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GROWING UP IN A BLENDED FAMILY OR A STEPFAMILY: WHAT IS THE IMPACT ON EDUCATION?

by

Marianne Sundström

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Abstract

This paper studies the effects of growing up in a blended family or a stepfamily on children's educational outcomes. I use a random sample of 40,000 Swedish children born in the mid-1960s matched to their full and half-siblings born in 1960-1970, in total 76,000 children. Childhood family and siblings structure is inferred using the censuses combined with the Swedish multigenerational register. The children are followed into adulthood and their education examined. The cross-section results indicate that growing up with half-siblings is negatively correlated with education and living with both biological parents and no half-siblings is associated with more schooling than living with a single parent or a stepparent. To assess causality I estimate sibling-difference models and find that the negative correlations disappear which is consistent with selection explaining the cross-section results. Narrowing the siblings sample to children in stable blended families reveals that joint children obtain significantly more schooling than stepchildren. In stable stepfather blended families the difference is even larger. Possible explanations for these interesting findings are that fathers are more willing and able to support their children with their current spouse and that stepfathers do not share their income equally between their biological children and their stepchildren.

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Keywords: Family structure, stepfamilies, stepfathers, sibling differences, educational attainment

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1. Introduction

The aim of this paper is to add to our understanding of the role of family background in shaping educational outcomes. More specifically, using a large Swedish data set I examine whether living in a blended family or a stepfamily during childhood affects educational attainment. Many previous studies have investigated the link between outcomes and childhood family structure. Less attention has been paid to the relationship between outcomes and family and sibling structure taken together, capturing the complexity of family relationships by measuring the biological relationship between the children in the household such as whether they are full-siblings, half-siblings, or biologically unrelated. Furthermore, while inequality between households has been extensively studied, little attention has been paid to inequality within households. For example, when analyzing inequality in household income, the standard approach is to assume that all children in the household are treated alike; the equivalence scale approach embodies this assumption. Although this is a convenient assumption for the analysis of inequality across households, the assumption that joint children and stepchildren are treated alike is not necessarily a correct description of reality and warrants empirical investigation.

Most previous studies of the relationship between child outcomes and childhood family and sibling structure have, however, used small and selective samples and relied on cross-section estimation which do not account for selection. Using methods which do that is vital since family structure is not randomly assigned. Unlike previous studies I use a large Swedish data set on a random sample of children born in 1964-1965 matched with data on their full and half-siblings born in 1960-1970, and adopt a sibling-difference approach using a strict identification strategy to assess causality.

The motivation for the paper comes from Björklund, Ginther and Sundström (2007), which finds for Sweden and the United States that the association between a person's educational

attainment and annual earnings and his/her number of siblings is more negative for the number of half-siblings than for the number of full siblings. In particular, having lived with half-siblings is negatively correlated with educational and earnings outcomes even when controlling for number of half and full-siblings. That paper, like most of the literature, defined family structure from the child's perspective. Thus, joint children in blended families were classified as living in an intact family whereas their half-siblings were classified as living in a stepfamily.

This paper makes five contributions to the literature. First, most previous papers on family structure lack sufficient sample size to draw definitive conclusions about the associations with educational outcomes. This study uses data from Swedish population registers which permits large enough sample sizes to estimate with some precision the parameters of interest. Second, as I have information on full-siblings and half-siblings and whether (and when) the siblings lived together, and in which family structure, I am able to use sibling-difference models to take account of selection and assess the causal impact of living in a certain family and sibling structure in childhood. Third, I can assess post-childhood outcomes since I have information on educational attainment in 1996--measured as years of schooling and completion of academic track in high school (*gymnasium*)--when the individuals are 26-36 years old. Fourth, it is interesting to examine Sweden in this context because it has generous welfare provisions which may reduce the economic disadvantage associated with living in a non-intact family and growing up in such a family is likely to be associated with less social stigma than, for example, in the United States so any adverse effects may be smaller in Sweden. That said, Björklund, Ginther and Sundström (2007), finds very similar effects of family structure on children's outcomes in the United States and Sweden.

The analysis begins by exploring household based and child-based approaches to defining family and sibling structure taking account of sibling structure as measured by the incidence and

number of co-resident and non-resident full and half-siblings. Whereas Ginther and Pollak (2004) used a household-based definition of family structure, distinguishing between intact families, single parent families, and blended families, this study goes beyond the household to analyze the relationships of non-resident full and half-siblings with outcomes. I find that the specification that use child-based measures of family structure combined with controls for resident full and half-siblings and non-resident siblings fits the data best and provide an improved model. This model is used to estimate descriptive regressions of the association between family and sibling structure and children's educational outcomes. I find that living with half-siblings is associated with lower education. Living in a single parent family or a stepfamily is correlated with significantly less schooling than living with both biological parents and no half-siblings. Finally, I exploit the large sample size and detailed information on sibling relationships to estimate a sibling-difference model of the effect of family and sibling structure on children's educational outcomes. Using this approach, I find that the negative correlations between schooling and living in a single parent family or a stepfamily disappears which is in line with selection being the explanation for the negative associations found in the cross-section analysis. However, children who lived a greater proportion of childhood in an intact family with resident or non-resident half-siblings have significantly more schooling than their sibling(s) who lived in other family structures. When I examine this relationship more closely by comparing joint and stepchildren in blended families I find that stepchildren have lower educational attainment than joint children, especially those who lived in stable stepfather blended families. Possible explanations for this interesting finding are that fathers are more willing and able to support their own children when their mother is the current spouse, and that the father in the blended family does not share his income equally between his 'own' children and his stepchildren.

In the next section I briefly review previous research on the relationship between child outcomes and family and sibling structure. In Section 3 I present the data, sample and variables, discuss the measures of family and sibling structure, present descriptive statistics and describe my empirical approach. Section 4 presents the findings and Section 5 concludes.

2. Research on family and sibling structure

The family structure literature, which began by distinguishing between single-parent families and two-parent families, has focused on narrower and narrower family structure categories. McLanahan and Sandefur (1994) found that stepchildren had educational outcomes very similar to those of children in single parent families. They concluded that the key distinction was between children who grow up with both biological parents and those who do not. In contrast, Ginther and Pollak (2004) and Gennetian (2005) found that the joint children in blended families experienced educational outcomes very similar to those experienced by their half-siblings and to those of children in single parent families. In line with these results, cross-section results of Björklund, Ginther and Sundström (2007) for Sweden and the United States show that having lived with half-siblings is negatively correlated with educational and earnings outcomes even when controlling for number of half and full-siblings.

Apart from Björklund et al. (2007) there are, however, very few studies of outcomes of children in stepfamilies using Swedish data. One exception is Jonsson (2001) which uses data from the 2000 Swedish Level of Living Survey for children and finds that children in such families more often than those in intact families state that their mother has too little time for them. Also, the fraction which reports that they do not get on well with their stepparent is relatively high and when asked about whom they turn to when they worry about something, most children say they talk to their mother, a friend or their father, very few turn to their stepparent. In

addition, Turinen (2011) investigates the educational outcomes of children who get a half-sibling using Swedish register data. His preliminary findings point to a negative association with education as measured by children's grade point averages at age 16.

For the United States, on the other hand, quite many studies have investigated outcomes for children in stepfamilies. For example, Hanson, McLanahan and Thomson (1996) find that, after accounting for household conflicts, children in stepfather families perform worse in school and have lower wellbeing than children living in original, two-parent families and also do no better than those in single mother families. They call this result the 'stepfather paradox' since one would expect children who live with two parents to do better even if one is a stepparent. In contrast, Cobb-Clark and Tekin (2011) find that adolescent boys who have no father figure in their lives engage in delinquent behavior to a greater extent than those who had a residential or non-residential biological father or a residential stepfather. This association is not explained by the lack of paternal involvement or by the income differentials associated with father's absence. Further, as mentioned, Ginther and Pollak (2004) show that children in blended families incur about equal educational disadvantages compared to children who live with both biological parents and no half-siblings, regardless of whether they are the biological children of both parents or of only one of the parents.

