree or diploma/NVQ level 4 and equivalent, and higher degree/NVQ level 5.

### 1.4.2 Explanatory variables of parental divorce

As explanatory variables for the effect of parental divorce, I use variables from the second wave when cohort members were 10 years old. I include variables that are related to each theoretical explanation. Family income is not a continuous variable. Parents were asked about the range of family's gross weekly income: under 35 pounds per week; between 35 and 49 pounds per week; between 50 and 99 pounds per week; between 100 and 149 pounds per week; between 150 and 199 pounds per week; between 200 and 249 pounds per week; 250 pounds or more per week. In order to create a continuous variable of family income, I calculate the mean for each range, but I use 17.5 pounds for the lowest range and 275 pounds for the highest range. Although there

are several ways of adjusting household income, recent OECD publications (e.g. OECD 2009) use the square root scale. I therefore standardize this variable using the formula pounds per week / √ number of people in the household[6].

I also create an index that captures parental supervision. Parents were asked four questions referring to supervision: "Does your child go to the shops on his/her own? Does your child play in the street on his/her own?; Does your child go to the park or playground on his/her own? Does your child go on local buses on his/her own?". For each question, the response options were 1= almost every day, 2= about once a week, 3=seldom, 4=never. The index is calculated by adding up all answers. This variable has values from 4 (minimum) to 16 (maximum). The alpha reliability coefficient for the four items in this study is 0.63.

As stated above, the BCS70 allows children's psychological problems before and after parental separation to be taken into account. Children's psychological problems were measured on the Rutter Parental 'A' Scale of Behavior Disorder (Rutter, Tizard and Whitmore, 1970). This scale was completed by the parents -usually the mother- and was designed to measure behaviour-adjustment problems. However, only 15 items on the original scale were collected in wave 2. These items were summarized in a continuous variable. This takes values between 0 (no psychological problems) and 84 (highest psychological problems).

### 1.4.3 Control variables

To estimate our full models, I control for a variety of child and parental characteristics, all of which were measured in the first follow-up wave prior to any family disruption**.** One of the main limitations of the British Cohort Study 1970 is that the first wave contains no information about family income. For this reason, I use a proxy, namely the highest level of parental education completed by the father or by the mother. This variable has 6 categories: 1- No qualifications; 2- Low level vocational qualifications; 3- O-level or equivalent; 4- A-level or equivalent; 5- State Registered Nurse (SRN) or Certificated of Education (Teachers); 6-Degree.

[6] I found similar results using the OECD modified equivalence scale, which assigns a value of 1 to the head of the household, of 0.3 to each additional adult member and of 0.03 to each child (see appendix).

Although the BCS70 dataset is rich in many domains, its ability to measure family processes, such as family conflict, is limited. There is no direct measure of family conflict, but there are other variables that can be considered proxies of prior quality of the marital relationship, such as the children's psychological problems and the mother's mental health prior to divorce (Dehle and Weiss, 1998; Coyne, Thompson and Steven, 2002). The mother's mental health was measured using the "Malaise Inventory" created by Rutter, Tizard and Whitmore (1970). The Malaise Score is a continuous variable based on a 24 –item battery of questions. As mentioned above, children's psychological problems were measured by the "Rutter A Scale of Child Behavior Deviance Test" based on the mother's reports. At the first follow-up interview, a 19- item battery was summarized in a continuous variable with values between 0 (no psychological problems) and 63 (highest psychological problems). Some items included in the original Rutter A-scale were excluded from this scale, mainly because of the high non-response rate on these items compared with the other items in the scale (Guide to the BCS70 5-year Survey Dataset, 1975). It should be pointed out that the "psychological problems at age 5" variable has 19 items, and this variable at age 10 has 15 items. I do not therefore have the same variable for children's psychological problems before parental divorce and afterwards, but they are broadly similar.

Other variables might be related to previous family relationships, such as "Father has read to the child to the child in the last week" or "Mother has read to the child in the last week". It seems reasonable think that parents who have a good relationship may read more to their child. These variables also measure quality of parenting.

Because the main dependent variable is the children's educational level at age 30, vocabulary test scores at age 5 before parental divorce is also included as a control variable. The test score at age 5 was derived from the English Picture Vocabulary Test (EPVT) which is an adaptation of the American Peabody Picture Vocabulary Test. The minimum value is –5 and the maximum is 3. It consists of a series of 56 sets of four different pictures, with a particular word associated with each set of four pictures. The child asked to point out the one picture which corresponds to the given word, and the test proceeds with words of increasing difficulty, until they make five mistakes in a run of eight consecutive items. The final item achieved is designated the ceiling item. The

EPVT raw score is the total number of correct items occurring before the ceiling item. The resulting distribution of raw EPVT scores was skewed, and so the scores were transformed to give a standard normal distribution value (minimum=-5 and maximum=3) (Guide to the BCS70 5-year Survey Dataset, 1975). The final control variable is sex, in which 1 is female and 0 is male.

## 1.5 Structural equation modelling

Structural equation modelling (SEM) is a statistical approach that allows researchers to estimate and test models consisting of simultaneous equations. In this chapter, structural equation modelling for three main reasons is used. One advantage of the SEM model is that it enables the issue of causality to be addressed carefully, since it permits the spurious relationships caused by predetermined variables included in the model to be taken into account, as well as spurious correlation due to unobserved variables, by introducing correlations between the disturbance terms. It is therefore possible to observe the effect of parental divorce taking into account observed and unobserved family characteristics (such as parental conflict).

Another advantage of this statistical approach is that it enables the total effect of the explanatory variables to be disaggregated into direct effects (those that go directly from one variable to another) and indirect effects (those between two variables that are mediated by at least one intervening variable) (Bollen, 1989). It is therefore possible to disentangle the effect of parental divorce into direct and indirect effects; i.e. to observe the importance of family income, supervision and children's psychological problems in order to explain the effect of parental divorce on children's educational level. SEM model also enables multi-group comparisons to be made in order to observe if an effect is statistically different in certain groups.

