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Parental birth order and general upper secondary educational attainment

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Abstract. Some recent studies suggest that parental birth order may influence offspring educational attainment. However, no previous research on this interrelation has been concerned with the first stage of tracking into schools. We do so, and examine how parental birth order is associated with attainment of general upper secondary education in Finland. This first tracking point is greatly selective of persons who subsequently aim for university studies. We use three-generational register data on the total Finnish population and assess how the probability of having the matriculation examination at age 20 is associated with parental birth order. The total number of individuals in the child generation is 377,038. We find that the probability of having the matriculation examination decreases with parental birth order. Within-family analyses using cousin fixed effects models, which account for unobserved characteristics in the extended family, show also that having later-born parents, and in particular a later-born father, is negatively associated with first tracking into schools. These parental birth order patterns can be solely attributed to the fact that earlier-born parents are higher educated and found in higher social classes than later-born parents. The results largely corroborate findings from similar analyses of length of schooling in Sweden, although the contribution of parental education and social class is notably stronger in our study context.

Keywords: intergenerational effects, parental birth order, general upper secondary education, cousin fixed effects, Finland

Introduction

Research has consistently shown that parents' education and socioeconomic status are strong predictors of offspring academic achievement as well as other socioeconomic outcomes (Jäntti and Jenkins, 2015; Pfeffer, 2008). A full understanding of the relationship between family background and these outcomes require that intergenerational processes are viewed in a demographic context (Mare, 2014). Along with observed resources within the family, unobserved factors that are shared by siblings and uncorrelated with the parental resources may influence offspring attainment. Sibling similarity studies show that outcomes differ between individuals who share the same parents, suggesting that mechanisms of inequality are at work also within families (Björklund and Jäntti, 2012; Grätz et al., 2021; Grätz and Kolk, 2022). Such mechanisms of cumulative disadvantage may produce further relative deprivation over generations (Diprete and Eirich, 2006).

Studies have pointed to birth order differences in various educational achievements, such as transition to high school (Härkönen, 2014), years of education (Barclay, 2015) and completed educational attainment (Black et al., 2005), with better outcomes for first- and earlier-born siblings than for later-born. The variation is presumed to be a result of differences in nurture. Since later-born siblings generally are lower educated than their earlier-born siblings, variation in educational attainment may manifest over generations. Parental birth order may therefore, through parenting behaviour, influence offspring educational attainment net of offspring's own birth order. To our knowledge, only two studies exist on this topic, which both use length of schooling as the outcome variable. Barclay et al. (2021) use Swedish register data, while Havari and Savegnago utilises survey data from several European countries. Both studies suggest that intergenerational effects exist, but that they are mediated through parents' educational attainment.

No previous research has focused on the first stage of tracking into schools, which strongly determines future educational careers. We are the first to do so, and examine how parental birth order is associated with attainment of general upper secondary education in Finland. Tracking into schools increases inequalities in educational opportunities later in life. School tracking manifests in better socio-economic outcomes for persons with general education as compared to those with vocational education, because the former type of education prepares students for more advanced educational programs and lays the foundation for lifelong learning (Ozer and Perc, 2020; UNESCO, n.d.). Individuals' transitions between different educational stages are also important mechanisms lying behind their completed educational attainment (Blossfeld and Shavit, 1993; Breen et al., 2009).

In the Finnish education system, the first tracking into schools takes place in the calendar year when youngsters complete primary school. This is usually at age 16, which corresponds with the age at first selection into distinct education programs in several other countries (OECD, 2020). The youngsters can then choose between general upper secondary education, which leads to matriculation examination, and vocational education and training. Very few of those who choose vocational education will continue to university studies. This first tracking point therefore separates between persons who aim for an academic track and persons who do not aim for higher education. The Finnish setting consequently makes it possible to study antecedents of the first tracking point into schools. Similar highly-selective education systems are found in, for instance, Germany, albeit the German pupils are tracked at an even younger age than in Finland (Ozer and Perc, 2020), and in France and Spain (CEDEFOP, 2019; Herbaut et al., 2019).

We aim to study the association between parental birth order and their children's probability of having a general upper secondary education, measured as having the matriculation examination at age 20. Hence, we focus an educational choice that people make at young age, rather than on

achieved education in adulthood. To this end, we use register data that cover the full population of Finland. For comparative purposes, we employ an empirical strategy that is similar to the one used by Barclay et al. (2021), who studied the neighbouring country Sweden. Our analyses are based on three generations and we estimate parental birth order through cousin fixed effects. Maternal and paternal cousin groups are constructed, and the models thus control for shared family background.

Intergenerational birth order effects on education

A considerable amount of research has documented birth order differences in various educational and socioeconomic outcomes, with first- or earlier born being advantaged. As for education, sibling comparisons show that first-born children are more probable than later born of being enrolled in the expected grade given own age (Esposito et al., 2020). They also have higher GPA (Kalmijn and Kraaykamp, 2005), more years of education by the age of 30 (Barclay, 2015), more years of completed schooling (Härkönen, 2014), and higher completed educational attainment (Black et al., 2005) than their later-born siblings. First-born children have also significantly higher odds of progressing to high school than their younger siblings (Härkönen, 2014). Birth order effects for the transition to tertiary education are reported by Barclay (2018) for Sweden, whereas Härkönen (2014) find no such effects for Germany.

A range of explanations has been proposed for birth order effects, including the hypotheses about resource dilution hypothesis and confluence. The resource dilution hypothesis suggests that first-born siblings are advantaged because they have exclusive access to parental attention and time until a sibling is born (Blake, 1981). Indeed, there is evidence that first-born children spend more time with their parents than later-born (Price, 2008). The confluence model also recognizes that structural changes to the sibling group size may matter (Zajonc, 1976).

However, the theory holds that such changes affect the intellectual environment in the family; the more children in a family, the lower is the average intellectual environment within it. First-born children thus experience the highest quality of home environment, with positive consequences for their cognitive development and educational achievements, whereas later-born children face a disadvantage in terms of lower quality of intellectual resources. A first-born advantage in early cognitive development has been documented at least with respect to general cognitive and literacy skills (Barreto et al., 2017; Lehmann et al., 2018).

The sibling competition hypothesis (Trivers, 1974) focuses on the parent-offspring conflict and has been applied on the relationship between sibling group size and educational performance. It argues that siblings compete with one another over parental resources, including money. Thus, family size may matter with respect to financial resources needed to invest in the human capital of the children. In large families, later-born children may receive less financial support for their studies from the parents than their earlier-born siblings. Also in countries with free education up to university level, such as Finland, siblings may experience unequal parental involvement which may influence the children's educational careers differently (Danielsbacka and Tanskanen, 2015).

Birth order effects are also suggested to result from parenting styles that practice stricter upbringing of a first-born child than later-borns (Hotz and Pantano, 2015), cultural differences in strategic parenting (Isungset et al., 2019), and cultural preferences to favour investment of resources toward the first born, in particular if the first born is a son (Esposito et al., 2020; Raza et al., 2022).

Thus, the major part of the explanations suggests that the birth order effects are a result of differences in parental care and investment. Studies on adopted sibling groups (Barclay, 2015), as well as on sibling groups where a sibling has deceased (Kristensen and Bjerkedal, 2007), show that differences in educational attainment and intelligence are explained by social rank

rather than biological rank. How children are raised consequently seem to matter for their educational outcomes. Whether birth order variation in attainment can be channelled through intelligence is debated. Most of the controversy boils down to whether birth order has a true within-family effect or reflects spurious between-family association, with earlier borns in small families being more intelligent than later borns in large families (Havari and Savegnago, 2022).

