# Health outcomes of only children across the life course: An investigation using Swedish register data

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## Abstract

The proportion of only children – children with no full biological siblings – is growing in high-income settings, but we know little about their life course outcomes and how this is related to long-term health. Previous studies of only children have tended to focus on short-term, developmental and intellectual outcomes in early life or adolescence, and provide mixed evidence. Using Swedish population register data on children born between 1940 and 1975, we compare only children with children from multi-child sibling groups, taking into account birth order, family size and half-siblings to account for family complexity. We consider physical health outcomes measured at late adolescence (height, body mass index and physical fitness), and mortality. Only children with and without half-siblings had lower height and fitness scores, were more likely to be overweight or obese, and had higher mortality, than those with 1 or 2 biological siblings. Only children without half-siblings generally did better than only children with half-siblings, suggesting that only children experiencing parental disruption experience additional disadvantages. With the exception of height, the patterns persist after adjustment for parental characteristics and after employing within-family cousin comparison designs. In mortality models, some of the excess risk for only children was explained by adjustment for fertility, marriage and educational history. We discuss the extent to which the patterns we observe are explained by selection processes and contextual differences in the prevalence of one-child sibling groups.

# Introduction

Researchers have long been interested in how family size and birth order in the family of origin affect child development. Recent years have seen a surge of studies using exogenous ‘shocks’ to sibling group size, such as twin births, to identify how the number of siblings affects educational, socioeconomic, and health outcomes over the life course. However, this work has largely ignored children without siblings, commonly known as ‘only children’. Only children constitute a large and growing proportion of all sibship groups in high-income, low fertility settings, and this increase is likely to continue (Frejka, Hoem, and Sobotka 2008). Previous studies of only children have generally focussed on short-term, developmental and cognitive outcomes in early life or adolescence (Falbo and Polit 1986; Falbo 2012; Mancillas 2006; Blake 1981b). While many of these studies find that only children are advantaged, others report disadvantages relative to children raised in multi-child sibling groups (Mancillas 2006). The long-term health consequences of being an only child have received little attention. One recent study suggested that only children experience a mortality disadvantage (Baranowska-Rataj, Barclay, and Kolk 2017), but more evidence is needed to understand the extent of the excess health risk accruing to different types of only children and how it might be explained. The past decades have also witnessed an increase in family complexity and diversity of family forms, meaning that it is necessary to distinguish between only children with and without half-siblings (Fomby, Goode, and Mollborn 2016).

This study uses Swedish population register data to investigate health outcomes of only children relative to other types of sibling groups at various stages of the life course from late adolescence (ages 17-20) to mortality at age 50 and over. We compare only children with children from other sibship types, taking into account birth order, family size and the presence of half-siblings in order to account for family complexity and how this might result in different health outcomes between only children and children raised in other types of sibling groups. We consider a range of physical health outcomes measured at late adolescence, and mortality. To reduce bias from confounding factors, we adjust for parental sociodemographic and socioeconomic characteristics and also employ within-family cousin comparison designs to adjust for all time-invariant factors that remain constant within the extended family. The study extends the current literature by using high-quality longitudinal data capturing medium and long-term health outcomes, distinguishing only children without half-siblings from those who have half-siblings, and using a novel methodological design to reduce the impact of selection effects on our estimates.

## The outcomes of only children: theory and empirical research

The family environment is seen as a critical influence on short- and long-term health and wellbeing, and academic interest in the differences between only children and those with siblings dates back over a century. Psychologist G. Stanley Hall famously claimed in his 1898 study that “being an only child is a disease in itself” (cited in (Fenton 1928)), and his contemporary Alfred Adler, who wrote extensively on birth order, also took a dim view of only children, considering them spoilt and negatively socially selected, with neurotic, mentally unstable parents (Adler 1930). Studies from the US, UK, Netherlands, Korea and China have demonstrated the persistence of a negative ‘only child stereotype’ in the population, where only children are depicted as being selfish, anxious, and lacking in social skills (Mancillas 2006). In the US, for example, Gallup polls from 1980s-2018 show that just 2-3% of adults surveyed think that it is ideal to have only one child (Saad 2018). A common reason given by parents for their desire to have a second child was the desire to avoid having an only child (Falbo and Polit 1986).