Structural equation models in this paper are estimated on the basis of a correlation matrix. Polychoric and polyserial correlations for variables that are not continuous are used. These kinds of correlations provide better estimations of dichotomous and ordinal variables than Pearson correlations (Saris, VanWijk and Scherpenzeel, 1998). The PRELIS and LISREL programs enable data obtained from an ordinal scale to be

analyzed, by estimating a matrix of polychoric and polyserial correlations developed from categorical data, and computing the asymptotic variance-covariance matrix for the estimation (Jöreskog and Sörbom, 1996a,b). For these reasons, the structural equation models in this study are undertaken using matrices of polychoric and polyserial correlations, and the asymptotic covariance matrix is estimated and used as input in the estimation of structural models. The analysis are carried out using the LISREL 8.51 computer program (Jöreskog and Sörbom, 2001). Jöreskog and Sörbom, (1989) recommend using the Weighted Least Squares Solution (WLS), rather than the Maximum Likelihood Solution (MLS). The former provides better estimates of the Chi-square goodness-of-fit measures and standard errors for categorical and ordinal data than the latter. However, LISREL does not allow estimation of multi-group models using asymptotic covariance matrix.

Meanwhile, assessing the correctness of a structural equation model is essential in avoiding incorrect conclusions from empirical research. In order to evaluate whether a model fits the data, I report the chi2 test and the RMSEA. However, Saris, Satorra and Van der Veld (2009) show that these fit indices do not provide sufficient evidence on the fit of models, because they ignore the power of the test. For this reason, the models are adjusted using JRule software for the detection of misspecifications (Van der Veld et al.,2008) based on the procedure developed by Saris, Satorra and Van der Veld (2009). If a misspecification is detected, I introduce the reasonable adjustments suggested by JRule on a step-by-step basis.

## 1.6 Missing data

Table 1 shows the percentage of missing cases by family type for all the variables used in this paper. For children from intact families, the highest percentages of missing cases are in the variables of the first and second wave at age 5 and 10. As mentioned above, the intact group is created using family structure information in the fifth wave at age 30. This is because some of them were not interviewed in wave 1 or 2. In fact, some children that participated in the wave at age 30 did not take part in the waves at 5 or/and 10 years old.

**Table 1. Percentages of missing cases by family type.**

| | Intact families | Divorce families | Total |
|---|---|---|---|
| Sex | 7.4 | 0.0 | 16.4 |
| Children's psychological problems at age 5 | 17.8 | 0.5 | 16.4 |
| Mother's malaise at age 5 | 18.4 | 0.9 | 16.4 |
| Mother having read to the child in the last week | 17.4 | 0.0 | 0.0 |
| Father having read to the child in the last week | 17.4 | 0.0 | 0.0 |
| Vocabulary test at age 5 | 17.4 | 0.0 | 0.0 |
| Highest parental education at age 5 | 19.2 | 2.5 | 18.3 |
| Educational level at age 30 | 0.0 | 28.7 | 1.6 |
| Children's psychological problems at age 10 | 16.2 | 9.4 | 15.8 |
| Family income at age 10 | 20.2 | 6.7 | 19.5 |
| Parental supervision at age 10 | 13.6 | 2.8 | 13.0 |
| N | 7531 | 436 | 7967 |

For 270 children from intact families, there is information on their family structure and educational level at age 30, but there is no information about them in the variables at age 10 and 5 (comparison 1 of Table 2). Table 2 shows that there are no statistically significant differences in educational level at age 30 between those children for whom there is no information for the variables at 5 and 10 years old, and those for whom this information is provided.

**Table 2: Means and percentages of children from intact families by groups of missing cases.**

| *Comparison 1* | Missing at age 5 and 10 | No Missing at age 5 and 10 |
|---|---|---|
| Educational level at age 30 | 2.61 | 2.61 |
| *Comparison 2* | Missing all variables at age 10 | No Missing at age 10 |
| Educational level at age 30 | 2.43** | 2.61** |
| Children's psychological problems at age 10 | 6.13** | 6.95** |
| Mother's malaise at age 5 | 3.81 | 3.91 |
| Mother having read to the child in the last week at age 5 | 71% | 74% |
| Father having read to the child in the last week at age 5 | 50% | 51% |
| Vocabulary test at age 5 | -0.22 | -0.13 |
| Highest parental education | 2.59** | 2.83** |
| *Comparison 3* | Missing some variables at age 10 | No Missing at age 10 |
| Educational level at age 30 | 2.61 | 2.61 |
| Children's psychological problems at age 10 | 6.45** | 6.95** |
| Mother's malaise at age 5 | 3.81 | 3.91 |
| Mother having read to the child in the last week at age 5 | 71% | 74% |
| Father having read to the child in the last week at age 5 | 51% | 51% |
| Vocabulary test at age 5 | -0.13 | -0.13 |
| Highest parental education level | 2.91 | 2.83 |
| *Comparison 4* | Missing all variables at age 5 | No missing at age 5 |
| Educational level at age 30 | 2.68 | 2.60 |
| Children's psychological problems at age 10 | 21.56 | 21.80 |
| Family income at age 10 | 64.38 | 64.50 |
| Parental supervision at age 10 | 8.40 | 9.00 |
| *Comparison 5* | Missing some variables at age 5 | No missing at age 5 |
| Educational level at age 30 | 2.52 | 2.60 |
| Children's psychological problems at age 10 | 22.9 | 21.80 |
| Family income at age 10 | 55.8*** | 64.50*** |
| Parental supervision at age 10 | 8.96 | 9.00 |

Note: For means, independent samples t-test and chi square test for percentages. *p <0.05, **p <0 .01, ***p< 0.001.

498 individuals answered the questions about the variables at 5 and 30 years old, but they did not answer the questions regarding the variables at 10 years old. Of these, 158 did not take part in the survey at 10 years old. I checked whether there are any differences between those providing information on the relevant variables at 10 years old (5905 cases) and those that did not (comparison 2 of Table 2). It turned out that the former group has a higher educational level than the latter (with the parents also having higher educational levels). In addition, those who provided information on the relevant variables at 10 years old had few psychological problems at age 5 that those who did not provide information on the relevant variables at 10 years old.