Since birth order effects on education may be a result of nurture rather than innate capabilities, intergenerational spill over effects need to be considered. Indeed, recent research suggests that these kinds of effects may be transmitted across generations (Barclay et al., 2021; Havari and Savegnago, 2022). Thus, if first-born parents are higher educated than their later born siblings, this effect may translate into higher educational attainment among the offspring. Furthermore, Barclay et al. (2021) argue that if parental educational attainment influences the attainment of their children, parental birth order should matter for offspring educational attainment net of offspring birth order. For example, a first-born child of a first-born mother should achieve higher levels of educational attainment than the first-born child of a second-born mother.

One potential reason to why intergenerational birth order effects occur are parenting behaviour (Barclay et al., 2021). If parents raise children in the same way as they were raised, first-born parents who experienced high quality interaction from their own parents may see this parenting style as normative and thus practice it while upbringing their own children. There may also be more interaction between parents and children who share the same birth position or parity-gender combination. Barclay et al. (2021) argue that residual effects of parental birth order on offspring attainment may exist to the extent that any controls for parental socioeconomic attainment do not capture all downward advantages of early parity of parents.

However, this research area has gained only little interest, and existing studies have focused solely on offspring's number of years of completed education. Havari and Savegnago (2022) estimated a pooled model and separated regressions by family size based on the Survey of

Health, Ageing and Retirement in Europe (SHARE) data from several European countries. They found that having a first-born parent is associated with more years of education, mainly due to higher educational attainment of the parents. The impact of parental birth order on years of education has also been examined based on register data on three generations from Sweden (Barclay et al., 2021). The between-family analysis as well as the cousin fixed effects analysis showed negative parental birth order effects, which were largely mediated by the parents' education and social class.

Context

The education system in Finland consists of early childhood education and care for children before the compulsory education, one year of compulsory pre-primary education for children under the age of seven, compulsory basic education for children aged 7-16, post-compulsory upper-secondary education, and higher education. One of the key principles of education in Finland is that it must be available to all citizens. Education is free at all levels, and a well-established system of study grants and loans ensures study opportunities for everyone (Finnish Government, 2021).

After finishing comprehensive education, young persons generally apply for upper secondary education, which is either general upper secondary education or vocational education and training. This first tracking point thus takes place during the 9th grade of comprehensive school, that is, at the age of 15-16. General upper secondary education leads to matriculation examination and vocational education and training to vocational qualification. Both upper secondary education tracks usually take three years to complete. Roughly half of the young person choose the general track and the rest vocational education and training (Official Statistics of Finland (OSF), 2023).

General upper secondary education students who pass the examination are eligible to apply for further studies at the tertiary level, comprising universities and universities of applied sciences. Until the mid-1990s, success in a general upper secondary education was a prerequisite for entry to university and other tertiary level education. At present, also graduates of vocational education can apply for further studies at those study places, but choosing general upper secondary education still indicates that the person aims for higher education later on. Hence, the choice between general and vocational upper secondary education clearly influences the individual's future educational outcomes. It has been shown that of persons born in the mid-1970s, 39 per cent of the students who finished general upper secondary school continued their studies at the university level, whereas the same applies to only one per cent of those who completed vocational upper secondary school (Heiskala and Erola, 2019). After having finished upper secondary education, only 23 per cent of those with a general education, and as much as 74 per cent of those with a vocational education, left the educational system.

Data and methods

We use data from the Finnish population registers, which contain longitudinal information on the entire resident population of the country in 1970-2020. Each person can be linked to the mother and the father subject to that the parent was alive at the end of 1970. The multigenerational structure of the population registers means that we also can link persons to their siblings, cousins, and grandparents.

We only examine index persons (G1) with information on both parents and all four grandparents. We restrict the analysis to persons whose parents (G2) were born after 1958, in order to include as many as possible of the parents' earlier born siblings. We analyse the probability of having a general upper secondary education as measured by whether or not a

person has the matriculation examination. It is measured at age 20, in order to include persons who graduate one later than what is normal, because of exchange studies or any other delay. Thus, we examine index persons born no later than 2000. The oldest cohort is born 1975. To be able to define the offspring's birth order and sibling group size, we exclude those who have siblings born outside the birth interval 1975-2000. To avoid confusion over birth order, we exclude sibling groups at the level of the child and the parent that include multiple births. We also exclude sibling groups whose maternal or paternal grandmother's (G1) birth year is unknown. The number of observations in the full sample is 377,038 (Table 1). In the within-family analyses, we exclude families where the children are only cousins, which is the case if their parents were only children or if their aunts and uncles did not have any children of their own. Thus, we exclude families where the mother is the only child in the maternal cousin sample, and families where the father is the only child in the paternal cousin sample. These samples amount to 335,146 and 338,239 observations, respectively.

Table 1. Sample exclusion process

Exclusion stage	N (in G3)	Sample type
Total population ever observed 1970-2020	8,290,911	Full sample
ID for both parents	4,920,073	Full sample
ID for all four grandparents	2,198,109	Full sample
Both parents born afer 1958	1,499,707	Full sample
Born no later than 2000	558,283	Full sample
With no sibling born after 2000	430,942	Full sample
No multiple births	414,283	Full sample
No multiple births in parents' generation	379,761	Full sample
No maternal or paternal grandmother without birth year	377,038	Full sample
Families where mothers not only children	335,146	Maternal cousin group sample
Families where fathers not only children	338,239	Paternal cousin group sample

We use the same explanatory variables and apply the same methodology as Barclay et al. (2021). Thus, we control for several variables that are related to parental and offspring birth order, and to the probability of having a general upper secondary education. Control variables

at the parental level are both parents' birth year, sibling group size, and their mother's age at birth. The birth year of the mother and the father captures the benefits of educational expansion over time that later-born siblings and cousins may experience (Breen et al., 2009). The mother's and the father's sibling group size is included because the number of siblings is correlated with educational attainment, and higher birth order siblings will be drawn from larger sibling groups (Barclay et al., 2021; Black et al., 2005). We adjust also for maternal grandmother's age at mother's birth and paternal grandmother's age at father's birth, because.later-born siblings are generally born to older parents, and higher parental age may be related to educational outcomes (Tearne, 2015).

Educational expansion may have benefited index persons that are born in a later calendar year, which requires controlling for the birth year of the index person (Barclay et al., 2021; Breen et al., 2009). Other important factors at the level of the child that may be influenced by parental birth order are the mother's and the father's age at birth, birth order and sibling group size. We conrtrol for them, and for the sex of the index person.

We consider parents' educational attainment and social class as potential mediators for the association between parental birth order and offspring's probability of having a general upper secondary education. Maternal and paternal educational attainment is based on the highest attained level of education, categorised into primary, secondary without matriculation examination, secondary with matriculation examination, lower tertiary, higher tertiary, and graduate school. Maternal and paternal social class is defined as the lowest class observed using the Erikson, Goldthorpe, and Portocarero (EGP) occupational class scheme (Erikson et al., 1979). The variable is categorized into EGP=I (upper service class, including self-employed professionals), EGP=II (lower service class), EGP=III (routine non-manual), EGP=IV (self-employed non-professionals, farmers, and fishermen), EGP=V–VII (skilled and unskilled workers), and unknown/other.

To analyse the intergenerational effects of birth order on upper secondary educational attainment, we apply cousin fixed effects. To this end, we construct sibling groups in the parents' and the offspring's generation in order to identify the birth order of the parents and their offspring, and cousin groups in the offspring generation. A sibling group consists of a set of individuals who share a mother and father, and a cousin group of persons that share a biological grandmother and grandfather.