### *Potential explanatory mechanisms for differences between only children and children from multi-child sibling groups*

A number of theories have been proposed to explain how family size and birth order affect long-term outcomes, some of which suggest that only children should be advantaged, and others that they should be disadvantaged. According to the resource dilution hypothesis (Blake 1981a; Downey 2001), only children should have a developmental advantage because they do not have to share their parents with other siblings and should therefore enjoy the undivided attention and resources of their parents. Economic theories that describe the 'trade-off' between child quality and quantity also suggest that only children should benefit from the undivided economic and time resources of the parents (Becker and Lewis 1973). Another influential theory, the confluence hypothesis (Zajonc 1976) argues that the average degree of cognitive stimulation in the household varies as more children are born, which affects children's cognitive development. For example, a first-born interacts exclusively with his or her cognitively mature parents, which is a very stimulating environment for that first-born. A second-born, however, interacts with both the parents as well as their much less cognitively developed older sibling. Likewise, the first-born also then interacts with an even less cognitively stimulating newborn. The confluence hypothesis generally predicts advantages for only children as they are raised in a household with a consistently higher than average degree of cognitive stimulation. A later theoretical supplement to the confluence hypothesis argued that the advantage of first-born children may also derive from tutoring their younger siblings. The rehearsal of knowledge and its communication to younger siblings is likely to benefit first- and earlier-born children compared with later-borns, but only children would never benefit from this opportunity.

An important alternative explanation for differences between only children and those with siblings is *selection* in terms of which types of parents have only one child. A recent paper comparing standardised test scores at age 15 across 31 low fertility countries found that only children generally do worse in countries with a lower proportion of only children. This pattern suggests that negative selection in terms of the characteristics of parents who have only one child may explain the only child disadvantage in countries where only children do worse (Choi and Monden 2017). The authors also found that where only children did have lower test scores, this was generally explained by lower parental socioeconomic status. Only children are also more likely to be the offspring of separated or divorced parents; an analysis of Swedish data from 1971-1994 showed higher divorce rates for women with one child, compared with women at parity two or three (Andersson 1997). Progression to parity two is also affected by parental health and wellbeing, and parents who have a particularly difficult experience with the first child may be less likely to continue childbearing (Margolis and Myrskylä 2015). These patterns underscore the importance of accounting for the characteristics of the parents of only children as well as carefully considering the surrounding context.

### *Previous empirical research: non-health outcomes of only children*

A series of reviews and meta-analyses suggest that only children do not have intellectual or developmental disadvantages in early life; indeed, in some domains they seem to do better than children with siblings (Falbo and Polit 1986; Falbo 2012; Polit and Falbo 1987). This only child advantage can also be found in studies of only children using data from China, where the one-child policy may be considered an exogenous shock on family size (Chen and Goldsmith 1991; Poston, and Falbo 1990; Falbo 2012; Falbo and Poston 1993). However, some notable studies do document multidimensional disadvantages for only child in China (Cameron et al. 2013a).

Comprehensive reviews have shown, however that the only child educational and intellectual advantage is most pronounced in comparisons with later borns; first- or second-borns from two-child sibling groups perform just as well as only children (Falbo 2012). This pattern is still consistent with the resource dilution hypothesis since first-born children live their lives as only children until the birth of a second sibling. There is also evidence that the only child cognitive and educational advantage diminishes with age (Falbo 2012). However, only children typically have higher long-term educational attainment than children raised in multi-child sibling groups (Gee 1992), perhaps due to only children having better access to parental resources for paying tertiary education costs (Falbo 2012).