Furthermore, there are 859 cases with some missing values in one or two of the three variables at 10 years old (comparison 3), but there are no differences between this group and those with no missing information at 10 years old. The only exception is psychological problems: the first group has fewer psychological problems than the latter.

There are also 736 children with missing values in all the variables at 5 years old, but the other waves contain information about them (comparison 4 of Table 2). However, there are no differences between this group of children and those that have no missing cases in the variables of the 5-year-old wave (6,021 cases).

500 children have missing values in one or more of the variables at 5 years old, but there is information about them in the other waves (comparison 5 of Table 2). However, there are no differences between this group of children and those with information in all the variables of wave 5 (the only exception being household income at 10 years old). In conclusion, there are few differences between those children with missing cases in a given wave and those that do not have missing cases in the same wave.

**Table 3: Means and percentages of children from divorce families by groups of missing cases.**

| | Missing education | No Missing education |
|---|---|---|
| Sex | 34%*** | 39%*** |
| Children's psychological problems age 5 | 58.5 | 57.99 |

| | | |
|---|---|---|
| Mother's malaise at age 5 | 5.3 | 4.95 |
| Mother having read to the child in the last week at age 5 | 66% | 68% |
| Father having read to the child in the last week at age 5 | 33% | 41% |
| Vocabulary test at age 5 | -0.41 | -0.36 |
| Highest parental education level | 2.4 | 2.55 |
| Children's psychological problems at age 10 | 28.12*** | 24.54*** |
| Family income at age 10 | 39.41 | 39.03 |
| Parental supervision at age 10 | 9.94** | 10.86** |

Note: For means, independent samples t-test and chi square test for percentages. *p < 0.05, **p <0 .01, *** p< 0.001.

The group of children from divorced families is created using information on their family structure in the first and the second follow-up interview. For this reason, the number of missing cases in the variables of this group is lower than for children from intact families (Table 1). In contrast, the percentage of missing cases of children's educational level which is measured in wave 5 is 28% for children from divorced families. This indicates that children from divorced families tend not to continue to participate in the survey. This is a potential source of bias in my results, because it shows that data are not missing at random (Allison, 2001). In fact, table 3 shows that not including these children in the analysis might be a source of bias. In fact, a comparison between those for whom there is information on their educational level at age 30 and those for whom there is no information shows that the former group has more psychological problems and less parental supervision than the latter.

For this reason, three strategies are used to deal with the missing cases. First, I carry out all analyzes using listwise deletion of missing data. This reduces the sample size by 37 percent. Second, I use multiple imputation estimation, using the PRELIS software. This procedure allows all cases in the analysis (amounting to 7,967) to be included. Third, since I have a high percentage of missing cases in the same variables for the group of children in intact families, I restrict the sample to those that gave information on their family structure in waves 1, 2 and 5. These restrictions reduce the sample size to 5,852 cases as well as the number of missing cases in the intact group. With these sample restrictions, the number of missing cases of the variables measured in the waves 1 and 2 are lower than the percentage of missing cases of the divorce group. I use multiple imputation estimation for imputing missing cases of the restricted sample. Because the results of the three methods for handling missing data are similar, my preferred model is

the one with the largest sample size. I therefore present the results that I have obtained using the second strategy.

## 1.7 Results

### 1.7.1 Parental divorce: causal or selection effect?

Table 4 shows the descriptive results by family type for: the control variables measured before parental separation when the children were 5 years old; the intervening variables measured after parental separation when the children were 10 years old; and the children's educational level at age 30. It can be seen that children from divorced families have a lower educational level than those from intact families, and these differences are statistically significant. However, according to the selection explanation, it is important to note that differences in educational achievement begin before parental separation, since the vocabulary test score at 5 years old is lower for children that subsequently experiencing parental divorce than for those not experiencing this event. One possible explanation for this finding is that divorced families are already different from intact ones before the parental divorce. In fact, the descriptive results show that before family dissolution, mothers that will divorce have more psychological problems than those from intact families and, that parents who will experience this event are less educated and read less to their child than their counterparts in intact families, but the differences are greater between fathers than between mothers. These results show that the mother's and father's disengagement starts before parental divorce.

**Table 4. Means, percentages and standard deviations by family type.**

| | Divorce families | Intact families | Total |
|---|---|---|---|
| Sex | 45%***(std=1.00) | 53%***(std=1.00) | 53% (std=1.00) |
| Children's psychological problems at age 5 | 58.16 (std=4.71) | 57.81 (std=4.12) | 9.02 (std=4.07) |
| Mother's malaise at age 5 | 5.04***(std=3.74) | 3.99***(std=3.17) | 4.04 (std=3.21) |
| Mother having read to the child at age 5 | 68%***(std=1.00) | 74%***(std=1.00) | 73% (std=5.69) |
| Father having read to the child at age 5 | 39%***(std=1.00) | 52%***(std=1.00) | 50% (std=5.69) |
| Vocabulary test at age 5 | -0.37***(std=1.32) | -0.13***(std=1.28) | -0.15 (std=1.28) |
| Highest parental education | 2.50***(std=1.00) | 2.82***(std=2.46) | 2.56 (std=2.46) |
| Educational level at age 30 | 2.09***(std=1.00) | 2.60***(std=1.00) | 2.58 (std=2.89) |
| Children's psychological problems at age 10 | 25.70***(std=11.67) | 21.97***(std=10.19) | 22.17 (std=10.30) |
| Family income at age 10 | 38.98***(std=24.19) | 64.33***(std=27.34) | 62.93 (std=27.74) |
| Parental supervision at age 10 | 8.96***(std=1.00) | 10.20***(std=1.00) | 10.01 (std=1.98) |

Note: For means, independent samples t-test and chi square test for percentages. *p < 0.05, **p < 0.01, ***p < 0.001.