Furthermore, previous research has found that the differences in child outcomes between children from the same type of non-intact family to some extent can be accounted for by the different ways in which they and their parents ended up in that family type. For example, parental death has been shown to be less negatively related to child outcomes than parental divorce (Biblarz and Gottainer 2000; Corak 2001; Lang and Zagorsky 2001). This indicates that family structure is not randomly assigned. Thus, the correlations discussed above may reflect selection rather than causation. The finding of Björklund et al. (2007) of no difference in educational or

earnings outcomes between siblings by proportions of childhood lived in certain family structures for Sweden and the United States is consistent with the presence of selection bias. In contrast, Case, Lin and McLanahan (2001) using mother fixed-effects models find that children who lived with a step, adoptive or foster mother obtained less schooling than the biological children of that woman. Moreover, Evenhouse and Reilly (2004) analyze the Adolescent Health data using family fixed-effects estimation methods. They find that stepsiblings do worse than their half-siblings who are the joint children in blended families for some child education outcomes including GPA, trouble at school and school suspensions. Stepchildren also have adverse outcomes in terms of risky behavior such as early sexual activity and use of drugs and alcohol. They have lower relationship quality with stepparents and worse emotional health.

Why may living in a blended family or a stepfamily have a negative impact on outcomes? One possible explanation is that parents' time and stepparents' time are imperfect substitutes and that this leads to fiercer competition for the parents' time between the full and half-siblings which, in turn, creates more stress for the children (Ginther and Pollak 2004). Children in blended families may also experience more stress because, as suggested by Cherlin (1978), the parental and stepparent roles lack clear definitions. Another possible explanation, borrowed from evolutionary psychology, is that parents favor their own offspring over their stepchildren (Case et al. 2001). Thus, in a blended family in which there are joint children of the couple and half-siblings who are the biological children only of the mother, the father will favor his own offspring over his stepchildren but the mother may equalize inputs and outcomes between her children. She has the means to do so since she most often does the lion's share of household work and childrearing. However, if the half-siblings are the biological children of the father only, the mother will not attempt to equalize between the joint child and the stepchildren. This explanation is consistent with the finding of Case et al. (2001) that children raised by step, adoptive or foster

mothers have less schooling than the biological children of that woman. The socio-biology may, however, be more complicated than that. Thus, Anderson, Kaplan, Lam and Lancaster (1999a) suggest that fathers, too, favor their own offspring and especially that of their current spouse because, as they argue, male parental care can also be seen as a form of relationship effort. In line with this prediction, they find that men invest significantly more time and money in their genetic offspring with their current mate, less in their stepchildren and even less in their genetic offspring with a previous spouse.[1]

In this paper I compare educational outcomes of siblings by their exposure to different family and sibling structures. I distinguish between proportions of childhood lived in different forms of 'intact' families, different types of stepfamilies and single parent families. Furthermore, I examine the effect of siblings, half and full, co-resident as well as non-resident on children's outcomes. The strength and contribution of the paper comes from its use of a large data set that includes educational attainment in adulthood. Using these data allows me to make comparisons among many types of family and sibling structures and compare educational outcomes of siblings. I now discuss the data in greater detail.

3. Data

3.1 Data, sample and variables

My starting point is a random sample of almost 40,000 (non-adopted) individuals born in Sweden in the years 1964 through October 1965 drawn from the population registers of Statistics Sweden and observed in the bidecennial censuses in 1965, 1970, 1975 and 1980. Combining the census data with information from the Swedish multigenerational register allows me to trace the biological relationship, or lack thereof, between the adults in the household and the children in

[1] See also Anderson, Kaplan and Lancaster (1999b).

the sample. I also identify the full and half-siblings of these children, and those born in 1960-1970, who were observed in the censuses in 1965, 1970 and 1975 (siblings born in 1960-1965), and in 1970, 1975 and 1980 (siblings born in 1966-1970) were matched to their siblings in the random sample. In total, this gives me an estimation sample of over 76,000 observations.

I adopt this rather narrow age limitation as part of my identification strategy since I want siblings to have shared most of their early childhood. For this reason, I also require that all siblings (full and half) included in the analysis lived together with their random-sample sibling in the first census they were observed (in 1965 and 1970 respectively). This requirement leads however to most half-siblings included being on the mother's side (1,672); few half-siblings on the father's side lived with the focal child (78). In addition, I include information on the total number of resident and non-resident full and half-siblings of the child as control variables. Finally, I include an indicator for whether the child ever lived with a social sibling, that is, a non-biologically related child.

I use two outcome measures. First, years of schooling which is a discrete variable and has been inferred from the information on highest level of education attained in 1996 according to Statistics Sweden's educational registers. Schooling in Sweden is structured differently than, for example, in the United States. All students must attend school through age 16. After that, they may go to high school (*gymnasium*) in which for the studied cohorts there was a choice between the academic tracks of three years and the vocational tracks of two years. Thus, secondary schooling involves more tracking than, for example, in the United States and attendance is not compulsory after age 16. The second outcome measure is completion of the three year academic

track of *gymnasium*, also measured in 1996, which is required for university studies. Approximately 40 % of the studied cohorts completed the three-year academic track.[2]

Besides the mentioned controls for number of resident and non-resident full-siblings and half-siblings on the mother's and the father's side, respectively, ever lived with social siblings and age and gender, the independent variables are education of the rearing parent(s), birth order and number of family structure transitions. The education of the rearing parent(s) refers to their highest level of education attained in 1970 and is a five-level categorical variable: compulsory schooling (reference category), vocational training, *gymnasium*, college/university degree and missing information on education[3]. The rearing parent is the biological or stepparent in the census household. Birth order is a discrete variable, measured on the mother's side, which takes the value one for her first born child, two for second born children, three for third born children and four for fourth or later born children. Number of family structure transitions is the number of *changes* in family structure a child experienced and is a discrete variable which takes the values 0, 1 or 2 since I observe family structure in three censuses.

3.2 Measuring family structure

When first considered, measurement of family structure is straightforward: Does a child live with one or both biological parents? However, this simple approach breaks down when one considers family and siblings structure together and their changes over time. In families where one or both parents have children with a previous spouse/partner it is possible for one child to live with both biological parents, while another, her half-sibling, lives with a biological parent and a stepparent.

[2] This fraction was considerably lower in the parental generation (see Table 1 and Table 2).
[3] I have information on the education of the biological parents of the focal child and that of any stepparent in the census household but not on that of the father (mother) of the resident half-siblings on the mother's (father's) side.

For example, in a blended family the youngest child may spend his or her entire childhood with both biological parents while the oldest child in the same family may be reared first by both biological parents, then by a single parent, and finally by one biological parent and a stepparent. By using measures of family and sibling structure in blended families and stepfamilies I examine the extent to which children share an environment that has a similar effect on their educational outcomes, regardless of the child's biological relationship to the parents. Even if the blended family environment has a similar effect on all children, the oldest child in myblended family example experiences two different environments for a portion of her childhood.

Most studies of the association between family structure and child outcomes, including McLanahan and Sandefur (1994) and Manski et al. (1992), use one-year 'window' measurements taken at a given age as a proxy for family structure throughout childhood.[4] The window measurement necessarily fails to reflect any changes in family structure experienced by a child over time. Wolfe, Haveman, Ginther, and An (1996) examine the reliability of these window variable estimates and conclude that one-year window variables serve as weak proxies for childhood circumstances and events, and can result in unreliable estimates.

Family structure variables that are not subject to the window problem can be created with retrospective data. Using data from the censuses combined with data from the Swedish multigenerational register,[5] I obtain highly accurate information on family structure from ages zero to 15 (until age 10 for the children born in 1965 and in 1970), including stepfamilies and cohabitations. The census data have the advantage of being less plagued by recall and

[4] Wolfe, Haveman, Ginther, and An (1996) enumerate papers with the window problem.

[5] From this register we can establish the biological relationships among adults and children in the household.

measurement error, but the disadvantage of not recording changes in family structure between censuses.