To examine how parental birth order is related to their children's probability of having a matriculation examination, we estimate linear probability models using ordinary least square regressions. We start by using the full sample without implementing fixed effects. We estimate four baseline models. The first model follows equation (1), where *y* is a binary variable equal to 1 if the index person has a matriculation examination at age 20 and zero otherwise, and *BO* refers to a vector of the birth order of the mother and the father:

$$y = \beta_0 + \beta_l BO_l + \varepsilon \quad (1)$$

In the second model, we control for both parents' birth year and sibling group size, and maternal and paternal grandmother's age at birth, where *G2controls* refer to a vector of the control variables at the level of the parents:

$$y = \beta_0 + \beta_l BO_l + \beta_m G2controls_m + \varepsilon \quad (2)$$

The third model additionally controls for the index persons' sex, birth year, birth order, and sibling groups size, and the mother's and the father's age at birth, where *G3controls* refers to a vector of the control variables at the level of the index person:

$$y = \beta_0 + \beta_l BO_l + \beta_m G2controls_m + \beta_n G3controls_n + \varepsilon \quad (3)$$

Finally, we control also for the mediating variables described in the data section. In this fourth baseline model, *G2mediators* refer to a vector of maternal and paternal educational attainment and social class:

$$y = \beta_0 + \beta_l BO_l + \beta_m G2controls_m + \beta_n G3controls_n + \beta_o G2mediators_o + \varepsilon \quad (4)$$

In the following stage, we apply a fixed effects design that is based on a shared grandparental ID and hence, compares cousins. We have two data sets, one for each set of cousins. Cousin fixed regressions estimated on the maternal cousin set are presented in models 5-7 and those on the paternal cousin set in models 8-10.

$$y_{ij} = \beta_0 + \beta_l BO_{l,ij} + \beta_m G2controls_{m,ij} + \alpha_j + \varepsilon_{ij} \quad (5)$$

$$y_{ij} = \beta_0 + \beta_l BO_{l,ij} + \beta_m G2controls_{m,ij} + \beta_n G3controls_{n,ij} + \alpha_j + \varepsilon_{ij} \quad (6)$$

$$y_{ij} = \beta_0 + \beta_l BO_{l,ij} + \beta_m G2controls_{m,ij} + \beta_n G3controls_{n,ij} + \beta_o G2maternal\ mediators_{o,ij} + \alpha_j + \varepsilon_{ij} \quad (7a)$$

$$y_{ij} = \beta_0 + \beta_l BO_{l,ij} + \beta_m G2controls_{m,ij} + \beta_n G3controls_{n,ij} + \beta_o G2maternal\ mediators_{o,ij} + \beta_p G2paternal\ mediators_{p,ij} + \alpha_j + \varepsilon_{ij} \quad (7b)$$

$$y_{ik} = \beta_0 + \beta_l BO_{l,ik} + \beta_m G2controls_{m,ik} + \delta_k + \varepsilon_{ik} \quad (8)$$

$$y_{ik} = \beta_0 + \beta_l BO_{l,ik} + \beta_m G2controls_{m,ik} + \beta_n G3controls_{n,ik} + \delta_k + \varepsilon_{ik} \quad (9)$$

$$y_{ik} = \beta_0 + \beta_l BO_{l,ik} + \beta_m G2controls_{m,ik} + \beta_n G3controls_{n,ik} + \beta_p G2paternal\ mediators_{p,ik} + \delta_k + \varepsilon_{ik} \quad (10a)$$

$$y_{ik} = \beta_0 + \beta_l BO_{l,ik} + \beta_m G2controls_{m,ik} + \beta_n G3controls_{n,ik} + \beta_p G2paternal\ mediators_{p,ik} + \beta_o G2maternal\ mediators_{o,ik} + \delta_k + \varepsilon_{ik} \quad (10b)$$

Also in these models, y is a binary variable equal to 1 if the index person has a matriculation examination at age 20, and zero otherwise. The indexes i, j, and k refers to individual i in maternal cousin group j, and paternal cousin group k. α is the fixed effect for maternal cousin group j, δ is the fixed effect for paternal cousin group k, and ε is the residual. As with the models without cousin fixed effects (Models 1–4), we control for confounding variables measured at the time of the parent's birth in Models 5 and 8 and for variables at the level of G3 in models 6 and 9. In estimations based on the maternal cousin sample, we include maternal mediating variables (educational level and social class) in Model 7A, and add paternal mediating variables in Model 7B. Similarly, in Models 10A and 10B we add paternal and maternal mediating variables, respectively, to the analysis based on the paternal cousin sample. Controlling for the mediating variables of the non-focal parent as we do in models 7B and 10B (i.e. for paternal socio-economic status in the maternal cousin sample and vice versa) may add sources of bias, because it opens up for possible influence of factors from the other side of the family that we are not able to control for. However, in practice, and as our results will show, these controls do not affect our estimates for maternal birth order in the maternal cousin sample, or for paternal birth order in the paternal cousin sample, to any noteworthy degree.

Table A1 in the Appendix show the distribution of variables for men and women in the youngest generation by own, the mother's and the father's birth order.

Results

Between-family analyses

The results from the full sample analyses are presented in Figure 1. Each model in the figure correspond to the equation with the same number in the methods section. Model 1 shows that relative to having a parent who was first-born, having a parent who was second-born slightly

increases the probability of having a matriculation examination at age 20. The same applies to having a mother who is third-born, whereafter the probability decreases with maternal birth order so that having a fifth- or later-born mother relative to a first-born mother is associated with a three percentage points lower probability of having a matriculation examination at age 20. The pattern for father's birth order is similar, albeit the negative effects are larger. Persons whose fathers are fifth- or later-born have a six percentage points lower chance of having a matriculation exam than those with a first-born father.

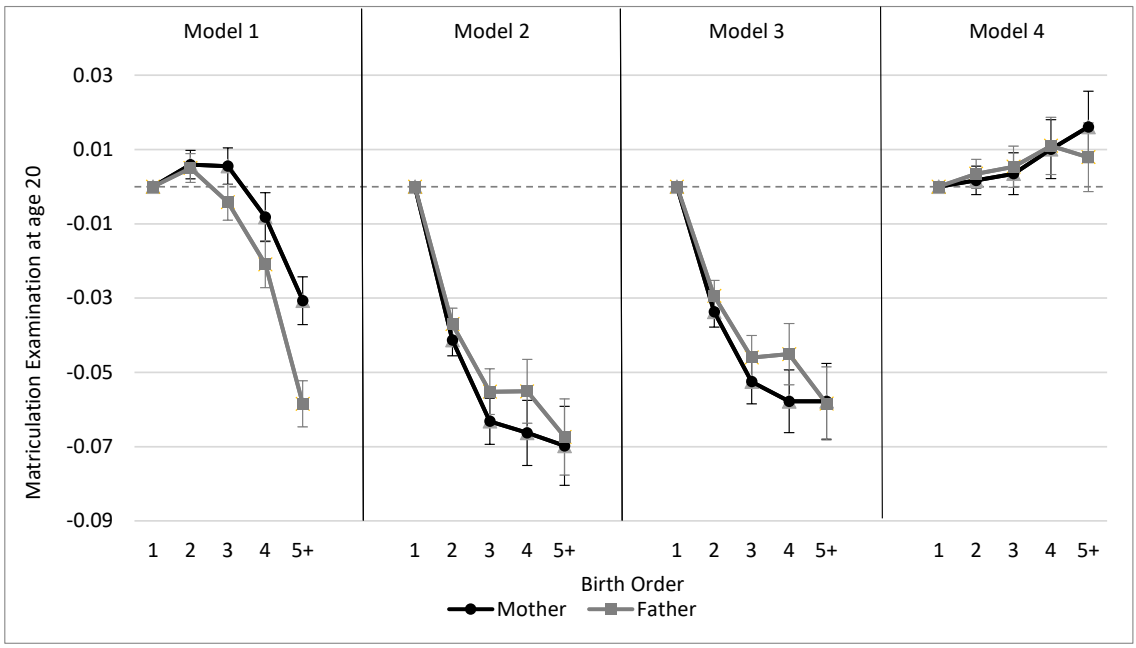

Figure 1. Between-family analyses of the association between parental birth order and the probability of having a matriculation examination at age 20.