In contrast to the selection explanation, before parental divorce, both groups of children have similar levels of psychological problems (at age 5) but after this event, children from divorced families have more psychological problems (at age 10) and are less supervised (at age 10) than children from intact families. Table 4 also shows that the divorced families only have around half of the income of intact families. In short, families that divorce are different than intact families before and after this event. However, are differences in children's educational level due to parental divorce or to previous family characteristics?

The results of the structural equation modelling in Table 5 show the impact of several control variables, measured before separation, on parental divorce and on children's educational level. Contrary to the predictions of the socio-economic selection explanation, parental education and parental divorce are not significantly related (b=-0.02). In contrast, according to the selection explanation, mother's malaise (b=0.11, p < 0.001) and children's psychological problems (b=0.01, p < 0.001) are related to parental divorce. Additionally, the father having read to the child (b=-0.10, p < 0.01) is

significantly associated with parental divorce, but not the mother having read to the child (b=-0.07). Significant predictors of children's educational level are parental educational level (b=0.38, $p < 0.001$), children's psychological problems (b=-0.03, $p < 0.001$), mother's malaise (b=-0.04, $p < 0.01$) father having read (b=0.17, $p < 0.001$), vocabulary test at age 5 (b=0.10, $p < 0.001$), and sex (b=-0.03, $p < 0.05$). Nevertheless, in order to consider whether control variables capture some of the spurious effect of parental divorce on children's level of education, the control variables must affect both parental divorce and children's level of education. Table 5 shows that only the children's psychological problems, the father having read, the vocabulary test score at age 5 and sex are associated with parental divorce and children's educational level. These results therefore suggest that some selection exists.

**Table 5. Unstandardized coefficients from the structural equation models showing links between exogenous variables and parental divorce and children's educational level.**

| **Independent variables at age 5** | **Dependent variables** | |
|---|---|---|
| | *Model 1* Divorce | *Model 2* Educational level |
| Sex | -0.12***(0.03) | -0.03* (0.01) |
| Children's psychological problems | 0.01***(0.01) | -0.03***(0.01) |
| Mother's malaise | 0.11***(0.01) | -0.04** (0.01) |
| Mother having read to the child in the last week | -0.07 (0.04) | 0.02 (0.02) |
| Father having read to the child in the last week | -0.10** (0.04) | 0.17***(0.02) |
| Highest parental education level | -0.02 (0.03) | 0.38***(0.01) |
| Vocabulary test | 0.05***(0.01) | 0.10***(0.01) |

Model 1 :Chi-Square = 0.00 d.f. = 28, P-value =1.00, CFI=1, GFI=1, RMSEA= 0.0000. N=7967.
Model 2 :Chi-Square = 0.00 d.f. = 28, P-value =1.00, CFI=1, GFI=1, RMSEA= .0000. N=7967.
Note: Standard Errors in brackets *p < 0.05, **p < 0.01, *** < 0.001 (two-tailed tests).

Model 1 in Table 6 shows that parental divorce has a significant effect (b=-0.18, $p < 0.001$) on children's level of education, but it is necessary to test whether this effect is spurious. In order to deal with the selection effects, I introduce a range of controls in model 2 that includes most of the family and children's characteristics before the divorce. One of the limitations of my study is that I do not have information on family conflict prior to the divorce. As mentioned above, one of the advantages of the SES technique is that it is possible to take unobserved variables into account, by introducing correlations between the disturbance terms. Let us assume that parental conflict can affect parental divorce and children's educational level. Some control variables that are

predictors of these variables may also be affected by parental conflict or other unobserved variables. In that case, the disturbance term of the variable of parental divorce and the disturbance terms of these control variables must be correlated. Vocabulary test scores at age 5 are related to parental divorce and children's educational level, and the disturbance terms in these variables and parental divorce are correlated.

**Table 6. Unstandardized coefficients from the structural equation models showing links between exogenous variables, parental divorce and children's educational level.**

| **Independent variables at age 5** | **Dependent variables** | |
|---|---|---|
| | *Model 1* Educational level | *Model 2* Educational level |
| Divorce | -0.18***(0.02) | -0.10***(0.02) |
| Sex | | -0.04** (0.01) |
| Children's psychological problems | | -0.03** (0.01) |
| Mother's malaise | | -0.03** (0.01) |
| Mother having read to the child in the last week | | 0.02 (0.02) |
| Father having read to the child in the last week | | 0.16***(0.02) |
| Highest parental education level | | 0.38***(0.01) |
| Vocabulary test age 5 | | 0.10***(0.01) |

Model 1 :Chi-Square = 0.00 d.f. = 1, P-value =1.00, CFI=1, GFI=1, RMSEA = .0000. N=7967.
Model 2 :Chi-Square = 0.00 d.f. = 21, P-value =1.00, CFI=1, GFI=1, RMSEA = .0000. N=7967.
Note: Correlation between parental divorce and vocabulary test in model 2. The correlation is b =-0.05, p <0.001. Standard Errors in brackets *p < 0.05 **p <0 .01 *** <0 .001 (two-tailed tests)

In model 2, in addition to adding the rest of the control variables, I include a correlation between parental divorce and the vocabulary test score[7] at age 5 (0.05, p <0.001) and the direct effects of these variables on children's educational level. By including these specifications in the model, I am theoretically controlling for unobserved variables, such as parental conflict. The effect of parental divorce decreases from -0.18 to -0.10, a reduction of 40% of the impact, but it remains significant (p <0.001), . Moreover, it is important to note that in this model, there is no correlation between the disturbance terms of parental divorce and children's educational level. This finding indicates that I am controlling for both observed and non-observed effects. The value -0.10 should therefore be the net effect of parental divorce on children's educational level. Nevertheless, it is important to note that the effect of other variables such as parental