Only a handful of studies have examined the long-term social and demographic outcomes of only children (Gee 1992; Blake 1981a; Diekmann and Engelhardt 1999; Bobbitt-Zeher, Downey, and Merry 2016; Trent and Spitze 2011; Blake, Richardson, and Bhattacharya 1991). Some studies have examined whether only children are less sociable than those with siblings by looking at adult social participation and affiliation, but the results are mixed with no strong evidence in either direction (Blake 1981a; Blake, Richardson, and Bhattacharya 1991; Trent and Spitze 2011). Studies from Canada, the US and Germany have found that only children have higher divorce rates than children raised in multi-child sibling groups (Bobbitt-Zeher, Downey, and Merry 2016; Diekmann and Engelhardt 1999; Gee 1992), which may be related to the fact that only children are more likely to have divorced or separated parents (e.g. see Andersson 1997). Research in Sweden (Kolk 2014) and Canada (Gee 1992) has also found that only children have lower fertility and are more likely to be childless, which is consistent with the evidence for intergenerational fertility patterns (Murphy and Wang 2001), though a US study found that the fertility of only-children did not differ from children in two-child families after adjustment for background characteristics (Blake 1981a). Given that fertility and marital history are related to post-reproductive mortality (Barclay et al. 2016), these trends may be important for explaining why only children seem to have higher mortality in Sweden (Baranowska-Rataj et al. 2017).

### *Previous empirical research: health outcomes of only children*

Despite the considerable theoretical motivations, there has been much less research examining whether only children differ from those with siblings in terms of health outcomes. The resource dilution hypothesis (Blake 1981a) would predict that only children reap health benefits as well as developmental advantages by not sharing parental resources. There may be direct health benefits deriving from more material resources for health care and having greater parental attention for physical and psychological needs in childhood. As some studies suggest higher educational attainment for only children (Gee 1992; Falbo 2012), only children may experience indirect health benefits by virtue of their higher socio-economic status. More generally, classical economic theories on the trade-off between quantity and quality of children (Becker and Lewis 1973), and from demography which posit an inverse relationship between family size and offspring survival (Cleland 2001) would also suggest better long-term health outcomes for only children through enhanced resources and greater parental investment.

On the other hand, the parents of only children may be negatively selected in a number of ways that could impact offspring health. For example, reduced parity progression may be related to adverse first birth experiences which reduce parental wellbeing (Margolis and Myrskylä 2015), or may be related to parent’s underlying poorer health reducing fecundity. The trend for increasing numbers of only children is linked to advanced maternal age, which is associated with adverse birth and offspring outcomes (Kenny et al. 2013), despite higher socioeconomic status ameliorating risks (Myrskylä, Barclay, and Goisis 2017). Only children are more likely to have divorced, separated, or absent parents (Andersson 1997), a factor which is associated with a range of negative social and health outcomes (Goisis, Özcan, and Van Kerm 2019; Amato and Anthony 2014; McLanahan, Tach, and Schneider 2013; Strohschein 2005). The literature on intergenerational family patterns indicates that only children are also more likely to divorce or separate themselves (Dronkers and Härkönen 2008), and if they have had half-siblings, to experience multi-partner fertility (Lappegård and Thomson 2018).