3.3 Descriptive statistics

The family structure variables discussed above account for both the relationship of the child to the biological or stepparent and the relationship of the child to non-resident and co-resident full and half-siblings. Since the proportion lived in one of these structures is based on information from three censuses, each of the measures take the values 0, 0.33, 0.66 or 1. Table 1 presents descriptive statistics for the random sample, the full-siblings, the half-siblings on mother's side and the half-siblings on father's side that lived with their sibling in the random sample during part of childhood. It is clear that although a large majority has lived in an intact family without half-siblings during most of childhood—on average 73 % of childhood for those in the random sample and 74 % of childhood for the full sample, a sizeable proportion has lived with half-siblings or has half-siblings residing in other households. We further see that half-siblings on the mother's side have lower educational attainment than the other children and that the fraction among the mothers of these half-siblings that has at least *gymnasium*-level of education is below average. Quite a large fraction of the random-sample children have at least one half-siblings, about 21 %,[6] 14 % have half-siblings on their mother's side, 12 % have half-siblings on their father's side and 5 % have half-siblings on each parent's side (not shown). Clearly, family and sibling structure is more complex than whether or not a child lives with both biological parents.

Table 2 displays descriptive statistics for children in the whole sample according to family structure they ever lived with, that is, the proportion in that family structure is at least 0.33. We

[6] This fraction is similar to that found, for example, for the United States and Australia, see Thomson et al. (2012).

see that there are large variations in, for example, the fraction that has completed *gymnasium* from more than 40 % among children who ever lived in an intact family and no half-siblings down to less than 30 % among those who ever lived in a blended family, in a stepfamily or with a single parent. Also, it is more common for boys to have lived with a single father or a stepmother while girls more often have lived with a single mother or a stepfather.

Table 3 compares outcomes for children by family and sibling structure. Panel A in Table 3 compares outcomes for children who lived in intact families with no half-siblings, with non-resident half-siblings, and with resident half-siblings. The results suggest that having half-siblings is associated with educational disadvantages whether they live in the same household or not. Children who live in intact families and have no half-siblings have significantly more schooling than those with half-siblings. In particular, these children are more than 10 %-age points more likely to graduate from *gymnasium*. Children with half-siblings who live elsewhere have significantly higher educational attainment than those who have co-resident half-siblings.

Panel B in Table 3 compares outcomes for children living in intact families and no half-siblings to those living in blended families. As expected, the former children have significantly more schooling. Panel C compares children who have lived in a blended family for at least one-third of their childhood. Unlike Ginther and Pollak (2004) I find significant differences in outcomes between joint children and stepchildren; joint children have more schooling. Also, it is striking that the differences between children in intact families with no half-siblings and those in blended families (Panel B) are larger than the differences between the children in blended families (Panel C).

Panel D considers whether there are significant differences in outcomes for children living with a stepmother or stepfather for at least a third of childhood. Although fewer children live with a stepmother, they have significantly more schooling than those who live with a stepfather which

is in contrast to the finding of Case et al. (2001). In the cross-section analysis I investigate whether these differences persists after controlling for covariates.

3.4 Empirical approach and identification strategy

I start by using pooled cross-sectional regressions to examine the correlations between childhood family and sibling structure and educational outcomes. For simplicity, consider a two-child family where investments in the human capital of each child are a function of family economic resources, observable parental characteristics (education), family environment (proxied by family structure), and the sibling composition of the household (cf. Becker and Tomes 1979, 1986). For child *i* in family *j* consider the following outcome equation:

$$HC_{ij} = \alpha S_{ij} + \beta FS_{ij} + \gamma W_{ij} + \delta X_{ij} + u_{ij} \qquad (1)$$

where HC_{ij} measures a child's educational outcome, S_{ij} measures the sibling composition of the household, FS_{ij} measures the proportion of childhood lived in a particular family structure, W_{ij} observable parental characteristics, X_{ij} measures individual characteristics, and u_{ij} is the error term.

However, since family structure is not randomly assigned, *FS* is likely correlated with u and I therefore adopt a sibling-difference approach to estimate the causal effect of family structure and eliminate selection bias. The error term can be decomposed into three components: $u_{ij} = \varphi_j + \eta_i + \upsilon_{ij}$, where φ_j is the family-specific component, η_i is the individual-specific component, and υ_{ij} is random error. The advantage of the sibling-difference approach is that if φ_j captures permanent family characteristics shared by the siblings in the family, first differencing across siblings will eliminate selection bias. For this approach to be valid I have adopted the identification strategy of defining 'family' very precisely from the perspective of the focal child and putting strict requirements on siblings to be included in the analysis. This is because I want

them to have shared the main part of their early childhood and been exposed to the same family environment. First, they have to be full or half-siblings; almost all are full-siblings. Second, they should have at most ten years age difference. Third, they have to be living with the focal child in the first census they were observed.

Thus, the siblings in the analysis share both genes and family environment but since they differ in age, they may differ in the proportion of childhood they experienced a particular family structure. In addition, for children who are half-siblings the same family implies a different family structure. By assuming that family structure only operates through a family fixed effect, φ_j, and that all family effects are sibling-invariant, $W_{ij} = W_j$, I first difference (1) with respect to siblings and estimate the following equation:

$$\Delta HC = \alpha \Delta S + \beta \Delta FS + \delta \Delta X + \Delta u \qquad (2)$$

Under these assumptions, the model eliminates any observed or unobserved variables that do not vary within a family. There are, however, cases when the sibling-difference estimator may be impaired by potential biases (discussed in greater detail in Björklund and Sundström (2006)), but these biases should be less likely in this analysis because of the strict identification strategy adopted. The approach I take is to use cross-sectional regressions to estimate versions of Eq. (1) with different control variables, and in a second step to control for family fixed effects using Eq. (2). Finally, a comment on the use of robust standard errors may be in place. As children with many siblings are overrepresented in the sample I use robust standard errors to correct for this in the cross-section analysis, but in the sibling-difference analysis I do not since this approach assumes that there is a family fixed effect which is differentiated out.

4. Findings

4.1 Exploring the complexity of family and sibling structure

The analysis begins by estimations of cross-sectional regressions of family and sibling structure in order to determine the appropriate specification. I combine child and household based measures to define family and sibling structure using years of schooling as the outcome variable. Thus, in Table 4 Model 1 I distinguish between proportions of childhood lived in the following family and sibling structures: Intact family with resident half-siblings, intact family with non-resident half-siblings, single father family, single mother family, stepfather/biological mother family, stepmother/biological father family and without biological parents, using proportion of childhood lived in an intact family and having no half-siblings as the reference category. Controls for age and gender are included in all models. The results show that all family/siblings structures are associated with less schooling than the reference group. Interestingly, living in an intact family with resident half-siblings is significantly more negatively correlated with schooling than living in intact family with non-resident half-siblings and living in a stepfather family is significantly more negative correlated than living in a stepmother family. Also, the coefficient for lived with a single father is significantly more negative than that for lived with single mother. In Model 2 I add controls for resident and non-resident full-siblings and half-siblings and also distinguish between half-siblings on the mother's and the father's side. In addition, I include an indicator for ever having lived with social siblings. Consequently, the coefficients for intact family with resident half-siblings and intact family with non-resident half-siblings decrease in magnitude but are still significantly different from each other (at $p<.05$) while those for stepfather family and stepmother family no longer are. With the exception of half-siblings on the father's side, all of the coefficients for siblings are negative and statistically significant and taken together they increase explanatory power. I tested the sibling coefficients to see whether there were

significant differences between them and found that the number of resident full-siblings has a more negative association than non-resident full-siblings. A similar relationship was found for half-siblings on the mother's side but for half-siblings on the father's side the relationship was the opposite, that is, resident half-siblings were positively associated and non-resident negatively related.

Following these results, Model 3 collapses the narrowly-defined family and sibling structure variables by lumping together intact family with resident and non-resident half-siblings as well as stepfather and stepmother families. Further, non-resident full and half-siblings are counted in a single category. We see that the coefficients for the unchanged variables remain basically the same as does the explanatory power. Model 3 is the preferred specification used in the remainder of the cross-sectional models.

4.2 How robust are these estimates to additional controls?

In Tables 5A and 5B I build on the preferred specification (Table 4 Model 3) to evaluate how robust the estimates of family and sibling structure are to controls for additional observable characteristics. Model 1 includes controls for age, gender, and family structure (single father, single mother, intact with resident/nonresident half-siblings, stepparent, and without biological parents). Model 2 includes the covariates in Model 1 plus number of full-siblings lived with, number of resident half-siblings on the mother's and father's side, respectively, and an indicator for ever lived with social siblings. Model 3 includes the covariates from Model 2 and adds control variables for the biological or rearing parent's educational background. Model 4 includes the covariates from Model 3 and adds the number of family structure transitions experienced as well as birth order.