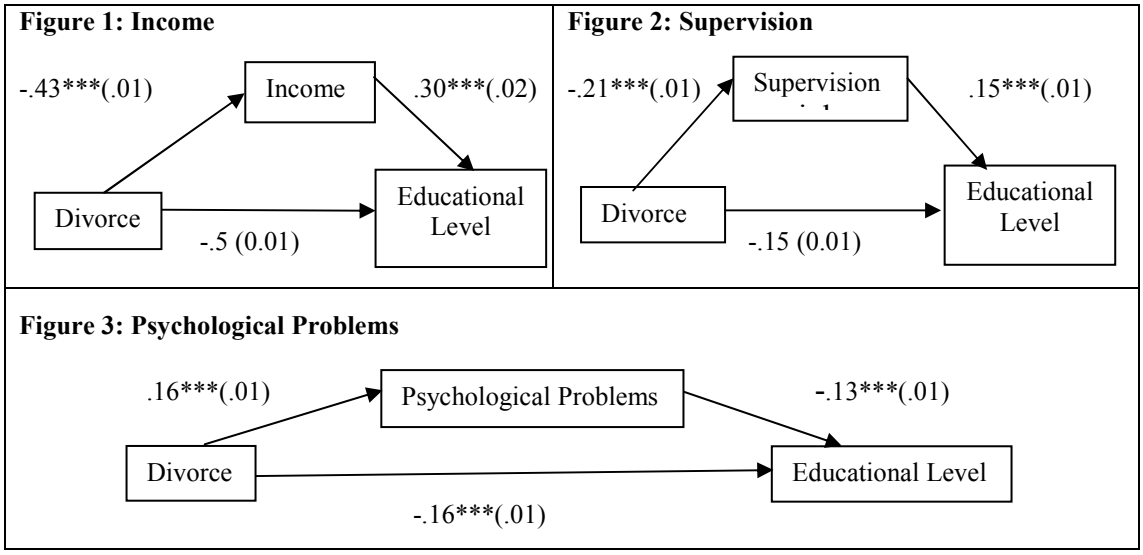
[7] Other models were done with other variables that are related to parental divorce and the children's educational level, such as father's reading to the child and children's psychological well-being at age 5. However, I found similar results using these variables as for the vocabulary test score at age 5.

education (b= 0.38, p < 0.001) is higher than the effect of parental divorce on children's educational level. These results show that parental divorce is not the most critical factor determining educational achievement, but it is a factor that has significant measurable consequences (Sandefur and Wells, 1999).

### 1.7.2 Which causal mechanisms are relevant?

The main goal of this paper is to analyze whether family income, parental supervision and children's psychological problems after divorce explain part of the effect of parental divorce on children's educational level .structural equation modelling allows us to test to what extent these variables mediate the effect between parental divorce and their educational level. A mediating variable must be affected by parental divorce, and must also have an impact on children's educational level.

**Figures 1, 2 and 3. Unstandardized coefficients from the structural equation models showing links between parental divorce, mediating variables and educational level.**




Chi-Square = 0.00 d.f. = 1, P-value =1.00, RMSEA = .0000. N=7967. Mediating variable of model 1 is income at 10 years old. *p < 0.05 **p < 0.01 *** < 0.001 (two-tailed tests)

Figures 1, 2 and 3 show the effect of parental divorce on each individual mediating variable and the direct effect of these variables on children's educational achievement. The other mediating variables and the control variables are not included. A mediating variable has to be affected by parental divorce and at the same time must have an impact on children's educational level. Figure 1 shows that on the one hand, the impact of parental divorce on family income (b=-0.43, p < 0.001) and the impact of family income

on children's educational level (b=0.30, p <0.001) are both large and significant. Moreover, when family income is included in the model, the direct effect of parental divorce on children's educational level decreases from b=-0.18, p < 0.001(see model 1 in Table 6) to b=-0.05 and is no longer significant. In the model without control variables, family income therefore mediates around 70% of the effect of parental divorce on children's educational level.

Figure 2 shows that parental divorce has a strong and negative impact on parental supervision (b=-0.21, p < 0.001) and parental supervision also affects children's educational level (b=-0.15, p < 0.001). Parental supervision therefore mediates around 19% of the effect of parental divorce on children's educational level. Finally, Figure 3 shows that the effect of parental divorce on children's psychological problems is positive and significant (b=0.16, p < 0.001) and these problems also have a significant impact on their educational level (b=-0.13, p < 0.001). Children's psychological problems consequently mediate around 13% of the effect of parental divorce on children's educational level. In sum, models without control variables demonstrate that the most important mediating variable is family income, but parental supervision and children's psychological problems explain a non-negligible part of the effect of parental divorce on educational level. However, these results change when control variables are added to the model.

**Table 7. Unstandardized coefficients from the structural equation models showing links between exogenous variables and mediating variables**

| Independent variables at age 5 | Model 1 Income | Model 2 Supervision | Model 3 Psychological problems |
|---|---|---|---|
| Divorce | -0.37***(0.10) | -0.16***(0.02) | 0.10* (0.05) |
| Sex | -0.05 (0.05) | 0.27***(0.01) | -0.08** (0.03) |
| Children's psychological problems | 0.03 (0.97) | 0.00 (0.01) | 0.11 (0.56) |
| Mother's malaise | -0.01 (0.89) | -0.05***(0.01) | 0.25 (0.45) |
| Mother having read to the child in the last week | -0.02 (0.07) | 0.04* (0.02) | -0.04* (0.02) |
| Father having read to the child in the last week | 0.09***(0.03) | 0.05***(0.01) | 0.00 (0.03) |
| Highest parental education level | 0.45* (0.20) | 0.13***(0.01) | -0.05 (0.09) |
| Vocabulary test at age 5 | 0.04 (0.38) | 0.05***(0.01) | -0.05 (0.16) |

Model 1 :Chi-Square = 0.00 d.f. =, P-value =1.00, CFI=1, GFI=1, RMSEA = .0000. N=7967.
Model 2 :Chi-Square = 0.00 d.f. = 21, P-value =1.00, CFI=1, GFI=1, RMSEA = .0000. N=7967.
Model 3 :Chi-Square = 0.00 d.f. = 21, P-value =1.00, CFI=1, GFI=1, RMSEA = .0000. N=7967.
*p < 0.05, **p < 0.001,***p < 0.001 (two-tailed tests)