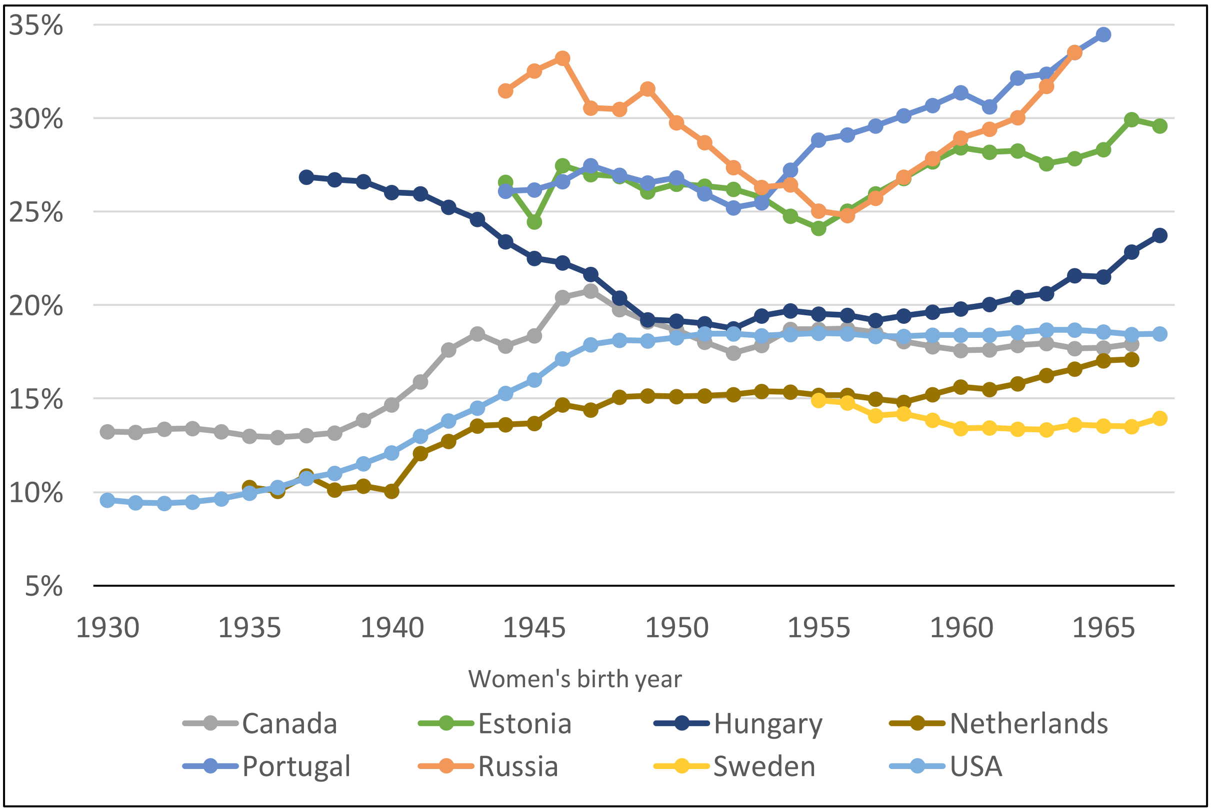
Studies of short term health outcomes have found a consistent pattern of higher child and adolescent obesity rates in only children compared to those with siblings across a range of contexts including the US (Datar 2017; R. H. Mosli et al. 2016), Denmark (Haugaard et al. 2013), China (Li et al. 2017; Min et al. 2017; Cheng 2013), Brazil (de Oliveira Meller et al. 2015) and Japan (Wang et al. 2007). These patterns may due to differential maternal feeding practices (Rana H. Mosli et al. 2015). However, a study looking at UK and Brazilian cohorts found no differences in obesity and blood pressure between only children and children with siblings at 18 years of age (Howe et al. 2014). Therefore, as for educational outcomes (Choi and Monden 2017), only child health outcomes might vary across contexts due to varying selection in terms of parental characteristics.

The long-term health effects of being raised as an only child have been explored even less. Findings from a recent Swedish study suggested that only children have higher mortality rates than children raised with siblings, even after socioeconomic factors were accounted for (Baranowska-Rataj, Barclay, and Kolk 2017). The explanation for this pattern is not clear, but we could speculate based on previous studies of birth order and health, if we assume that only children may share some characteristics with first-borns. A Norwegian study found that first-borns (of which only children are a unique subset) were more likely than later-borns to be obese and have higher blood pressure at age 40 (Black, Devereux, and Salvanes 2016), suggesting that this weight disadvantage may be carried through life. On the other hand, first-borns had more favourable health behaviours like lower smoking and alcohol consumption which may offset some of the negative health risks (Black, Devereux, and Salvanes 2016), and the overall picture is that first-borns tend to have lower mortality compared to later-borns (Barclay and Kolk 2015). So even if first-born children from multi-sibling groups may experience some of their upbringing as only children, their health outcomes still differ. Recent studies of how sibling group constellations are associated with later health have tended to use sibling fixed effect designs (Barclay and Myrskylä 2014; Barclay and Kolk 2015). These sibling comparison designs are motivated by examining variation within the family, but only children are dropped from such comparisons because there is no variation within a one-person group. Other recent studies using instrumental variable estimation such as an exogenous shocks that increases family size (e.g. ‘twin shock’) (Baranowska-Rataj, Barclay, and Kolk 2017) also involve excluding only children. Hence only children have been overlooked, which is part of the motivation for this study.