Table 5A displays estimates of the relationship between family and sibling structure and years of schooling. As before, we see that living outside of an intact family is correlated with

lower educational attainment (Model 1). Adding the sibling variables in Model 2 reduces the estimated negative coefficients for living with a single mother, living in an intact family with resident/non-resident half-siblings and living with stepparents. As before, the presence of full-siblings and half-siblings on the mother's side has a negative and significant association with years of schooling, whereas co-resident half-siblings on the father's side have a positive and significant association. Resident full-siblings reduce years of schooling more than non-resident full or half siblings do. After controlling for rearing parent's education in Model 3, all coefficients decrease in magnitude. In particular, the estimates for lived with half-siblings and social siblings fall by about half and that for lived with full-siblings falls by a quarter. In Model 4 I control for number of family structure transitions and birth order and see that younger siblings have lower educational attainment. The inclusion of these two variables further reduces the magnitude of the family structure estimates as well as those for resident full-siblings, resident half-siblings on the mother's side and ever lived with social siblings—the latter turns insignificant.

Turning to the probability of *gymnasium*-completion (Table 5B), we see very similar relationships between the family and sibling structure variables. As I add sibling structure, parental education, and birth order, the estimated correlations drop. As before, children living with a single father and those living without biological parents have worst outcomes but there is no difference between children living in a stepfamily and those living with a single mother. The estimates in Table 5B (Model 4) are very telling. For example, having lived with a single mother or in a stepfamily is associated with about 15 %-age points lower probability of *gymnasium*-completion and having lived in intact with resident or non-resident half-siblings with about 6 %-age points lower probability relative to the reference group. Each additional resident full sibling is associated with lower probability of *gymnasium*-graduation as is resident half-siblings on the

mother's side, social siblings and the number of family structure transitions. In contrast, having lived with half-siblings on the father's side and being the oldest child increases the probability of graduation whereas the number of non-resident full and half-siblings no longer is significantly correlated.

Taken together, the results show that estimates of the family structure correlations are very sensitive to the inclusion of sibling structure, parental education, and birth order. Children who lived with single fathers or without biological parents have the lowest educational attainment. Further, the results show that there is little to suggest that children who live with a stepmother do worse than those who live with a stepfather once sibling structure is accounted for. This result is at odds with that of Case, Lin, and McLanahan (2001) that living with a stepmother in the United States is associated with worse educational outcomes than living with a stepfather. This difference in results may be explained by a number of factors which I come back to in the concluding discussion. Another difference between myresults and those often obtained for the United States is that I do not find any 'stepfather paradox', that is, that children living in stepfather families do worse than those living in single mother families (Hanson et al. 1996). By contrast, I find that these groups of children are about equally disadvantaged in terms of education but those from stepparent families do better than those from single father families. One possible explanation for this difference could be that measuring family structure by census household, as I do, picks up more stable stepfamilies than do the survey measures which have been used in the studies for the United States. It is possible also that the selection into single motherhood is more negative in Sweden than in the United States where single motherhood is more common.

In order to take account of any selection bias in the estimates of family structure correlations with children's educational outcomes, I now proceed to estimate sibling-difference models.

4.3 Sibling-difference estimates

To take account of selection bias in the form of unobserved time-constant characteristics within the family, I estimate sibling-difference models which rely on the fact that the siblings differ in age and may have lived different proportions of childhood in a particular family structure for identification. In addition, as mentioned several times before, the same family may imply different family structures for the siblings in it.

I begin by estimating sibling differences in the effects on educational attainment of childhood family and sibling structure using the whole sample and a similar set of controls as in Table 5A and B and using proportion lived in intact family and no half-siblings as the reference group. The resulting estimates are presented in Table 6 and show somewhat puzzling that siblings who have lived greater proportions of childhood with both biological parents with resident or non-resident half-siblings have more years of schooling as well as higher probability of completing *gymnasium* than those who lived longer in other family structures. However, for years of schooling the coefficient is only significant at the 5 %-level once birth order is taken into account in Model 3 and only at the 10 %-level for *gymnasium*-completion (Model 3). Interestingly and importantly, the negative associations found in the cross-sections analysis for living in a single parent family, in a stepfamily or without biological parents all disappear when the family fixed effect is netted out. Neither do I find any educational differences between siblings by number of full and half-siblings they lived with but the number of non-resident full and half-siblings seems to have a small positive impact on years of schooling. These results are consistent with the hypothesis of selection being the explanation for the negative associations

found in the cross section. Finally, it is striking that younger siblings have significantly less schooling net of family and sibling structure and the family fixed effect.

The finding that children who lived greater proportions of childhood with both biological parents and resident or non-resident half-siblings have more education than their siblings who lived in other family structures calls for further investigation. I do that in the next section by examining children who grow up in blended families more closely, comparing the educational outcomes of the joint children to those of the stepchildren. In addition, since living a non-intact family may have an adverse impact on children's education among subgroups of families, I disaggregate the sample by parental education and family size, perform sibling analyses and evaluate the results.

4.4 Disaggregating the sibling-difference analysis

The finding in the previous section that children who have lived greater proportions of childhood with both biological parents and resident or non-resident half-siblings have more schooling than their siblings who lived in other family structures suggests that schooling may differ between joint and stepchildren in blended families. I examine this by narrowing the sample to children who spent at least a third of childhood in a blended family by whether they were the joint children of both parents or stepchildren with one biological parent and a stepparent in Table 7A and find that stepchildren indeed have fewer years of schooling and lower probability of *gymnasium*-completion but the estimates are only weakly significant. However, when I further narrow the sample to children who spent the whole childhood in a blended family, the coefficients for stepchildren increase in magnitude and the explanatory power of the models increase (Table 7B). Thus, time lived in a blended family seems to matter. These results are at odds with the hypothesis of all children in blended families experiencing more stress, since I find

that stepchildren do significantly worse than joint children, but in line with those of Evenhouse and Reilly (2004) that stepchildren have more unfavorable outcomes.

Furthermore, when I remove the few children who ever lived with a stepmother from the sample and focus on children in *stable stepfather* blended families, the estimates increase in magnitude and statistical significance (Table 7C). Thus, the stepchildren in these families have on average about 0.4 years less of schooling and are about 0.08 % less likely to complete *gymnasium* than the joint children of both parents. These effects are quite substantial, larger than those of having two resident full-siblings (cf. Table 5A and B). Finally and interestingly, a comparison of the results in Table 7B and C suggest that in Sweden living with a stepmother does not affect schooling negatively, whereas living in a stepfather blended family does, which is at odds with the findings for the United States by Case et al. (2001). The children who lived in stepmother blended families are too few to enable me to estimate the effects separately for them but the finding is consistent with the averages presented in Table 3D. Why living in a stepfather blended family has an adverse effect on educational attainment is still unclear but the finding is consistent with the time of biological fathers and stepfathers being imperfect substitutes as well as with stepfathers favoring their own offspring when that offspring are also the children of the current spouse as found by Anderson et al. (1999a), (1999b)

I now go on to disaggregate the siblings sample in order to investigate if the non-significant effects found for living with a single parent or in a stepfamily for the full sample remains when I focus on subgroups. Table 8 presents siblings-difference effects on years of schooling by parental education. The results, which are consistent with those in Table 6, show that older siblings have more schooling in all educational categories net of family fixed effects. Further, among families where both rearing parents have only compulsory education, but not among the more highly educated, children who lived with both biological parents and

resident/non-resident half-siblings have more schooling than those in other family structures. One possible explanation for this finding is that the less educated are more financially constrained and therefore prioritize their joint child. To examine this hypothesis further I next disaggregate the siblings sample by family size comparing children who lived with three or more full or half-siblings to those with only one resident sibling. The results are consistent with those for the full sample and show that among children with only one resident full or half-siblings, but not among those in large families, those who lived in an intact family with resident/non-resident siblings had more schooling. This is at odds with the financial constraints explanation for the more favorable educational outcomes of these children since the larger families should be expected to be more financially constrained.