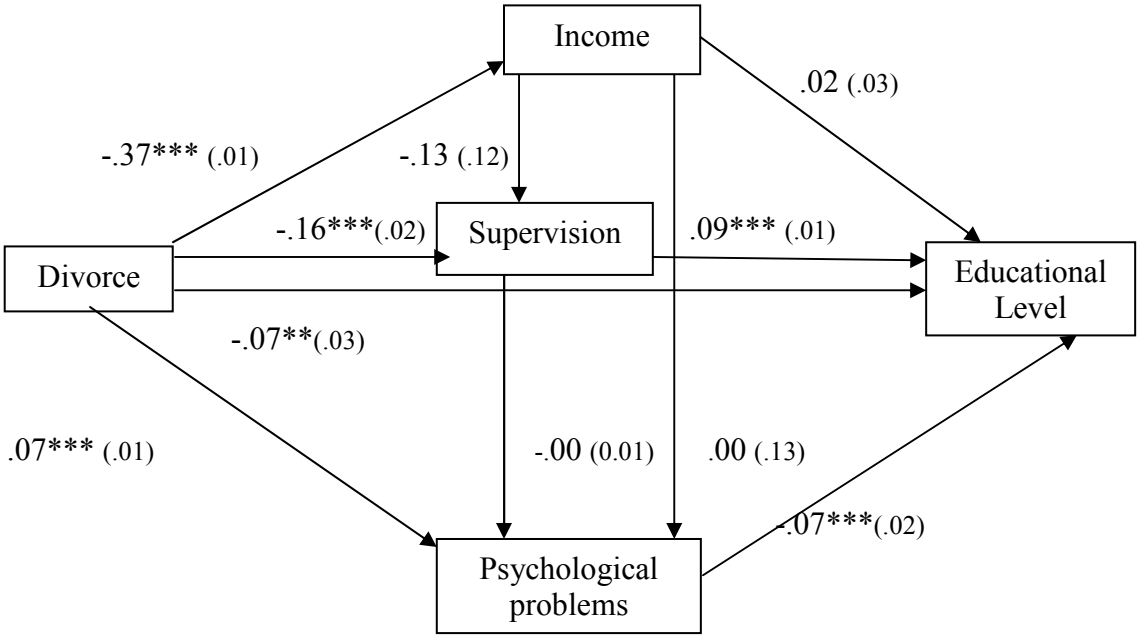
Table 7 shows the effects of the control variables and parental divorce on the mediating variables. When the control variables are added, the effect of parental divorce on family income declines from -0.43[8] to -0.37, but is still significant. There is a reduction of 14% in the effect. The parental educational level also has a strong and significant effect on family income (b=0.45, $p < 0.05$) but as shown in Table 5, the former has no significant effect on parental divorce (b=0.00). These results therefore show that parental divorce and parental educational level have independent effects on family income. Moreover, after the introduction of the control variables, the effect of parental divorce on parental supervision decreases from -0.21 to -0.16, a decline of 22%. However, the coefficient is still negative and significant. It is important to note that parental divorce is one of the most important variables associated with parental supervision, since the impact of other variables such as parental education (b=0.13, $p <0.001$) and whether the mother reads to the child (b=0.04, $p <0.05$) and whether the father reads to the child (b=0.05, $p <0.001$) is not as large. Finally, the coefficient of parental divorce on children's psychological problems is reduced from 0.16 to 0.10 when the control variables are included in the model, but it is still significant and positive. The effect declines by around 38%. In sum, the control variables do not eliminate the negative effect of parental divorce on the mediating variables. But do the mediating variables still have an impact on children's educational level?

Figure 4 shows the links between parental divorce, income, parental supervision, children's psychological problems after divorce and children's educational level, when the control variables and the effects between the mediating variables are included in the model . It shows that although parental divorce has a significant effect on family income (b=-0.37, $p < 0.001$), the family income does not have a significant impact on children's educational level (b=0.02). Moreover, family income does not have a significant effect on children's psychological problems (b=0.00) and parental supervision (b=-0.13). Family income therefore does not mediate the negative effect of parental divorce on educational level when the control variables are added. In contrast, the effect of parental divorce on children's psychological problems (b=0.07, $p <0.001$) and the impact of this variable on children's educational level (b=-0.07, $p <0.001$) are both significant. As a result, children's psychological problems mediate around 5% of the effect of parental

[8] The effects of parental divorce on the mediating variables without control variables in the model are shown in figure 1 2 and 3.

divorce on children's educational level[9]. Meanwhile, parental supervision also mediates around 15% of this effect, since parental divorce has a significant impact on parental supervision (b=-0.16, $p < 0.001$) and the latter has an effect on children's educational level (b=0.09, $p < 0.001$). It can also be seen that parental supervision is not associated with children's psychological problems (b=0.00). Finally, Figure 4 shows that the direct effect of parental divorce is still significant, which means that the mediating variables that I use in this analysis do not explain the entire effect of parental divorce.

**Figure 4. Standardized coefficients from the structural equation model, showing links between parental divorce, family income, parental supervision, children's psychological problems after divorce and children's educational level.**




Chi-Square = 10.90 d.f. = 29, P-value =1.00, CFI=1, GFI=1, RMSEA = .0000. N=7967.
Note: Numbers in parentheses are Standard Errors. Controlled by highest parental education, mother having read to the child at age 5 , father having read to the child at age 5, psychological problems at age 5, gender, mother's malaise being at age 5 and vocabulary test at age 5. There is a correlation between vocabulary test and parental divorce.