## Demographic context of this study

The proportion of women who have one child varies widely across high-income countries. Women from Eastern and Southern European countries are more likely to have one child than women from Northern and Western Europe, and other high-income countries like the USA and Japan (see Fig.1, based on completed cohort fertility estimates). Of women born in 1965, 34% in Portugal had one child, compared with 14% in Sweden, raising questions about the degree of selectivity across contexts. Although studies demonstrate the entrenchment of the 2-child family ideal in Europe (Sobotka and Beaujouan 2014), Fig.1 shows that since 1960 in some contexts the proportion of women having one child has been increasing, but the proportion has been stable in Sweden, the US and Canada. Reduced parity progression from 1 to 2 children may be related to changing partnership and fertility trends typical of the second demographic transition (Lesthaeghe 2010). Postponement of the first birth may reduce the likelihood of progressing to a second due to reduced fecundity at later ages, and increasing divorce and separation rates may delay or reduce fertility. Finally, increases in blended and stepfamilies may reduce the number of biological children women have with one partner, without affecting the average family size. The continuation of these trends in high-income countries (Sobotka 2017) mean that biological only children are likely to become increasingly prevalent.

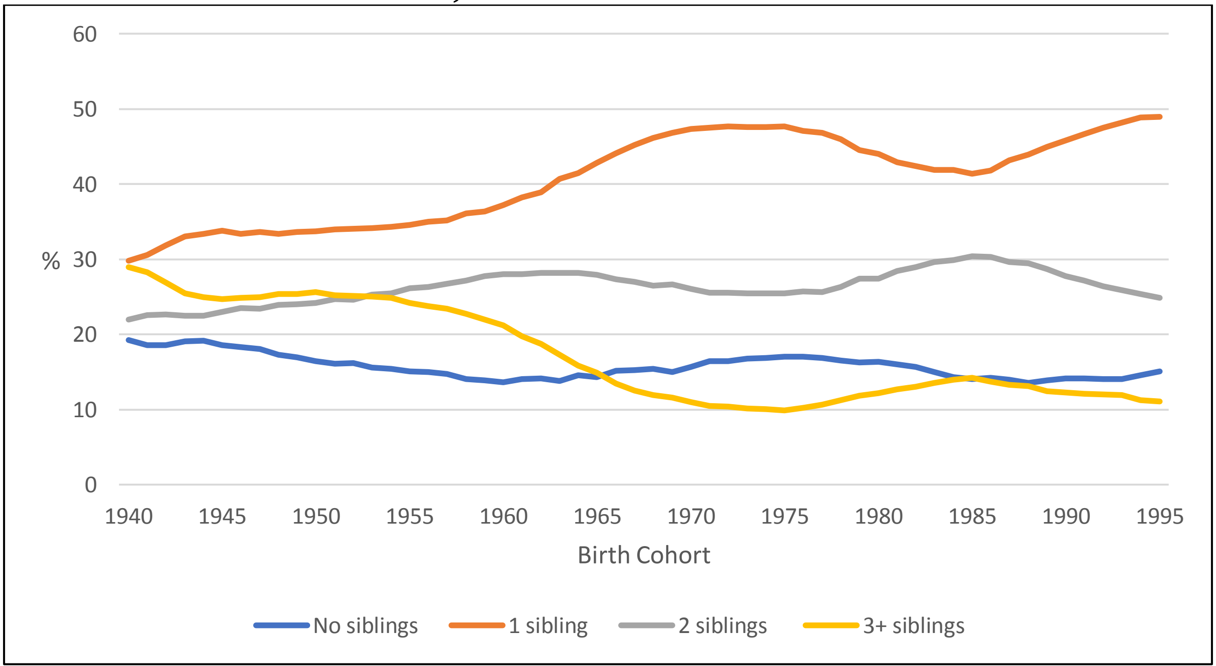
**Figure 1: Percentage of women who had one child, according to women's birth cohort 1930-65, selected high income countries**




Source: Human Fertility Database (https://www.humanfertility.org/cgi-bin/main.php), authors' calculations based on cohort parity progression ratios.