5. Conclusions

I have examined the effect of childhood family and sibling structure on children's educational outcomes in Sweden using a sample of 76,000 siblings born in Sweden between 1960 and 1970 and incorporating controls for resident and nonresident full and half-siblings. The analysis began by extending the family-based classifications of family structure of Ginther and Pollak (2004) with child-based definitions of family and sibling structure. These more narrow definitions yielded interesting results. The cross-section estimates showed that both family and sibling structure are significantly correlated with educational attainment. Living in an intact families and having no half-siblings is associated with higher educational attainment in terms of years of schooling and graduating from *gymnasium* than living with a single parent, in a stepparent family or without any biological parent. Furthermore, living in such a family is associated with more schooling than living with both biological parents and having resident or non-resident half-siblings.

My main finding appeared in the sibling difference analysis. I found that all of the negative associations for living in non-intact family structures found in the cross-section analyses disappear once family fixed effects are accounted for. This interesting result is consistent with selection being the explanation for the negative associations found in the cross-section analysis. The sibling analysis does, however, show that children who lived longer with both biological parents and resident or non-resident half-siblings have more education than their siblings who lived in other family structures. When I narrowed the sample to children in blended families, I found that this rather puzzling result could be explained by the joint children of both biological parents having higher educational attainment than the stepchildren. Also, exposure seems to matter, since the difference between joint children and stepchildren is larger among children who lived the whole childhood in a blended family. Still another interesting finding is that when I focused on sibling differences within stable stepfather blended families, the educational disadvantage of stepchildren becomes larger. The explanation for this disadvantage remains unclear, but is in line with the hypothesis of fathers favoring their own offspring, especially if the offspring are the children of their current spouse, as well as with that of the time of the stepfather being a poor substitute for that of the biological father.

These results are in line with those found for the United States by Evenhouse and Reilly (2004) but at odds with those of Case et al. (2001) who found that children in blended families who live with a step, foster or adoptive mother have lower schooling than joint biological children and children who live with a stepfather. This difference in results might be explained by the small number of Swedish children who lives with a stepmother or that living with a stepmother has different implications in Sweden than in the United States. Thus, since living with a stepmother is a relatively rare phenomenon in Sweden, these families could be positively selected as suggested by the positive correlation between living with half-siblings on father's side

and educational outcomes and by the fact that the stepmothers as well as the biological fathers and mothers of these children are more educated. Alternatively, the results of Case et al. (2001) may be driven by the children with foster mothers.

My results also inform the work by Ginther and Pollak (2004) who found no significant differences between stepchildren and joint biological children in blended families in the United States, which could be used as an argument for family-based measures of family structure. However, when I use more detailed and child-based measures of family and sibling structure and analyze sibling differences, I find that stepchildren do significantly worse than joint children. I attribute this difference to my large sample size and the information on outcomes for siblings which allow me to identify effects of family and sibling structure.

Furthermore, the sibling analysis showed that younger siblings have significantly lower educational attainment also after controls for family and sibling structure and other observables as well as family fixed effects. Finally, I performed a couple of robustness checks to see whether the non-significant effects found in the sibling analysis for living in non-intact family structures remained when I disaggregated the siblings sample by parents' education and family size. The resulting estimates showed virtually the same pattern as for the whole sibling sample.

Although I find no evidence of a causal effect on educational attainment of growing up with a single parent or with a stepparent, other than that for stepchildren in stable blended families, several caveats are clearly in order. First, we cannot rule out the possibility that growing up in a non-intact family has causal effects in other countries, which for example, have less extensive social welfare provisions. Second, it is possible also that growing up in a non-intact family carries more of a stigma for children, for example, in the United States than it does for children in Sweden. Third, we cannot rule out the possibility that growing up in a non-intact family has causal effects on outcomes other than education for children in the Swedish context.

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Table 1. Descriptive statistics. Means and frequencies. Random sample children and the full-siblings and the half-siblings they lived with during childhood. Standard deviations in brackets.

Variable	Random Sample	Full Sibs	Half Sibs Mum	Half Sibs Dad	Full Sample
Years of schooling	11.38 [2.13]	11.33 [2.13]	10.42 [1.68]	11.28 [2.36]	11.34 [2.13]
Gymnasium- completion	0.41 [0.49]	0.40 [0.49]	0.20 [0.40]	0.35 [0.48]	0.40 [0.49]
Female	0.49 [0.49]	0.48 [0.49]	0.48 [0.5]	0.42 [0.49]	0.48 [0.49]
Year of Birth	1964.4 [.49]	1964.7 [3.23]	1965.1 [3.70]	1964.9 [3.88]	1964.6 [2.28]
Proportion Lived Intact No half sibs	0.72 [0.40]	0.78 [0.36]	00 [0]	 [0]	0.73 [0.40]
Proportion Lived Intact w half sibs	0.04 [0.18]	0.03 [0.14]	0.40 [0.41]	0.35 [0.40]	0.04 [0.18]
Prop. Lived Intact & Non-resident half sibs	0.06 [0.22]	0.07 [0.24]	0 [0]	0 [0]	0.06 [0.23]
Proportion Single Mother Family	0.06 [0.17]	0.05 [0.16]	0.20 [0.30]	0 [0]	0.06 [0.17]
Proportion Single Father Family	0.01 [0.08	0.01 [0.06]	0 [0]	0.07 [0.16]	0.01 [0.07]
Proportion Step Mum Bio Dad Family	0.00 [0.05]	0.00 [0.03]	0 [0]	0.35 [0.44]	0.00 [0.05]
Proportion Step Dad Bio Mum Family	0.03 [0.13]	0.02 [0.10]	0.28 [0.40]	0 [0]	0.03 [0.14]
Proportion w/ Stepparents	0.04 [0.14]	0.02 [0.10]	0.28 [0.40]	0.35 [0.44]	0.04 [0.14]
Proportion Lived w/o Bio Parents	0.03 [0.13	0.01 [0.08]	0.09 [0.21]	0.20 [0.31]	0.02 [0.11]
Ever lived w/ Stepfather	0.08 [0.27]	0.05 [0.21]	0.38 [0.48]	0 [0]	0.07 [0.26]
Ever lived w/ Stepmother	0.01 [0.11]	0.00 [0.09]	0 [0]	0.42 [0.49]	0.01 [0.10]
No. of family structure transitions	0.29 [0.55]	0.22 [0.49]	0.58 [0.67]	0.55 [0.59]	0.27 [0.53]
Birth Order	1.99 [1.00]	2.18 [.98]	2.36 [1.12]	2.30 [1.06]	2.09 [1.00]
Max No. of Full-siblings Lived W/	1.45 [1.10]	2.06 [1.22]	0.90 [1.16]	0.57 [0.98]	1.71 [1.20]
Max No. of Full-siblings Not Live W/	0.18 [0.57]	0.20 [0.63]	0.15 [0.51]	0.12 [0.51]	0.19 [0.60]
Max No. of Half Sibs Mother Lived W/	0.14 [0.46]	0.08 [0.35]	1.45 [0.76]	0 [0]	0.14 [0.47]

Variable	Random Sample	Full Sibs	Half Sibs Mum	Half Sibs Dad	Full Sample
Max No. of Half Sibs Father Lived W/	0.01	0.01	0.01	0.60	0.01
	[0.15]	[0.13]	[0]	[0.91]	[0.15]
Max No. of Half Sibs Mother Not Lived W/	0.09	0.08	0.08	0	0.09
	[0.41]	[0.38]	[0.35]	[0]	[0.40]
Max No. of Half Sibs Father Not Lived W/	0.19	0.15	0	0.16	0.17
	[0.63]	[0.53]	[0]	[0.52]	[0.58]
Max No. of Nonresident full/half-siblings	0.47	0.44	0.24	0.29	0.45
	[0.98]	[0.97]	[0.64]	[0.70]	[0.97]
Ever lived w/ social sibling	0.07	0.05	0.21	0.25	0.07
	[0.27]	[0.22]	[0.40]	[0.43]	[0.25]
Mum High Education	0.11	0.12	0.03	0	0.12[a]
	[0.32]	[0.33]	[0.18]	[0]	[0.31]
Dad High Education	0.23	0.23	0	0.25	0.23 [a]
	[0.42]	[0.42]	[0]	[0.44]	[0.42]
Rearing Mum High Education	0.11	0.12	0.03	0.25	0.11 [a]
	[0.31]	[0.33]	[0.18]	[0.43]	[0.32]
Rearing Dad High Education	0.23	0.24	0.16	0.27	0.23 [a]
	[0.42]	[0.43]	[0.36]	[0.45]	[0.42]
Observations	39,860	34,474	1,672	78	76,084

Standard deviations in brackets, EBD=Empty by definition, N,A,= Not available, Note: [a] *As a fraction of those with non-missing information on education,*

Table 2. Descriptive Statistics, Means and frequencies by sibling and family structure ever lived in. Standard deviations in brackets.