Notes. Models are based on the full sample. Model 2 controls for both parents' birth year and sibling group size, and maternal and paternal grandmother's age at birth. Model 3 adds index persons' sex, birth year, birth order, and sibling group size, and the mother's and the father's age at birth. Model 4 additionally includes maternal and paternal education and class.

When we control for variables at the parental level (both parents' birth year, sibling group size, and their mother's age at birth), the association becomes clearly negative, and we see an overall increase in the point estimates (Model 2). This pattern remains almost the same when variables at the child level are added (Model 3). When parental educational level and social class also are

included, there is a close to monotonous positive association between parental birth order and offspring educational attainment (Model 4).

The patterns for models 1-3 are almost identical to the corresponding ones presented by Barclay et al. (2021), although their size effects were notably higher. The final model diverges somewhat from the results in the corresponding model by Barclay et al. (2021), who found attenuated but still negative effects of parental birth order on years of education when parental socioeconomic attainment was adjusted for.

Within-family analyses

Next, we implement the cousin fixed effects design to control for unobserved factors that are shared among cousins and that may influence their probability of having a matriculation examination. Such factors are, for example, socioeconomic resources within the extended family. In Figure 2, we apply cousin fixed effects using the maternal cousin sample and focus on the point estimates for maternal birth order, as we in that sample control for unobserved maternal background characteristics. Similarly, we apply cousin fixed effects using the paternal cousin sample and focus on the point estimates for his birth order in Figure 3.

In Model 5 in Figure 2, we control for factors fixed at the time of the parents' birth. We see a slightly negative, but somewhat U-shaped, association between maternal birth order and offspring educational attainment, though with wide confidence intervals (Model 5). When variables at the child level also are included, this pattern does not change to any considerable extent (Model 6). When mother's educational level and social class are additionally included, the estimated associations for mother's birth order become positive, with large confidence intervals (Model 7A). Estimated associations for father's birth order become positive as well,

with wide confidence intervals, when father's educational level and social class are included (Model 7B).

The fixed effects models are repeated using the paternal cousin sample (Figure 3). Thus, models 8-10B in Figure 3 correspond to models 5-7B in Figure 2. Estimated associations between paternal birth order and offspring education largely mirror those observed between maternal birth order and offspring education in the maternal cousin sample. Standard errors tend to be slightly smaller in the paternal cousin sample, thus resulting in somewhat more narrow confidence intervals. We see that having a second-born father is associated with a 1.5 percentage point lower chance of having a matriculation examination as compared to having a first-born father, while having a third-born father is associated with a 2 percentage point lower chance (Model 8). These results are only modestly affected by variables at the child level (Model 9). When father's educational level and social class are included, associations for father's birth order become positive, with wide confidence intervals (Model 10A). The same happens to associations for maternal birth order when mother's educational level and social class are introduced (Model 10B).

These results of fixed effects regressions show that having later-born parents, and in particular a later-born father, is negatively associated with first tracking into schools. The association is entirely driven by the fact that earlier-born parents are higher educated and found in higher social classes than later-born parents. The results largely corroborate findings from similar analyses of length of schooling in Sweden (Barclay et al., 2021), although the contribution of parental education and social class is notably stronger in our study context.

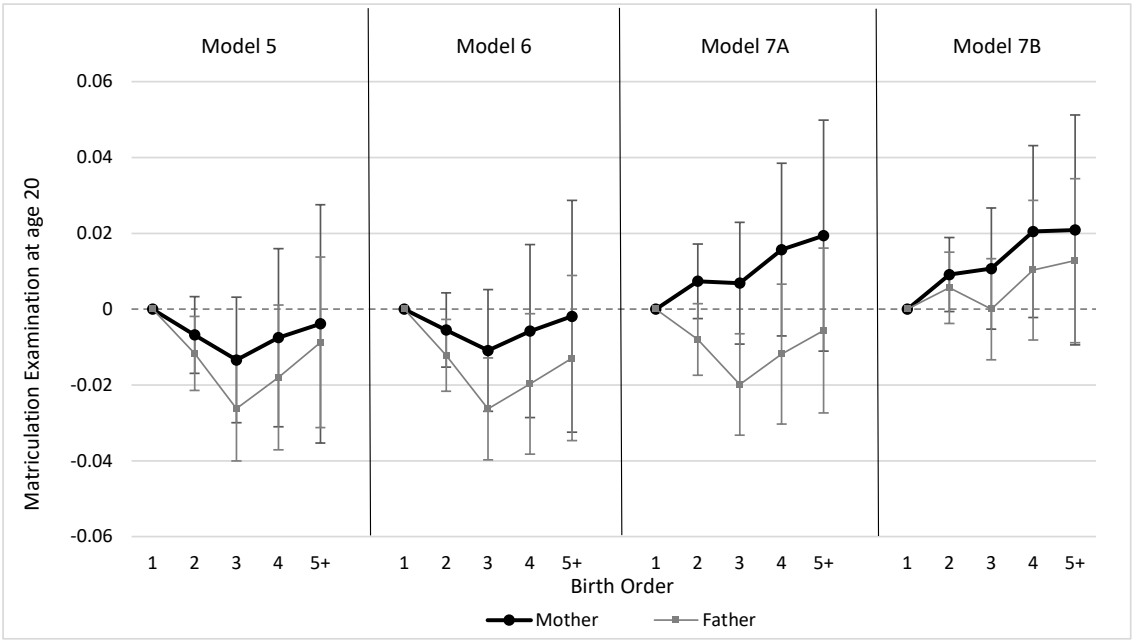

Figure 2. Within-family analyses of the association between maternal birth order and the probability of having a matriculation examination at age 20.

Notes. Fixed effects models using the maternal cousin sample. Model 5 controls for both parents' birth year, maternal and paternal grandmother's age at birth, and paternal sibling group size. Model 6 adds index persons' sex, birth year, birth order, and sibling groups size, and the mother's and the father's age at birth. Model 7A adds maternal education and class, and Model 7B additionally paternal education and class.