In Sweden the proportion of women having one child has remained low and stable, meaning that for the birth cohorts in this paper born 1940-1975, being an only child was fairly unusual. The majority of Swedish children had 1 or 2 full biological siblings (Fig.2). Among those born before 1945, the proportion of children from one-child sibling groups was 19%, this subsequently declined to a low of 14% in the 1963 cohort, followed by a slight increase for the 1975 cohort, before remaining at around 14-15% for children born 1980-1995. Figure 2 also shows a marked decline in children with three or more siblings, and a growing entrenchment of the 2-child norm. The separation and divorce rate is Sweden is relatively high, contributing to increases in the proportion of children with half-siblings (Thomson 2014). Among the 1940 cohort, just 7.8% of children had half-siblings, but this increased by nearly four times to 26.6% in the 1975 cohort. Therefore, a growing share of only children without any full biological siblings would have at least one half-sibling, meaning they could (dependant on shared residence) experience some of the (possibly positive) effects of having siblings, but on the other hand may also suffer from the negative effects of family disruption and divorce. In the Swedish context children with half-siblings have poorer educational outcomes (Turunen 2014). Only children are an increasingly heterogeneous group, something which is not usually accounted for in previous studies but which we are able to explore given the richness of the data we use in this study.

**Figure 2: Percentage of children by biological sibling group size in the family of origin. Men and women born in Sweden, 1940-1995.**




Figures based on birth records of children with a shared biological mother and father.
Source: Swedish population register, authors' calculations.

## Data and Methods

### Data

In this study we use Swedish population register data to examine how sibling group size, and particularly only child status, in the family of origin is related to health in early adulthood and mortality. Each individual in Sweden has a unique personal identification number (PIN) that is universally used for administrative purposes. A key administrative register that we use in this study is the Swedish multigenerational register, which allows us to link individuals to their parents and siblings. We examine sibling groups where all the children were born in Sweden in order to maximize the accuracy of the parent-child sibling linkages. In our analysis we also distinguish between children who were or were not raised in blended families. As a consequence, we exclude any children who are missing information on either the maternal or paternal linkage, but this is less than 1% in the birth cohorts that we study. We also exclude children in sibling groups with multiple births such as twins, as birth order is an important component of our analysis, and multiple births confuse the assignment of birth order.

We examine the relationship between sibling group size and four outcome variables: height, physical fitness, being overweight or obese, and mortality. Apart from mortality, information on all the other outcome variables are drawn from the Swedish military conscription register. In Sweden, men were universally required to report to military conscription tests between ages 17 and 20 to determine their physical and psychological suitability for military service. We use data on height, physical fitness, and BMI for cohorts born 1965–1975. Since only men were required to report to conscription tests in Sweden, we do not have data on these measures for women. However, although the outcome measures are available for men only, the measures of sibling group size and other characteristics of the sibling group are based on the whole sibling groups, including brothers and sisters.

The other main register that we use is the Swedish mortality register, which contains detailed information on all deaths in Sweden between 1960 and 2017. In our mortality analyses we include both men and women. Although our access to the Swedish mortality register includes data for the period 1960–2017, the multigenerational registers that allow family members to be linked to one another are incomplete before the 1990s (Statistika Centralbyrån 2011). We start our analysis of all-cause mortality at age 50, and to be included in our analytical sample our birth cohorts must have survived to age 50. We also exclude anybody who ever emigrated from Sweden before age 50. Table 1 details how we reach our analytical sample for both the conscription data analysis and the mortality analysis.

**Table 1: Sample exclusion process for this study**

| **Analysis of male health outcomes at age 17-20** | N included | N excluded |
|---|---|---|
| Total men born in Sweden 1965-75 | 634,403 | |
| ID for both parents | 626,970 | 7,433 |
| No multiple births | 611,610 | 15,360 |
| No missing values on conscription variables | 532,659 | 78,951 |
| Not missing grandmother ID and has male maternal cousins | 182,870 | 349,789 |
| **Analysis of mortality after age 50** | | |
| Total men and women born in Sweden 1940-60 | 2,305,911 | |
| ID for both parents | 2,146,263 | 159,648 |
| No multiple births | 2,074,826 | 71,437 |
| Did not emigrate or die before age 50 | 1.939,202 | 78,624 |
| No missing values on key covariates | 1,910,086 | 29,116 |

### *Sibling Group Size, Birth Order, and Blended Families*

The key explanatory variable in our study is sibling group size. Although we focus on only children, we compare only children to children raised in sibling groups with two, three or four or more children, rather than assuming that multi-child sibling groups are homogenous. We also explicitly model birth order as part of our sibling group size variable, as it is valuable to consider whether only children have similar outcomes to first-born children in multi-child sibling groups given that both only children and first-borns spend a period of time in early childhood with the exclusive attention of the parents and without competition from siblings. Furthermore, since later-born children generally do worse than first-borns, later-born siblings lower the average achievement in multi-child sibling groups. This means that a detailed consideration of the interplay of family size and birth order is essential for comparing the outcomes of only children to children in larger families. Our key explanatory variable has the following nine categories:

- Only child
- First-born in a two-child sibling group
- Second-born in a two-child sibling group
- First-born in a three-child sibling group
- Second-born in a three-child sibling group
- Third-born in a three-child sibling group
- First-born in a sibling group with four or more children
- Middle-born in a sibling group with four or more children
- Last-born in a sibling group with four or more children

We calculate our variable for family size and birth order based on both maternal and paternal fertility. That is to say, an individual designated as an only child is the only biological child of both the mother and the father. To take account of complex families, our main analyses always feature an interaction between our nine-category family size and birth order variable with a binary variable for whether the index person has any half-siblings or not from either the maternal or paternal side. Hence, our analyses include 18 categories which reflect the interaction between sibship size, birth order and the presence of any half-siblings. Therefore, we distinguish between two categories of only children in our analyses: non-blended only children (children who the only child of their unique mother-father pairing and who have no half-siblings), and blended only children (children who are the only child of their unique mother-father pairing, but who may have half-siblings from either the maternal side, paternal side, or both). We also experimented with an alternative specification, such as calculating the variable for sibling group size/birth order using just maternal fertility. The results are reported in supplementary material and discussed at the end of the results section.

### *Outcome Variables*

#### Height (men)

Height, measured in centimeters, is standardized (z-scores) for our analyses.

#### Physical Fitness (men)

Our measure for physical fitness is based on a measure of maximal working capacity, measured in watts (fysisk arbetsförmåga i watt). Maximal working capacity (MWC)— measured as the maximum resistance attained in watts when riding on a stationary bike (one of the most effective ways of measuring aerobic fitness) for 5–10 minutes—is closely related to maximal oxygen uptake ($V0_2max$), also known as maximal aerobic capacity. The correlation between these two variables has been reported to be approximately 0.9 (Patton, Vogel, and Mello 1982). The variable for MWC is an important predictor of mortality in adulthood among men (Sandvik et al. 1993). Because a measure of MWC in watts is not intuitively easy to interpret, we standardize this outcome measure using z-scores.

#### BMI (men)

We calculate BMI as mass (in kilograms) divided by height (in metres) squared at the time of conscription test. Using the standard cut-off points, we focus on whether our index persons were overweight or obese at the time of the military conscription test, meaning whether they had a BMI of 25 or greater.

**Mortality (men and women)**

We study mortality in the period 1990–2017 for Swedish men and women born 1940–1960. We focus on all-cause mortality starting at age 50. For the 1940 birth cohort that means we study them from age 50 in 1990 through to age 77 in 2017. For the 1960 cohort we follow them from age 50 through to age 57.

**Covariates**

We include a number of control variables in our models that previous studies have shown to covary with both our explanatory variable and our outcome variables. These include the birth year of the index person (1965, 1966...,1977), which is associated with family size as well as secular trends in our health measures. We control for both maternal age at the time of birth (15-19,20-24,....,35-39,40+), and paternal age at the time of birth (15-19,20-24,...,40-44,45+), as age at childbearing covaries with family size and birth order as well as health outcomes (Barclay and Myrskylä 2016). We also use information on maternal and paternal educational attainment, with eight categories: primary (<9 years), primary (9 years), secondary (10-11 years), secondary (12 years), tertiary (13-15 years), tertiary, but not including postgraduate qualifications (15+ years), and postgraduate qualifications (approximately 16-20 years). The final, eighth, category indicates whether the education variable has a missing value.