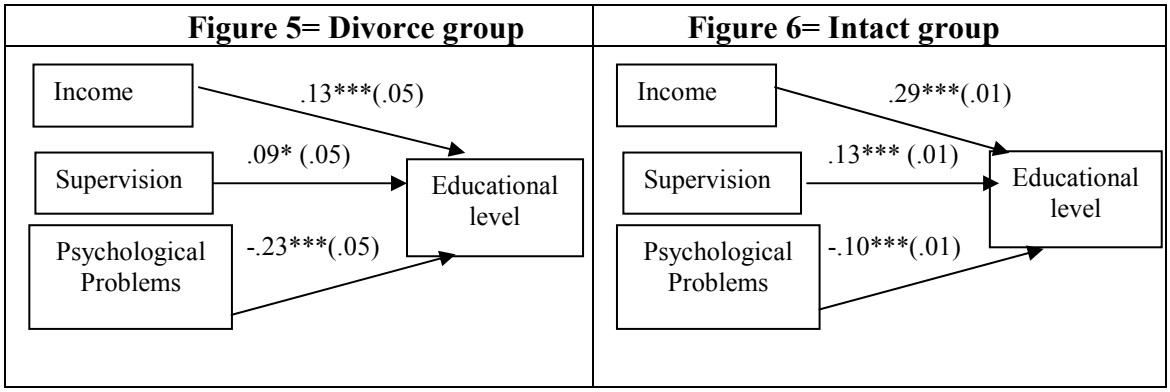
[9] When I introduce the effects of family income and parental supervision on children's psychological problems, the effect of parental divorce on children's psychological problems is reduced from 0.10 to 0.07. However, the indirect effects of children's psychological well-being are not significant. For these reasons, I have calculated the part of the effect of parental divorce on children's educational level that is explained by children's psychological problems using the total effect of this variable, which is b=0.10.

### 1.7.3 Do the effects of the mediating variables differ by family type?

As mentioned above, the previous analyzes are based on 7,531 children whose parents lived together until the cohort members were 21 years old, and 436 children whose parents divorced when they were aged between 5 and 10 years old. Due to the big difference of sample size between the groups, the effect of mediating variables on children's education mainly reflects the effect of children from intact families. In other words, for children that have experienced parental divorce, the effect of the mediating variables on educational level might be different. To test this, a multi-group comparison is run to see whether the effect of mediating variables differs between children from divorced families and those from intact families.

Figure 5 shows the effect of the mediating variables for children of divorced families only, and Figure 6 for children from intact families only. Indirect effects between the mediating variables or control variables are not included in these models. There are significant group differences for income ($x^2$= 11.17, df=1, p <0.001) and psychological problems ($x^2$=7.92, df=1, p < 0.01). The impact of income on children's educational level is stronger for children from intact families (b=0.29) than for children from divorced families (b=0.13). In contrast, the effect of children's psychological problems on educational level is lower for children that do not experience parental divorce (b=-0.10) than for children that experience this event (b=-0.23). The path from parental supervision to educational level is comparable for children from intact (b=0.09) and divorced families (b=0.13) ($x^2$=0.050, df=1). However, do these group differences remain when control variables are included in the model?

**Figures 5 and 6. Unstandardized coefficients of the structural equation multi-group model showing links between family income, parental supervision, children's psychological problems and children's educational level for children from divorced and intact families.**

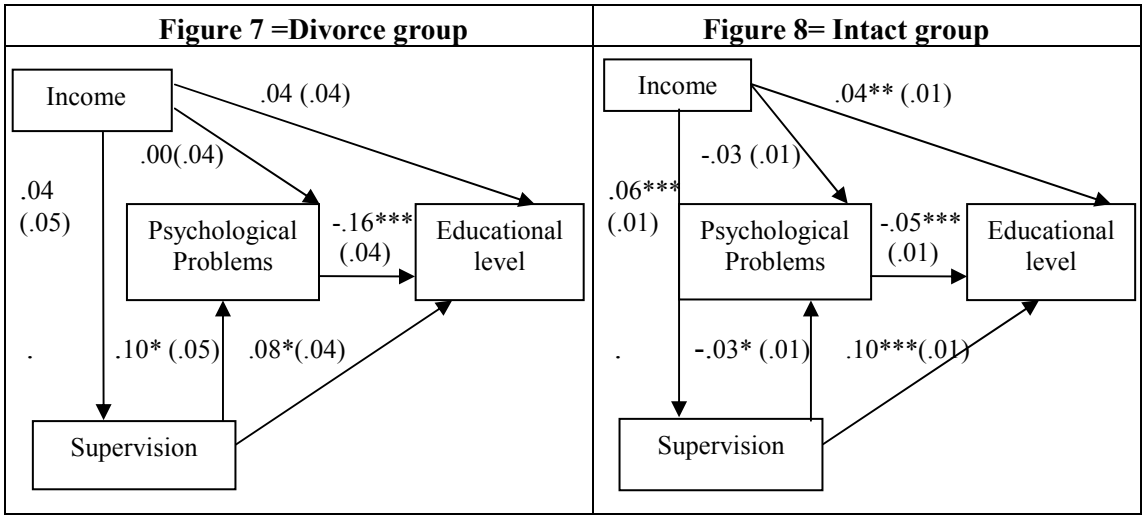



Chi-Square = 0.00 d.f. = 12, P-value =1.00, CFI=1, GFI=1, RMSEA = .0000.
Note: Numbers in parentheses are standard errors and there are several correlations between income, children's psychological problems and supervision.

Figures 7 and 8 show the coefficients of the mediating variables on children's educational level when control variables and indirect effects between the mediating variables are added to the model. Figure 7 shows the effect of the mediating variables only for children of divorce, and Figure 8 highlights the effect for children only from intact families. A comparison of Figure 7 and Figure 8 shows that the impact of children's psychological problems on children's educational level is still higher and significantly different ($x^2$=6.00, df=1, p< 0.05) for children from divorced families (b=-0.16, p< 0.001) than for children from intact families (b=-0.05 p< 0.05). In contrast, when control variables are included, group differences in the link between family income and children's educational level are not significant ($x^2$=0.00, df=1). However, this effect is only significant for children from intact families (b=0.04, p<0.01). Further exploration of the data showed that this difference is due to the different sample sizes of these two groups because. I performed a multi-group model where I put the same simple size of intact group (n=7536) in the divorce group (n=7536). I found that for the divorce group, the effect of family income on children's educational level was also significant (b=0.04, p<0.01).