Variable	Intact No Halfsib	Intact Res/ NonR Halfsib	Blended Fam	Step Fam	Single Dad	Single Mum	Ever Stepmum	Ever Stepdad
Years of schooling	11.49 [2.16]	10.77 [1.91]	10.63 [1.81]	10.78 [1.92]	10.74 [1.91]	10.80 [1.95]	11.07 [2.09]	10.74 [1.89]
Gymnasium-completion	0.43 [0.49]	0.28 [0.45]	0.25 [0.43]	0.28 [0.45]	0.27 [0.44]	0.29 [0.45]	0.362 [0.48]	0.27 [0.44]
Female	0.48 [0.49]	0.49 [0.5]	0.49 [0.5]	0.50 [0.5]	0.47 [0.49]	0.49 [0.5]	0.47 [0.49]	0.50 [0.5]
Year of Birth	1964.6 [2.29]	1964.7 [2.34]	1964.6 [2.35]	1964.3 [2.01]	1964.7 [1.94]	1964.7 [2.17]	1964.3 [1.91]	1964.3 [2.02]
Proportion Lived Intact No half sibs	0.91 [0.18]	0.01 [0.06]	0.06 [0.14]	0.22 [0.26]	0.35 [0.28]	0.27 [0.28]	0.32 [0.28]	0.20 [0.25]
Proportion Lived Intact w half sibs	0.00 [0.01]	0.34 [0.39]	0.43 [0.39]	0.02 [0.11]	0.03 [0.14]	0.053 [0.16]	0.03 [0.13]	0.02 [0.11]
Prop0. Intact & Non-resid0. half sibs	0.00 [0.02]	0.49 [0.42]	0.09 [0.19]	0.03 [0.12]	0.06 [0.17]	0.05 [0.15]	0.04 [0.14]	0.03 [0.12]
Proportion Single Mother Family	0.03 [0.12]	0.08 [0.18]	0.11 [0.20]	0.14 [0.20]	0.05 [0.14]	0.46 [0.20]	0.027 [0.10]	0.16 [0.20]
Proportion Single Father Family	0.01 [0.06]	0.018 [0.09]	0.01 [0.07]	0.01 [0.08]	0.40 [0.14]	0.01 [0.06]	0.083 [0.16]	0.00 [0.06]
Proportion Step Mum Bio Dad Family	0.00 [0.04]	0.00 [0.04]	0.01 [0.10]	0.05 [0.16]	0.03 [0.11]	0.00 [0.03]	0.43 [0.19]	0.00 [0.01]
Proportion Step Dad Bio Mum Family	0.01 [0.08]	0.03 [0.10]	0.21 [0.30]	0.42 [0.26]	0.02 [0.09]	0.09 [0.17]	0.00 [0.04]	0.48 [0.21]
Proportion W/ Stepparents	0.01 [0.08]	0.03 [0.12]	0.22 [0.31]	0.48 [0.21]	0.05 [0.14]	0.09 [0.18]	0.44 [0.20]	0.48 [0.21]
Proportion Lived w/o Bio Parents	0.014 [0.07]	0.02 [0.11]	0.05 [0.14]	0.07 [0.16]	0.03 [0.11]	0.05 [0.13]	0.03 [0.12]	0.08 [0.17]
Ever lived w/ Stepfather	0.04 [0.20]	0.06 [0.26]	0.38 [0.48]	0.87 [0.33]	0.06 [0.23]	0.23 [0.42]	0 [0]	1 [0]
Ever lived w/ Stepmother	0.00 [0.09]	0.01 [0.10]	0.03 [0.18]	0.12 [0.33]	0.08 [0.27]	0.00 [0.07]	1 [0]	0 [0]

Variable	Intact No Halfsib	Intact Res/ NonR Halfsib	Blended Fam	Step Fam	Single Dad	Single Mum	Ever Stepmum	Ever Stepdad
No. of family structure transitions	0.20 [0.48]	0.41 [0.61]	0.69 [0.73]	1.26 [0.60]	1.23 [0.46]	1.19 [0.53]	1.24 [0.57]	1.26 [0.61]
Birth Order	1.93 [0.92]	3.09 [0.88]	2.61 [1.11]	1.91 [1.03]	1.97 [1.04]	2.21 [1.09]	2.04 [1.04]	1.89 [1.02]
Max No. of Full-siblings Lived w/	1.80 [1.15]	1.72 [1.36]	1.23 [1.25]	1.05 [1.16]	1.52 [1.25]	1.36 [1.24]	1.38 [1.32]	1.00 [1.13]
Max No. of Full-siblings Not Live w/	0.19 [0.6]	0.22 [0.64]	0.16 [0.52]	0.17 [0.55]	0.23 [0.62]	0.22 [0.64]	0.31 [0.71]	0.15 [0.52]
Max No0. of Half Sibs Mother Lived w/	0.02 [0.17]	0.58 [0.74]	10.22 [0.72]	0.72 [0.90]	0.13 [0.44]	0.43 [0.75]	0.10 [0.42]	0.81 [0.91]
Max No0. of Half Sibs Father Lived w/	0.00 [0.05]	0.07 [0.34]	0.12 [0.44]	0.05 [0.28]	0.07 [0.35]	0.01 [0.15]	0.36 [0.66]	0.00 [0.11]
Max No0. Half Sibs Mother Not Lived w/	0.00 [0.10]	0.51 [0.81]	0.48 [0.83]	0.16 [0.53]	0.21 [0.63]	0.18 [0.58]	0.34 [0.73]	0.13 [0.49]
Max No. Half Sibs Father Not Lived w/	0.02 [0.18]	0.77 [0.99]	0.51 [0.99]	0.53 [0.98]	0.30 [0.74]	0.49 [0.95]	0.26 [0.73]	0.57 [1.00]
Max No. Nonresident Full/Half-siblings	0.22 [0.64]	1.52 [1.37]	1.16 [1.45]	0.87 [1.23]	0.75 [1.21]	0.89 [1.31]	0.92 [1.21]	0.86 [1.24]
Ever lived w/ social sibling	0.05 [0.22]	0.07 [0.27]	0.13 [0.34]	0.24 [0.43]	0.15 [0.36]	0.13 [0.33]	0.33 [0.47]	0.22 [0.41]
Mum High Education	0.12 [0.33]	0.06 [0.24]	0.04 [0.21]	0.07 [0.26]	0.07 [0.25]	0.09 [0.29]	0.12 [0.33]	0.06 [0.25]
Dad High Education	0.25 [0.43]	0.14 [0.35]	0.12 [0.32]	0.17 [0.37]	0.17 [0.37]	0.17 [0.37]	0.24 [0.43]	0.16 [0.36]
Rearing Mum High Education	0.12 [0.33]	0.06 [0.24]	0.05 [0.22]	0.07 [0.26]	0.08 [0.27]	0.09 [0.28]	0.13 [0.33]	0.07 [0.25]
Rearing Dad High Education	0.25 [0.43]	0.16 [0.37]	0.16 [0.36]	0.20 [0.40]	0.17 [0.37]	0.19 [0.39]	0.24 [0.43]	0.19 [0.39]
Observations	61,268	10,615	8,145	6,599	2,492	10,077	838	5,761

Table 3. Mean comparisons by family and sibling Structure

3A

Variable	Intact No Halfsib (a)	Intact Non-res Halfsib (b)	Intact w/ Halfsibs (c)
Years of schooling	11.49	10.85***	10.66***^^^
Gymnasium-completion	0.43	0.30***	0.26***^^^
Observations	61,268	7,064	5,160

Note: The table compares children who ever lived in any of the three family structures. A child may thus have lived in more than one of them,

3B

Variable	Intact No Halfsib (a)	Blended Family (b)
Years of schooling	11.49	10.63***
Gymnasium-completion	0.43	0.25***
# Observations	61,268	8,145

Note: The table compares children who ever lived in any of the two family structures. A child may thus have lived in both of them,

3C

Variable	Joint Children (a)	Stepchildren (b)
Years of schooling	10.68	10.56**
Gymnasium-completion	0.26	0.23***
# Observations	4,953	3,192

Note: The table compares children who ever lived in a blended family by whether they were joint or stepchildren which are mutually exclusive categories,

3D

Variable	Stepmother (a)	Stepfather (b)
Years of schooling	11.08	10.74***
Gymnasium-completion	0.36	0.27***
# Observations	838	5,761

Note: The table compares children who ever lived with a stepmother to those who ever lived with a stepfather,

Tests of statistical significance: (a) v. (b) and (a) v. (c) *†p<.10; *p<.05; **p<.01;***p<.001.*
(b) v. (c), ‡p<.1; ^p<.05; ^^p< .01; ^^^p<.001

Table 4. OLS-estimates of relationship between years of Schooling and family and sibling structure. Robust standard errors in brackets.