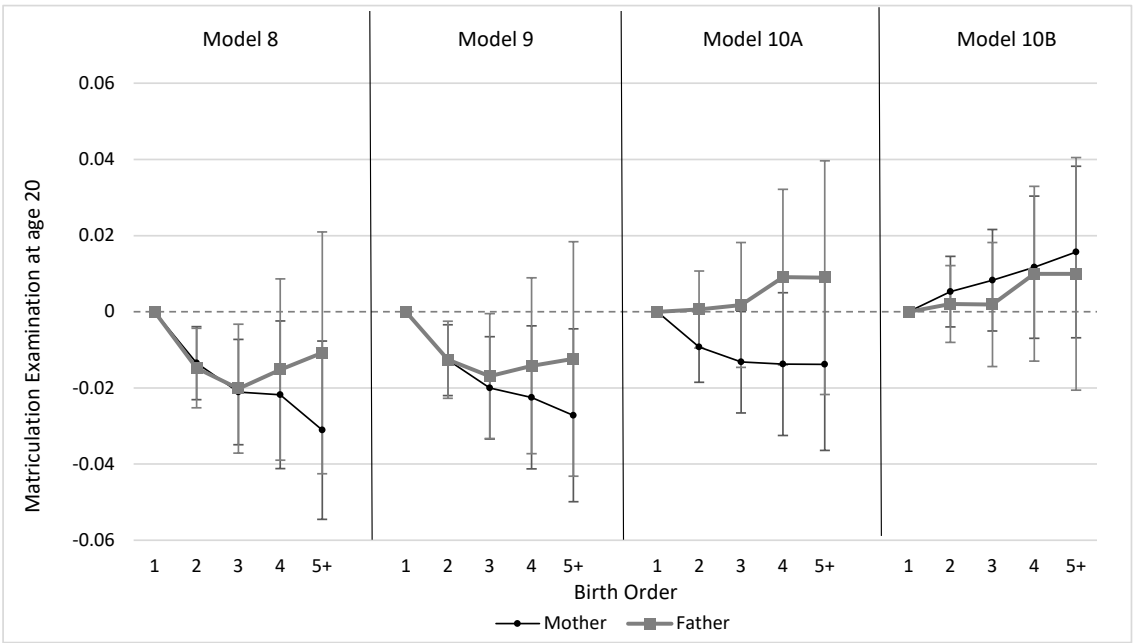

Figure 3. Within-family analyses of the association between paternal birth order and the probability of having a matriculation examination at age 20.

Notes. Fixed effects models using the paternal cousin sample. Model 8 controls for both parents' birth year, maternal and paternal grandmother's age at birth, and maternal sibling group size. Model 9 adds index persons' sex, birth year, birth order, and sibling groups size, and the mother's and the father's age at birth. Model 10A adds paternal education and class, and Model 10B additionally maternal education and class.

Discussion

In this paper, we have used three-generational total population register data from Finland to examine the association between parental birth order and upper secondary educational attainment. Thereby, we contribute to the scarce literature on intergenerational effects of birth order on education, which has until now focused on years of schooling.

We have focused on general upper secondary education, measured as the probability of having a matriculation examination at age 20, in a setting where the first school tracking point takes place at age 15-16 and sorts young persons into those who choose general upper secondary education and those who aim for vocational education. General upper secondary education is highly selective of persons who afterwards aim for university studies, suggesting that tracking into upper secondary education may be decisive for a person's completed educational attainment. Hence, we have focused on an outcome that is of outmost importance for a young person's future educational career.

We have performed between-family analyses based on the full data and within-family analyses based on the maternal and a paternal cousin sets, respectively. We find that parents' birth order is associated with their children's probability of having a matriculation examination. The between-family analyses, which do not account for unobservable factors that are shared among cousins, show that the matriculation examination is slightly more common among persons with first- or second-born parents, whereas having later-born parents than that is negatively associated with having a matriculation examination. The benefit of having a second- or third-born parent eradicates when we control for variables at the parental and child level. The negative effect of parental birth order on their children's probability of having a matriculation exam is fully explained by higher educational and socioeconomic attainment among first-born parents.

Unobservable characteristics that are shared within the extended family may matter for how parental birth order influences educational attainment. To account for these factors, we have applied cousin fixed effects regressions based on a shared grandparental ID and analysed the outcomes in the maternal set of cousins and the paternal set of cousins, respectively. The patterns emerging from our within-family analyses mirror those observed from the full sample analyses. Thus, offspring of later-born parents, and in particular later-born fathers, are less probable to have a general upper secondary education than those with first- or earlier born parents. The association between parental birth order and offspring upper secondary education is entirely mediated through parental education and class.

Since this is the first study concerned with parental birth order and first school tracking (in terms of general upper secondary education), there are no directly comparable studies. Some parallels can be drawn to the recent SHARE-based study by Havari and Savegnago (2022). It found that offspring of first-born parents have significantly more years of schooling compared to children of later-born parents, and that parental education was the main channel through which birth order effects persist until next generations. We have used the same methodology as Barclay et al. (2021) in their study on Sweden, and we find that general patterns for Finland resemble those for Sweden. Both countries are Nordic welfare states with similar educational systems that comprise free education at all levels, including tertiary education.

To the extent that the results differ across Finland and Sweden, the divergences are presumably because of the different educational outcomes studied. The size effects of parental birth order on educational attainment are in general notably lower in in our study, which is reasonable considering that our outcome, the probability of having a matriculation examination at age 20, applies to 45 per cent of the index persons, whereas the Swedish study uses a measure that is based upon the number of years that correspond to the educational level achieved by age 30. As country comparisons show somewhat higher social mobility in Finland than Sweden

(Pfeffer, 2008; The World Economic Forum, 2020), our finding nevertheless also conforms to the idea that intergenerational birth order effects are likely to be stronger in countries with lower social mobility, and weaker in countries with higher social mobility.

The mediating effect of parental socioeconomic status is more pronounced in the Finnish case, where the negative effects of parental birth order are eradicated once taking the mediators into account. In Sweden, the contribution of parents' education and class is notable as well, but the negative parental birth order effects remain marginally. Since tracking into upper secondary education takes place at an age when children still live with their parents, it is realistic that parental socioeconomic status matter more for the probability of having a matriculation examination at age 20 than for years of schooling at age 30. Furthermore, upper secondary education in Sweden can be considered less selective than in Finland, because in Sweden all national programmes, consisting of preparatory and vocational programmes, give basic qualification to attend university. In addition, the proportion that graduate from a preparatory program is close to 70 per cent in Sweden and studies in higher education with a vocational programme background is more common than in Finland (Heiskala and Erola, 2019; Skolverket, 2023). However, conclusions on the mediating effects of parental status should be made with some caution. A discussion on this matter is given by Barclay et al. (2021), who note that as parental education and class are collider variables, introducing them opens up the possibility for confounding by unobservable factors that may jointly affect parental socioeconomic status and offspring education.

Intergenerational birth order effects on education are gaining increased research interest. We have contributed to this research area by showing that birth order does not only influence someone's own education, but also predicts the upper secondary educational attainment of the next generation. That finding might be less interesting from a policy perspective if it was not for the fact that parental socioeconomic factors are the driving forces. Within-family

inequalities may be passed on to future generations and therefore call for more attention from researchers and policy makers. Studies suggest that family background plays an important role for the track that a child chooses, with higher effects in countries with highly stratified educational systems (Giancola and Salmieri, 2020; Pekkarinen, 2018). As there evidently are inequalities also within families, a given question raised by the present study is whether the findings can be generalised to countries with such educational systems. We therefore recommend that future research examines how parental birth order influences upper secondary education in settings where tracking to schools determines completed educational attainment.

References

Barclay, K. J. (2015). Birth order and educational attainment: evidence from fully adopted sibling groups. *Intelligence*, *48*, 109–122. https://doi.org/10.1016/J.INTELL.2014.10.009

Barclay, K. J., Lyngstad, T. H., & Conley, D. C. (2021). The Production of Inequalities within Families and across Generations: The Intergenerational Effects of Birth Order on Educational Attainment. *European Sociological Review*, *37*(4), 607–625. https://doi.org/10.1093/esr/jcab005

Barreto, F. B., Sánchez de Miguel, M., Ibarluzea, J., Andiarena, A., & Arranz, E. (2017). Family context and cognitive development in early childhood: A longitudinal study. *Intelligence*, *65*, 11–22. https://doi.org/10.1016/J.INTELL.2017.09.006

Björklund, A., & Jäntti, M. (2012). How important is family background for labor-economic outcomes? *Labour Economics*, *19*(4), 465–474. https://doi.org/10.1016/J.LABECO.2012.05.016

Black, S. E., Devereux, P. J., & Salvanes, K. G. (2005). The More the Merrier? The Effect of Family Size and Birth Order on Children's Education. In *Source: The Quarterly Journal of Economics* (Vol. 120, Issue 2). https://about.jstor.org/terms

Blake, J. (1981). Family Size and the Quality of Children. *Demography*, *18*(4), 421–442. https://doi.org/10.2307/2060941

Blossfeld, H.-P., & Shavit, Y. (1993). Persisting Barriers: Changes in Educational Opportunities in Thirteen Countries. In Y. Shavit & H.-P. Blossfeld (Eds.), *Persistent Inequality: Changing Educational Attainment in Thirteen Countries* (pp. 1–23). Westview press.