Finally, the path from parental supervision to children's educational level is comparable for the divorce group (b=0.08, p < 0.05) and the intact group (b=0.10, p < 0.001). The inter-group differences in the link between parental supervision and children's educational level are not significant ($x^2$=0.00, df=1).

**Figure 7 and 8. Unstandardized coefficients of the structural equation multi-group model showing links between family income, parental supervision, children's psychological problems and children's educational level for children from divorced and intact families.**




Chi-Square = 19.32 d.f. = 29, P-value =1.00, CFI=1, GFI=1, RMSEA = .0000. N=7967.
Note: Numbers in parentheses are Standard Errors. Controlled by highest parental education, mother having read to the child at age 5 , father having read to the child at age 5, psychological problems at age 5, gender, mother's malaise being at age 5 and vocabulary test at age 5.

There are also some indirect effects among the intervening variables. Parental supervision has a significant impact on children's psychological problems in both groups. For the intact group, the effect is negative ($b=-0.03$, $p<0.05$) which means that when children are less supervised, they have more psychological problems. In contrast, for the divorce group the sign of the effect is positive ($b=0.10$, $p<0.05$), which indicates that for children from divorced families, more supervision is related to more psychological problems. This finding is unexpected, because as noted above, parental supervision is positively related with children's educational level in both groups. Moreover, no group differences appear in the link between family income and parental supervision. Although Figures 7 and 8 show that this parameter is significant only in the intact group ($b=0.06$, $p< 0.001$), this is also significant in the divorce group when the sample size of the divorce group is increased ($b=0.04$, $p< 0.001$). Furthermore, the effect of family's income on children's psychological problems is not significant in either group.

### 1.7.4 Do the effects of parental divorce differ by income level?

In short, previous models have shown that when control variables are included in the model, family income (after divorce at age 10 of child) is not the most important predictor of educational level for children from divorced families, and it is also not a significant mediating factor of the effect of parental divorce on children's educational level. This finding is contrary to the previous literature (McLanahan, 1985; McLanahan and Sandefur, 1994; Thomson Hanson and McLanahan, 1994). In order to be sure about the importance of family income for the children of divorce, I therefore develop another research strategy. I run a multi-group analysis with three income groups[10]. I test whether the effect of parental divorce varies by income level. I hypothesized that if family income plays a relevant role after divorce, I should find that in the highest income group, parental divorce does not have a significant effect or that this effect is lower than in the other income groups.

**Table 8: Unstandardized coefficients of parental divorce on children's level of education by income groups in a multi-group analysis.**

| | Effect | Standard Error |
|---|---|---|
| High income group | -0.14*** | 0.02 |
| Mid-income group | -0.11*** | 0.02 |
| Low income group | -0.09** | 0.02 |

Chi-Square = 0.00 d.f. = 36, P-value =1.00, CFI=1, GFI=1, RMSEA = .0000.
Note: controlled by highest parental education, mother having read to the child at age 5 , father having read to the child at age 5, children's psychological problems at age 5, gender, mother's malaise being at age 5 and vocabulary test at age 5.

Table 8 shows the effect of parental divorce on children's educational level in the three income groups, when control variables are added to the model. Contrary to what was expected, the effect of parental divorce on children's educational level is lower in the

[10] In order to create the income groups, I used the option Replace Missing Values: Method Linear Trend at point of the SPSS 17. Then I asked the program to give two cut-off points in order to create groups of income with similar number of cases. The cut-off point values are 55.67 and 62.58. Due to the fact that many cases that have these values, it is impossible to create income groups with the exact number of cases. Since the main aim of this study is to compare the effect of parental divorce between children with low and high income levels, I decided to have a smaller amount of cases in these groups. There are therefore 2,145 cases in the first income group, which ranges from 6.01 to 55.18; 3,777 cases in the second income group, ranging from 55.67 to 62.58; and 2,145 cases in the third income group, which ranges from 65.95 to 194.10. I also performed the same analysis without imputing the income variable and the results are similar.

low income group than the high or middle income groups. There are also significant group differences between the high and the low income categories ($x^2$= 4.72, df=1, p < 0.05). In other words, the effect of parental divorce is significantly lower in the low income group than in the high income group. There are no significant group differences between the middle and low income brackets ($x^2$= 0.80, df=1) and between the high and middle income groups ($x^2$= 2.15, df=1).

## 1.8 Conclusions

The results reported here show that children and parents from intact families and divorced families are different in several domains before parental separation. Even if some selection effect exists, like previous studies I showed that parental divorce has a significant effect on children's educational level. I wondered which variables could mediate the negative impact of parental divorce on children's educational level. I found that parental divorce has a negative impact on children's psychological problems, parental supervision, and family income in the models with and without the control variables. Moreover, in the models without the control variables, family income is the most important mediating variable, but parental supervision and children's psychological problems also mediate a substantial part of this effect. In contrast, in the models with control variables, family income is no longer a mediating variable but parental supervision and children's psychological problems continue to mediate some part of this effect.

I also tested whether the impact of mediating variables on children's educational level differs by family type. I found that the effect of parental supervision on children's educational level is comparable for children from intact and divorced families. However, the effect of family income on the intact group is higher than on the divorce group when control variables are not included in the model. In contrast, in the model with control variables, there are no group differences in the effect of family income on children's educational level.

One of the most important findings in this study is that I found that there are significant group differences for psychological problems. The effect of children's psychological problems on their educational level is higher for children from divorced families than

for children in intact ones. In other words, in the former group, having psychological problems at age 10 leads to more long term consequences than for the latter group.

Moreover, the effect of parental divorce on children's educational level is the same in the three income groups. Put differently, parental divorce has similar effects in relation to educational attainment on those children that have high levels of economic resources after divorce as those that have low levels.

Finally, the findings of this study suggest that policymakers, as well as improving family income levels of children from divorced families, should pay more attention to their psychological problems after divorce. Some of the limitations of this study are the lack of a continuous measure of family income and information on parental conflict. Further research should give greater prominence to studying the long term effects of children's psychological problems after divorce, and resolve the limitations of this paper.

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