Variables	(1)	(2)	(3)
Proportion Lived Intact w half sibs	-0.874***	-0.568***	
	[0.037]	[0.048]	
Prop. Lived Intact & Non-resident half sibs	-0.632***	-0.441***	
	[0.031]	[0.036]	
Proportion Intact has res/nonres halfsibs			-0.468***
			[0.028]
Proportion Single Father Family	-1.520***	-1.538***	-1.536***
	[0.090]	[0.089]	[0.089]
Proportion Single Mother Family	-1.025***	-0.951***	-0.929***
	[0.041]	[0.044]	[0.043]
Proportion Step Dad Bio Mum Family	-1.070***	-0.922***	
	[0.049]	[0.062]	
Proportion Step Mum Bio Dad Family	-0.545**	-0.800***	
	[0.161]	[0.166]	
Proportion with Stepparents			-0.847***
			[0.055]
Proportion Lived w/o Bio Parents	-1.134***	-1.087***	-1.093***
	[0.055]	[0.064]	[0.064]
Max No. Half Sibs Mother Lived W		-0.241***	-0.281***
		[0.022]	[0.017]
Max No. Half Sibs Father Lived W		0.266***	0.261***
		[0.054]	[0.051]
Max No. Full-siblings Lived W		-0.207***	-0.210***
		[0.007]	[0.007]
Max No. Half Sibs Mother Not Lived W		-0.118***	
		[0.018]	
Max No. Half Sibs Father Not Lived W		-0.067***	
		[0.013]	
Max No. Full-siblings Not Live W		-0.103***	
		[0.013]	
Max No. Nonresident full/half-siblings			-0.088***
			[0.008]
Ever lived w/ social sibling		-0.150***	-0.153***
		[0.030]	[0.030]
Observations	76.084	76.084	76.084
R-squared	0.033	0.053	0.052

*Reference group: Proportion lived in intact family with no half-siblings, Controls: age and gender in all models. †p<.10; *p<.05;. **p<.01;***p<.001.*

Table 5A. OLS-estimates of relationship between years of schooling and family and sibling Structure. Robust standard errors in brackets.

Variables	(1)	(2)	(3)	(4)
Proportion Lived in Single Father Family	-1.493***	-1.536***	-1.062***	-0.960***
	[0.089]	[0.089]	[0.085]	[0.094]
Proportion Lived in Single Mother Family	-1.038***	-0.929***	-0.916***	-0.801***
	[0.041]	[0.043]	[0.042]	[0.052]
Proportion Intact has Res/Nonres Halfsibs	-0.726***	-0.468***	-0.366***	-0.296***
	[0.024]	[0.028]	[0.026]	[0.027]
Proportion Lived with Stepparents	-1.013***	-0.847***	-0.802***	-0.730***
	[0.047]	[0.055]	[0.052]	[0.058]
Proportion Lived w/o Bio Parents	-1.143***	-1.093***	-0.926***	-0.879***
	[0.055]	[0.064]	[0.060]	[0.065]
Max Number of Half Sibs Mother Lived With		-0.281***	-0.164***	-0.150***
		[0.017]	[0.016]	[0.016]
Max Number of Half Sibs Father Lived With		0.261***	0.096*	0.110*
		[0.051]	[0.047]	[0.047]
Max Number of Full-siblings Lived With		-0.210***	-0.162***	-0.127***
		[0.007]	[0.006]	[0.007]
Max Number of Nonresident full/half-siblings		-0.153***	-0.097***	-0.108***
		[0.030]	[0.028]	[0.028]
Ever lived w/ Social Sibling		-0.088***	-0.025***	0.004
		[0.008]	[0.008]	[0.008]
Rearing Mother's Education			Yes	Yes
Rearing Father's Education			Yes	Yes
Birth Order				-0.092***
				[0.011]
No. Family Structure Transitions				-0.061***
				[0.020]
	76,084	76,084	76,084	76,084
	0.033	0.052	0.205	0.206

*Reference group: Proportion lived in intact family with no half-siblings. Controls: age and gender in all models, education of rearing parent(s) in Model (3)-(4). †p<.10; *p<.05;. **p<.01;***p<.001.*

Table 5B. OLS-estimates of relationship between gymnasium-completion and family and sibling structure. Robust standard errors in brackets.

Variable	(1)	(2)	(3)	(4)
Proportion Lived in Single Father Family	-0.328***	-0.339***	-0.239***	-0.215***
	[0.020]	[0.020]	[0.020]	[0.022]
Proportion Lived in Single Mother Family	-0.209***	-0.183***	-0.181***	-0.154***
	[0.009]	[0.010]	[0.010]	[0.012]
Proportion Intact has Res/Nonres Halfsibs	-0.152***	-0.094***	-0.072***	-0.057***
	[0.006]	[0.007]	[0.006]	[0.007]
Proportion with Stepparents	-0.217***	-0.179***	-0.171***	-0.154***
	[0.011]	[0.013]	[0.012]	[0.014]
Proportion Lived w/o Bio Parents	-0.229***	-0.235***	-0.200***	-0.189***
	[0.008]	[0.015]	[0.015]	[0.016]
Max Number of Half Sibs Mother Lived With		-0.065***	-0.040***	-0.037***
		[0.004]	[0.004]	[0.004]
Max Number of Half Sibs Father Lived With		0.059***	0.024*	0.027**
		[0.011]	[0.010]	[0.010]
Max Number of Full-siblings Lived With		-0.047***	-0.036***	-0.029***
		[0.001]	[0.001]	[0.002]
Max Number of Nonresident Full/Half-siblings		-0.018***	-0.004*	0.002
		[0.002]	[0.002]	[0.002]
Ever lived w/ Social Sibling		-0.036***	-0.024***	-0.026***
		[0.007]	[0.007]	[0.007]
Rearing Mother's Education			Yes	Yes
Rearing Father's Education			Yes	Yes
Birth Order				-0.020***
				[0.002]
Number of Family Structure Transitions				-0.014***
				[0.005]
Observations	76.084	76.084	76.084	76.084
R-squared	0.029	0.048	0.175	0.176

*Reference group: Proportion lived in intact family with no half-siblings. Controls: age and gender in all models, education of rearing parent(s) in Model (3)-(4).†p<.10; *p<.05;. **p<.01;***p<.001.*

Table 6. Sibling-differences in educational effects of family and sibling structure. Standard errors in brackets. Full sample.