Breen, R., Luijkx, R., Müller, W., & Pollak, R. (2009). Nonpersistent Inequality in Educational Attainment: Evidence from Eight European Countries. *American Journal of Sociology*, *114*(5), 1475–1521. https://doi.org/10.1086/595951

CEDEFOP., & European Centre for the Development of Vocational Training. (2019). *Spotlight on VET : 2018 compilation*. Publications Office of the European Union.

Danielsbacka, M., & Tanskanen, A. O. (2015). The Association between Unequal Parental Treatment and the Sibling Relationship in Finland: The Difference between Full and Half-Siblings. *Evolutionary Psychology*, *13*(2), 147470491501300. https://doi.org/10.1177/147470491501300211

Diprete, T. A., & Eirich, G. M. (2006). CUMULATIVE ADVANTAGE AS A MECHANISM FOR INEQUALITY: A Review of Theoretical and Empirical Developments. *Annu. Rev. Sociol*, *32*, 271–297. https://doi.org/10.1146/annurev.soc.32.061604.123127

Erikson, R., Goldthorpe, J. H., & Portocarero, L. (1979). Intergenerational Class Mobility in Three Western European Societies: England, France and Sweden. *The British Journal of Sociology*, *30*(4), 415. https://doi.org/10.2307/589632

Esposito, L., Kumar, S. M., & Villaseñor, A. (2020). The importance of being earliest: birth order and educational outcomes along the socioeconomic ladder in Mexico. *Journal of Population Economics*, *33*(3), 1069–1099. https://doi.org/10.1007/s00148-019-00764-3

Finnish Government. (2021). *Education Policy Report of the Finnish Government*. The Finnish Government.

Giancola, O., & Salmieri, L. (2020). *Family Background, School-Track and Macro-Area: the Complex Chains of Education Inequalities in Italy FAMILY BACKGROUND, SCHOOL-TRACK AND MACRO-AREA: THE COMPLEX CHAINS OF EDUCATION INEQUALITIES IN ITALY 1* (04/2020; DiSSE Working Papers).

Grätz, M., Barclay, K. J., Wiborg, Ø. N., Lyngstad, T. H., Karhula, A., Erola, J., Präg, P., Laidley, T., & Conley, D. (2021). Sibling Similarity in Education Across and Within Societies. *Demography*, *58*(3), 1011–1037. https://doi.org/10.1215/00703370-9164021

Grätz, M., & Kolk, M. (2022). Sibling similarity in income: A life course perspective. *Research in Social Stratification and Mobility*, *78*, 100688. https://doi.org/10.1016/J.RSSM.2022.100688

Härkönen, J. (2014). Birth Order Effects on Educational Attainment and Educational Transitions in West Germany. *European Sociological Review*, *30*(2), 166–179. https://doi.org/10.1093/esr/jct027

Havari, E., & Savegnago, M. (2022a). The intergenerational effects of birth order on education. *Journal of Population Economics*, *35*(1), 349–377. https://doi.org/10.1007/s00148-020-00810-5

Havari, E., & Savegnago, M. (2022b). The intergenerational effects of birth order on education. *Journal of Population Economics*, *35*(1), 349–377. https://doi.org/10.1007/s00148-020-00810-5

Heiskala, L., & Erola, J. (2019). *Tracking and sorting in the Finnish educational system*.

Herbaut, E., Barone, C., Ichou, M., & Vallet, L.-A. (2019). *Tracking and Sorting in the French Educational System*. https://hal.science/hal-02909242

Hotz, V. J., & Pantano, J. (2015). Strategic parenting, birth order, and school performance. *Journal of Population Economics*, *28*(4), 911–936. https://doi.org/10.1007/s00148-015-0542-3

Isungset, M. A., Lillehagen, M., & Ugreninov, E. (2019). One Order Fits All? Birth Order and Education in Immigrant Families. *European Sociological Review*. https://doi.org/10.1093/esr/jcz040

Jäntti, M., & Jenkins, S. P. (2015). Income Mobility. In A. B. Atkinson & F. Bourguignon (Eds.), *Handbook of Income Distribution* (Vol. 2, pp. 807–935). Elsevier Science. https://doi.org/10.1016/B978-0-444-59428-0.00011-4

Kalmijn, M., & Kraaykamp, G. (2005). Late or later? A sibling analysis of the effect of maternal age on children's schooling. *Social Science Research*, *34*(3), 634–650. https://doi.org/10.1016/J.SSRESEARCH.2004.04.008

Kristensen, P., & Bjerkedal, T. (2007). Explaining the Relation Between Birth Order and Intelligence. *Science*, *316*(5832), 1717–1717. https://doi.org/10.1126/science.1141493

Lehmann, J.-Y. K., Nuevo-Chiquero, A., & Vidal-Fernandez, M. (2018). The Early Origins of Birth Order Differences in Children's Outcomes and Parental Behavior. *Journal of Human Resources*, *53*(1), 123–156. https://doi.org/10.3368/jhr.53.1.0816-8177

Mare, R. D. (2014). Multigenerational aspects of social stratification: Issues for further research. *Research in Social Stratification and Mobility*, *35*, 121–128. https://doi.org/10.1016/j.rssm.2014.01.004

OECD. (2020). *Sorting and selecting students between and within schools*. https://doi.org/https://doi.org/10.1787/ca768d40-en

Official Statistics of Finland (OSF). (2023). *Entrance to education*. https://stat.fi/en/statistics/khak

Ozer, M., & Perc, M. (2020). Dreams and realities of school tracking and vocational education. In *Palgrave Communications* (Vol. 6, Issue 1). Palgrave Macmillan Ltd. https://doi.org/10.1057/s41599-020-0409-4

Pekkarinen, T. (2018). School tracking and intergenerational social mobility. *IZA World of Labor*. https://doi.org/10.15185/izawol.56.v2

Pfeffer, F. T. (2008). Persistent Inequality in Educational Attainment and its Institutional Context. *European Sociological Review*, *24*(5), 543–565. https://doi.org/10.1093/esr/jcn026

Price, J. (2008). Parent-Child Quality Time: Does birth order matter? *Journal of Human Resources*, *43*(1), 240–265. https://doi.org/10.3368/jhr.43.1.240

Raza, S. H., Shah, Z. A., & Haq, W. (2022). Role of birth order, gender, and region in educational attainment in Pakistan. *Scientific Reports*, *12*(1), 11842. https://doi.org/10.1038/s41598-022-15700-x

Skolverket. (2023). *Statistik om förskola, skola och vuxenutbildning*. https://www.skolverket.se/skolutveckling/statistik/sok-statistik-om-forskola-skola-och-vuxenutbildning?sok=SokC

Tearne, J. E. (2015). Older maternal age and child behavioral and cognitive outcomes: a review of the literature. *Fertility and Sterility*, *103*(6), 1381–1391. https://doi.org/10.1016/J.FERTNSTERT.2015.04.027

The World Economic Forum. (2020). *The global social mobility report 2020 equality, opportunity and a new economic imperative*.

TRIVERS, R. L. (1974). Parent-Offspring Conflict. *American Zoologist*, *14*(1), 249–264. https://doi.org/10.1093/icb/14.1.249

UNESCO. (n.d.). *General education*. 2023. Retrieved February 23, 2023, from https://uis.unesco.org/node/3297442

Zajonc, R. B. (1976). Family Configuration and Intelligence. *Science*, *192*(4236), 227–236. https://doi.org/10.1126/science.192.4236.227

Table A1. Distribution of variables for men and women in G3 by own, mother's and father's birth order (%)

	Index person's birth order					Mother's birth order					Father's birth order				
	1	2	3	4	5+	1	2	3	4	5+	1	2	3	4	5+
N	196,566	130,075	40,333	7,758	2,306	162,243	109,804	52,547	25,498	26,946	151,932	110,542	56,784	28,254	29,526
Matriculation examination at age 20															
No	53.3	55.3	57.7	63.6	69.0	54.6	54.1	54.2	55.7	58.2	54.2	53.7	54.7	56.4	60.2
Yes	46.8	44.7	42.3	36.4	31.1	45.4	45.9	45.8	44.3	41.8	45.8	46.3	45.4	43.6	39.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mother's birth order															
1	43.9	42.9	40.8	39.0	32.4	100.0					45.6	43.5	41.0	39.0	35.8
2	29.5	29.2	28.3	25.3	22.1		100.0				29.3	29.7	28.8	28.5	27.3
3	13.6	14.1	14.7	15.2	13.4			100.0			13.3	13.7	14.9	15.1	15.3
4	6.4	6.8	7.7	8.8	11.0				100.0		6.0	6.6	7.3	8.0	9.1
5+	6.6	7.0	8.6	11.7	21.1					100.0	5.8	6.5	8.0	9.4	12.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Father's birth order															
1	41.6	40.2	36.7	32.8	27.5	42.7	40.6	38.4	35.6	32.7	100.0				
2	29.5	29.6	28.6	26.9	21.9	29.6	29.9	28.8	28.8	26.8		100.0			
3	14.6	15.1	16.4	17.3	17.0	14.4	14.9	16.1	16.2	16.9			100.0		
4	7.1	7.5	8.7	10.0	11.3	6.8	7.3	8.1	8.9	9.9				100.0	
5+	7.2	7.7	9.5	13.0	22.4	6.5	7.3	8.6	10.6	13.7					100.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Index person's birth order															
1	100.0					53.2	52.8	51.0	49.6	48.0	53.8	52.4	50.6	49.5	48.1
2		100.0				34.4	34.6	35.0	34.6	34.0	34.4	34.8	34.7	34.4	33.8
3			100.0			10.1	10.4	11.2	12.2	12.9	9.7	10.5	11.7	12.4	13.0
4				100.0		1.9	1.8	2.2	2.7	3.4	1.7	1.9	2.4	2.7	3.4
5+					100.0	0.5	0.5	0.6	1.0	1.8	0.4	0.5	0.7	0.9	1.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sibling group size															
1	33.8					18.8	18.3	16.0	14.9	14.0	19.4	17.7	15.9	15.2	14.3
2	45.7	69.0				48.5	48.3	47.4	44.9	42.1	49.3	48.7	46.1	43.9	41.5
3	16.6	25.0	80.8			24.8	25.8	27.0	28.4	28.7	24.2	25.7	27.9	29.1	28.9
4	3.2	4.8	15.4	80.2		6.1	5.9	7.2	8.4	9.4	5.5	6.3	7.6	8.5	9.7
5+	0.8	1.2	3.8	19.8	100.0	1.8	1.7	2.3	3.3	5.9	1.7	1.7	2.6	3.3	5.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Birth year															
-1985	11.7	4.1	1.0	0.3	0.1	6.2	7.0	9.0	10.5	13.2	6.3	7.1	8.8	10.3	11.5
1986-1990	27.2	19.7	11.9	7.6	6.4	20.7	21.7	24.2	26.7	28.9	20.4	21.9	24.3	26.4	27.9
1991-1995	37.7	40.3	39.6	37.1	34.7	39.3	38.8	38.9	37.6	35.8	39.0	39.0	38.7	38.2	37.2
1996-2020	23.5	35.9	47.6	55.0	58.9	33.8	32.5	28.0	25.2	22.1	34.3	32.1	28.3	25.1	23.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mother's age at child's birth															
<=21 years	20.3	4.7	0.6	0.1		12.4	12.1	11.8	12.0	13.5	12.4	11.8	11.8	12.9	14.4
22-25 years	30.7	22.3	10.7	5.4	1.6	25.5	24.8	23.8	23.8	25.8	24.8	24.7	24.8	25.6	26.8
26-29 years	30.6	37.0	30.8	26.1	21.3	33.0	33.0	32.4	32.0	30.5	32.9	32.9	32.9	32.0	31.0
30-33 years	13.6	26.8	38.7	39.5	39.8	21.2	21.6	22.6	22.3	20.7	21.5	21.9	22.0	21.2	19.7
34+ years	4.7	9.2	19.1	28.9	37.4	7.9	8.5	9.4	9.9	9.5	8.5	8.6	8.6	8.4	8.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Father's age at child's birth															
<=23 years	21.4	5.7	1.0	0.2		13.5	12.7	12.5	13.1	15.0	13.5	13.0	12.4	12.8	14.1
24-27 years	34.1	24.4	11.2	6.3	4.3	27.9	27.4	26.7	26.9	27.9	27.8	27.5	26.8	27.7	27.6
28-31 years	29.3	39.0	34.7	27.6	22.8	33.5	33.4	33.2	32.5	30.9	33.5	33.3	33.2	32.2	31.7
32-35 years	12.0	23.8	37.5	41.5	41.4	19.0	19.8	20.6	20.1	19.2	19.1	19.6	20.4	20.2	19.5
36+ years	3.3	7.2	15.6	24.5	31.4	6.2	6.7	7.0	7.5	7.0	6.1	6.5	7.2	7.1	7.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mother's sibling groups size															
1	12.1	10.8	8.7	6.9	4.3	25.8					12.2	11.3	10.1	9.5	8.4
2	35.9	35.2	31.6	25.5	22.8	44.1	54.5				37.0	35.8	33.3	30.9	27.5
3	26.4	27.1	27.5	26.6	18.5	21.1	30.6	62.6			26.8	26.9	27.1	26.2	25.3
4	13.2	13.7	15.4	16.8	14.8	6.5	10.5	25.5	63.2		12.8	13.5	14.5	15.6	15.3
5+	12.4	13.3	16.8	24.2	45.7	2.4	4.5	11.9	36.8	100.0	11.3	12.5	15.0	17.8	23.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Father's sibling groups size															
1	11.3	10.0	7.5	6.2	4.7	11.3	10.4	9.6	8.2	7.3	25.5				
2	34.7	33.9	30.0	24.1	14.4	35.8	34.4	31.3	30.1	25.0	44.1	53.9			
3	26.3	26.8	27.0	24.6	19.0	26.5	27.0	27.0	25.3	24.5	21.2	30.5	59.6		
4	13.7	14.3	16.2	17.7	14.3	13.7	13.9	15.1	15.7	16.7	6.4	10.7	26.6	60.7	
5+	14.0	14.9	19.3	27.4	47.7	12.8	14.4	17.1	20.8	26.6	2.7	4.8	13.8	39.3	100.0
Total	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(Continued)