	Years of schooling			Gymnasium- completion		
Variables	(1)	(2)	(3)	(1)	(2)	(3)
Proportion Single Father Family	-0.051	-0.131	-0.123	-0.027	-0.042	-0.040
	[0.229]	[0.230]	[0.230]	[0.055]	[0.056]	[0.056]
Proportion Single Mother Family	-0.021	-0.086	-0.020	0.015	0.004	0.018
	[0.156]	[0.158]	[0.158]	[0.038]	[0.038]	[0.038]
Prop Intact Resid/Nonres Halfsibs	0.253	0.287†	0.349*	0.049	0.057	0.070†
	[0.156]	[0.158]	[0.158]	[0.038]	[0.038]	[0.038]
Proportion with Stepparents	-0.105	-0.149	-0.083	-0.024	-0.030	-0.016
	[0.162]	[0.167]	[0.168]	[0.039]	[0.040]	[0.041]
Proportion Lived w/o Bio Parents	-0.028	-0.156	-0.116	-0.023	-0.046	-0.038
	[0.145]	[0.149]	[0.149]	[0.035]	[0.036]	[0.036]
Max No. Half Sibs Mother Lived w		Yes	-0.006		Yes	-0.005
			[0.055]			[0.013]
Max No. Half Sibs Father Lived w		Yes	-0.084		Yes	-0.013
			[0.122]			[0.030]
Max No. of Full-siblings Lived w		Yes	-0.056		Yes	-0.012
			[0.045]			[0.011]
Max No. NonResid Siblings		Yes	0.047**		Yes	0.008
			[0.021]			[0.005]
Birth Order			-0.147***			-
			[0.022]			[0.005]
# Observations	76.084	76.084	76.084	76.084	76.084	76.084
# Groups	39.874	39.874	39.874	39.874	39.874	39.874
R-square within	0.014	0.014	0.015	0.012	0.012	0.013

*Reference group: Proportion lived in intact family with no half-siblings. Controls: age and gender in all models. †p<.10; *p<.05;. **p<.01;***p<.001.*

Table 7A. Sibling-difference estimates of the effect on education of family structure for joint children and stepchildren who ever lived in a blended family. Standard errors in parentheses.

	Years of schooling			Gymnasium-completion		
Variables	(1)	(2)	(3)	(1)	(2)	(3)
Stepchild	-0.123†	-0.141*	-0.135†	-0.027†	-0.030†	-0.028
	[0.064]	[0.047]	[0.070]	[0.016]	[0.017]	[0.017]
Max no. of half sibs lived w/		Yes	Yes		Yes	Yes
Max no. of full sibs lived w/		Yes	Yes		Yes	Yes
Max no. of non-res full & half sibs		Yes	Yes		Yes	Yes
Birth order			Yes			Yes
# Observations	8.145	8.145	8.145	8.145	8.145	8.145
# Groups	4.376	4.376	4.376	4.376	4.376	4.376
R-square within	0.006	0.007	0.006	0.008	0.008	0.008

*Reference group: Joint children. Included are children who ever lived in a blended family. Controls: age and gender in all models. †p<.10; *p<.05;. **p<.01;***p<.001*

Table 7B. Sibling-difference estimates of the effect on education of family structure for joint children and stepchildren in stable blended families. Standard errors in parentheses.

	Years of schooling			Gymnasium-completion		
	(1)	(2)	(3)	(1)	(2)	(3)
Stepchild	-0.261†	-0.287†	-0.272†	-0.061†	-0.070†	-0.064†
	[0.136]	[0.150]	[0.151]	[0.033]	[0.036]	[0.037]
Max no. of half sibs lived w/		Yes	Yes		Yes	Yes
Max no. of full sibs lived w/		Yes	Yes		Yes	Yes
Max no. of nonres full & half sibs		Yes	Yes		Yes	Yes
Birth order			Yes			Yes
#Observations	2.353	2.353	2.353	2.353	2.353	2.353
#Groups	1.393	1.393	1.393	1.393	1.393	1.393
R-square within	0.028	0.031	0.032	0.024	0.027	0.029

*Reference group: Joint children. Included are children who lived in a blended family the whole childhood. Controls: age and gender in all models. †p<.10; *p<.05;. **p<.01;***p<.001.*

Table 7C. Sibling-difference estimates of the effect on education of family structure for joint children and stepchildren in stable blended families who never lived with stepmothers. Standard errors in parentheses.

	Years of schooling			Gymnasium-completion		
	(1)	(2)	(3)	(1)	(2)	(3)
Stepchild	-0.276*	-0.392*	-0.378*	-0.062†	-0.088*	-0.082*
	[0.137]	[0.154]	[0.155]	[0.034]	[0.038]	[0.038]
Max no. of half sibs lived w/		Yes	Yes		Yes	Yes
Max no. of full sibs lived w/		Yes	Yes		Yes	Yes
Max no. of nonres full & half sibs		Yes	Yes		Yes	Yes
Birth order			Yes			Yes
#Observations	2.307	2.307	2.307	2.307	2.307	2.307
#Groups	1.379	1.379	1.379	1.379	1.379	1.379
R-square within	0.027	0.033	0.033	0.023	0.029	0.030

*Reference group: Joint children. Included are children who lived in blended family the whole childhood and never lived with a stepmother. Controls: age and gender in all models. †p<.10; *p<.05;. **p<.01;***p<.001.*

Table 8. Sibling-differences in effects on years of schooling of family and sibling structure by educational level of biological/rearing parents. Standard errors in brackets.

Variables	Rearing Dad Hi Ed	Bio Dad Hi Ed	Bio Mum Hi Ed	Rearing Dad & Mum Compulsory Ed.
Proportion Single Father Family	-0.092	-0.355	-0.003	0.261
	[0.653]	[0.671]	[1.116]	[0.287]
Proportion Single Mother Family	-0.191	-0.309	-0.497	0.260
	[0.370]	[0.385]	[0.534]	[0.221]
Proportion Intact has res/nonres halfsibs	0.310	-0.264	0.746	0.440*
	[0.406]	[0.573]	[0.658]	[0.221]
Proportion with Stepparents	-0.330	-0.029	-0.735	0.133
	[0.413]	[0.473]	[0.651]	[0.235]
Proportion Lived w/o Bio Parents	0.049	0.216	-0.348	-0.045
	[0.387]	[0.414]	[0.586]	[0.204]
Max No. of Half Sibs Mother Lived With	-0.177	-0.130	0.389	0.087
	[0.173]	[0.293]	[0.342]	[0.069]
Max No. of Half Sibs Father Lived W	0.391	0.328	-0.144	-0.035
	[0.333]	[0.366]	[0.600]	[0.185]
Max No. of Full-siblings Lived W	-0.074	0.077	0.102	0.044
	[0.127]	[0.185]	[0.214]	[0.059]
Max No.of Nonresident full/half-siblings	0.041	-0.009	0.140	0.058**
	[0.067]	[0.081]	[0.110]	[0.026]
Birth Order	-0.216***	-0.229***	-0.184*	-0.126***
	[0.056]	[0.058]	[0.076]	[0.028]
#Observations	17.907	17.436	8.794	31.409
#Groups	9.428	9.209	4.437	16.405
R square within	0.023	0.024	0.029	0.016
Child's average years of schooling	12.59	12.63	13.12	10.60
	(2.24)	(2.24)	(2.15)	(1.74)

*Reference group: Proportion lived in intact family with no half-siblings and intact family with non-resident half-siblings. †p<.10; *p<.05;. **p<.01;***p<.001*

Table 9. Sibling-differences in educational effects of family and sibling structure according to number of full and half-siblings lived with. Standard errors in brackets.

	3 sibs or more	One sibling
Proportion Single Father Family	0.018	-0.525
	[0.470]	[0.384]
Proportion Single Mother Family	0.451	-0.205
	[0.296]	[0.282]
Proportion Intact has res/nonres halfsibs	0.297	0.663*
	[0.291]	[0.300]
Proportion with Stepparents	0.133	0.232
	[0.310]	[0.311]
Proportion Lived w/o Bio Parents	0.097	0.048
	[0.314]	[0.251]
Max Number of Half Sibs Mother Lived With	-0.035	0.465
	[0.088]	[0.950]
Max Number of Half Sibs Father Lived With	0.148	-0.879
	[0.163]	[1.181]
Max Number of Full-siblings Lived With	-0.048	0.276
	[0.073]	[0.962]
Max Number of Nonresident full/half-siblings	0.011	-0.030
	[0.029]	[0.062]
Birth Order	-0.105***	-0.194**
	[0.028]	[0.058]
#Observations	17.157	33.535
#Groups	7.130	21.412
R-square within	0.010	0.021
Average years of schooling	10.83	11.56
	(1.98)	(2.16)

*Reference group: Proportion lived in intact family with no half-siblings. †p<.10; *p<.05;.**p<.01;***p<.001.*