Table A1. Continued

	Index person's birth order					Mother's birth order					Father's birth order				
	1	2	3	4	5+	1	2	3	4	5+	1	2	3	4	5+
N	196,566	130,075	40,333	7,758	2,306	162,243	109,804	52,547	25,498	26,946	151,932	110,542	56,784	28,254	29,526
Mother's birth year															
1959-1961	15.7	16.9	19.7	22.5	28.5	15.1	16.2	18.7	21.3	20.7	15.3	16.7	18.5	18.6	19.3
1962-1964	25.9	28.5	32.4	34.8	36.9	25.0	27.0	31.4	32.5	35.3	25.8	27.5	29.5	31.6	31.4
1965-1967	24.8	26.5	27.1	25.6	24.0	24.8	25.6	26.2	27.1	27.9	25.1	25.6	26.1	26.5	26.8
1968-1970	17.1	16.8	14.1	12.5	8.5	18.5	16.7	14.5	12.6	11.8	17.7	16.5	15.4	14.8	14.5
>=1971	16.6	11.4	6.7	4.7	2.1	16.6	14.4	9.2	6.5	4.3	16.1	13.9	10.4	8.5	8.1
Total	100.0	100.0	100.0	100.0	100.0						100.0	100.0	100.0	100.0	100.0
Father's birth year															
1959-1960	18.5	20.5	24.7	29.1	32.2	17.7	19.6	22.8	25.6	27.3	17.9	19.9	22.8	24.0	24.2
1961-1963	28.8	31.3	35.2	36.6	39.6	28.1	30.0	33.8	34.9	36.9	28.2	29.9	33.1	34.7	36.7
1964-1966	23.8	24.8	24.3	22.4	19.5	24.3	24.5	23.8	23.9	22.3	23.9	23.9	24.4	24.9	24.9
1967-1969	15.8	15.0	11.5	9.3	7.2	17.0	15.1	12.5	10.6	9.7	16.8	15.2	12.9	11.7	10.9
>=1970	13.1	8.5	4.4	2.6	1.6	12.9	10.8	7.0	5.0	3.8	13.3	11.1	6.9	4.7	3.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mother's educational attainment															
Primary	9.3	7.1	7.2	9.1	10.2	8.1	8.2	8.4	8.9	9.7	8.5	8.2	8.0	8.5	8.9
Secondary, no matriculation examination	34.2	32.0	34.3	39.4	47.3	29.6	33.8	36.3	40.2	45.3	31.6	32.6	35.0	36.7	41.7
Secondary, matriculation examination	9.8	10.2	10.5	10.6	9.0	11.0	9.8	9.6	8.6	7.7	10.1	10.0	10.0	10.0	9.4
Lower tertiary	34.5	36.7	34.5	29.9	25.8	36.7	35.1	34.1	32.5	29.8	35.8	35.6	34.7	33.7	31.6
Higher tertiary	11.3	12.8	12.4	10.2	7.1	13.4	12.1	10.8	8.9	7.3	12.7	12.5	11.3	10.2	7.9
Graduate school	1.0	1.2	1.1	0.8	0.7	1.3	1.1	0.9	0.8	0.4	1.2	1.1	1.0	0.9	0.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mother's social class (EGP)															
Upper service class, including self-emp	54.7	57.3	57.7	56.3	55.9	58.1	57.0	55.0	50.5	45.4	57.9	56.9	55.0	51.7	48.3
Lower service class	26.8	25.4	23.5	21.8	19.6	25.8	25.9	25.6	25.9	26.5	25.5	25.8	26.1	26.6	26.7
Routine non-manual	11.9	11.6	12.6	13.9	16.4	10.9	11.3	12.5	14.7	17.2	11.1	11.4	12.4	13.7	16.1
Self-employed non-professionals, farmer	1.8	1.9	2.4	3.3	3.8	1.3	1.6	2.4	3.5	4.9	1.5	1.8	2.2	2.9	3.2
Skilled and unskilled workers	4.7	3.8	3.8	4.6	4.3	3.9	4.2	4.5	5.3	5.9	4.1	4.1	4.3	5.1	5.6
Other/unknown	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Father's educational attainment															
Primary	17.4	14.5	14.5	17.4	20.4	16.0	16.0	16.0	16.2	16.9	14.9	15.7	16.5	18.2	20.8
Secondary, no matriculation examination	43.7	42.4	43.4	46.2	46.8	41.7	42.6	44.0	46.9	50.5	39.7	42.9	46.2	48.7	52.8
Secondary, matriculation examination	5.8	5.8	5.3	4.6	4.0	6.0	5.8	5.6	5.0	4.1	7.0	5.5	4.9	3.8	2.8
Lower tertiary	23.3	25.6	24.7	22.0	20.7	24.6	24.5	24.1	23.2	21.7	26.0	24.5	23.0	21.4	18.5
Higher tertiary	8.6	10.3	10.6	8.5	6.5	10.2	9.7	9.0	7.7	5.9	10.9	9.9	8.4	6.8	4.5
Graduate school	1.2	1.4	1.6	1.3	1.6	1.5	1.4	1.4	1.0	0.8	1.6	1.4	1.1	1.0	0.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Father's social class (EGP)															
Upper service class, including self-emp	57.6	60.6	60.8	59.2	62.5	59.9	59.9	58.8	56.7	53.1	62.0	60.0	57.6	53.6	48.0
Lower service class	16.9	15.7	14.3	13.4	12.2	16.4	16.0	16.1	15.4	15.9	16.6	16.3	15.6	15.2	14.6
Routine non-manual	3.9	3.5	3.4	3.5	3.0	3.6	3.5	3.7	4.0	4.1	3.5	3.5	3.8	4.2	4.7
Self-employed non-professionals, farmer	6.2	6.6	8.5	10.5	10.6	5.8	6.1	7.3	8.8	11.4	4.2	5.7	8.4	10.8	15.7
Skilled and unskilled workers	15.3	13.5	12.9	13.3	11.5	14.2	14.4	14.0	15.1	15.3	13.5	14.4	14.5	16.0	16.7
Other/unknown	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Maternal grandmother's age at mother's birth															
<=20 years	14.1	13.2	13.0	13.0	8.8	27.2	6.2	0.8	0.0		14.1	13.9	13.0	12.5	12.4
21-24 years	30.0	29.5	28.9	28.0	25.5	40.6	33.1	15.1	5.3	1.0	30.5	29.9	29.0	28.0	27.3
25-28 years	23.8	24.0	23.6	22.8	23.8	19.2	32.0	29.7	21.6	9.0	24.0	24.0	23.7	23.6	22.8
29-32 years	15.0	15.3	15.2	14.8	16.0	7.2	16.6	26.5	28.2	22.1	14.8	15.2	15.3	15.8	15.5
33+ years	17.1	18.0	19.3	21.4	25.9	5.9	12.1	27.9	44.8	67.9	16.6	17.1	19.0	20.0	22.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Paternal grandmother's age at father's birth															
<=20 years	12.7	11.8	10.9	10.3	7.6	12.9	12.2	11.6	10.8	10.0	25.6	5.8	0.7	0.0	
21-24 years	28.8	28.3	26.8	25.4	20.8	29.2	28.5	27.5	26.3	25.3	40.3	31.8	14.8	5.6	0.8
25-28 years	24.1	24.3	24.2	23.3	24.2	24.2	24.4	24.1	23.8	23.5	19.9	31.8	29.8	21.5	9.6
29-32 years	15.9	16.3	17.1	17.7	19.4	15.8	16.1	16.4	17.2	17.5	7.7	17.7	26.6	28.5	22.4
33+ years	18.5	19.3	21.0	23.3	28.0	17.9	18.9	20.4	21.9	23.7	6.5	12.9	28.2	44.4	67.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0