To further adjust for socioeconomic conditions in the family of origin, we adjust for the mother's and father's socioeconomic status as reported in the 1960 census. This variable is based upon information on occupation and occupational status, and has 12 categories: [1] entrepreneurs in agriculture, forestry, etc.; [2] workers in agriculture, forestry, etc.; [3] entrepreneurs in industrial, commercial, transport and service occupations; [4] entrepreneurs in the free professions (doctors, lawyers, etc.); [5] company executives (employees); [6] officials (supervisors, technicians, office and commercial staff etc.); [7] workers other than group 2; [8] employees in the service profession; [9] military; [10] persons with unidentifiable professions; [11] students (non-work); [12] other non-employed or students. We also include an additional category, [13], for missing information. Since we use this covariate only as a control variable, we argue that it is useful to use this detailed categorisation, particularly as it was designed to capture important features of the Swedish occupational distribution at the time the information was collected. Further controls include a binary variable for whether the parents had divorced by the time the index person had reached age 16, and binary variables for whether the mother or father had died before the index person reached age 17.

In the mortality analyses we also control for variables capturing important sociodemographic and socioeconomic factors in the adulthood of our index persons. These include whether the mother or father had died before age 50, marital status at age 50 (unmarried, married, divorced, widowed), the index person's own educational attainment (same categories as used for the educational attainment of the index person's parents), the index person's own socioeconomic status taken from the 1990 census, and the number of children that the index person had by age 50 (0,1,...,6+). All of these variables have been shown to covary with family size as well as health outcomes ((Cherlin, Chase-Lansdale, and McRae 1998; Barclay et al. 2016; Myrskylä et al. 2014; Rostila and Saarela 2011; Weitoft et al. 2003; Torssander and Erikson 2010)).

## Statistical Analyses

### *Military Conscription Data*

To study the relationship between sibling group size in the family of origin and our various health outcomes derived from the military conscription register, we use ordinary least squares as well as linear regression with cousin fixed effects. Our outcome variables for physical fitness and height are continuous, but we analyse being overweight or obese as a binary variable. For the analysis of being overweight or obese, we use linear regression in the form of linear probability models with robust Huber-White standard errors (Stock and Watson 2008).

The fixed effects are applied to the cousin group. The model identification is by comparing health results within a maternal cousin group where one cousin is an only child, and the other has a different sibship constellation. Maternal cousin groups where both are an only child do not contribute to the estimates due to the lack of variation. The use of maternal cousin fixed effects implicitly adjusts for all factors that are shared within the maternal cousin group, such as the size of the parental sibling group, as well as grandparental resources (e.g. wealth) and other resources shared across the extended kin group. This may include material assets such as a shared wealth (e.g. a shared vacation home), but also symbolic aspects such as a shared surname or a common family history and identity. The fixed effects approach also inherently adjusts for factors that are difficult to observe and measure, such as all elements of shared socioeconomic background to the extent that such factors are shared by cousins.

For each military conscription outcome variable (height, physical fitness, and overweight/obese), we estimate two models using the full population:

$$y = \beta_1 SGSBO \times Blended + \beta_2 BirthYear + \alpha + \varepsilon$$

$$y = \beta_1 SGSBO \times Blended + \beta_2 BirthYear + \beta_3 X + \alpha + \varepsilon$$

where $y$ is our outcome variable, *SGSBO x Blended* is our nine-category sibling group size and birth order variable interacted with a binary variable for whether the index person had any maternal or paternal half-siblings or not (yielding 18 discrete categories), *BirthYear* is a categorical variable for year of birth (1965,1966,...,1975), $\alpha$ is the constant, and $\varepsilon$ is the error term. In model 2 we introduce additional control variables indexed by $X$, a vector of covariates including categorical variables for maternal and paternal age at the time of birth of the index person, categorical variables for maternal and paternal educational attainment, categorical variables for maternal and paternal socioeconomic status (drawn from the 1960 census), a binary variable for whether the parents had divorced by the time the index person had reached age 16, and binary variables for whether the mother or father had died before the index person reached age 17. Further details on these covariates is available in the prior subsection.

For each of our three military conscription outcome variables we also estimate a third model, using linear regression with maternal grandmother cousin fixed effects:

$$y_{ij} = \beta_1 SGSBO_{ij} \times Blended_{ij} + \beta_2 BirthYear_{ij} + \beta_3 X_{ij} + \delta_j + \varepsilon_{ij}$$

where the subscripts *i* and *j* refer to sibling *i* in cousin group *j*, and designates the cousin fixed effect. Model 3 includes the same vector of control variables, *X*, that were included in Model 2. The analytical sample for Model 3 is based on cousin groups that share a maternal grandmother, and we exclude individuals who are 'only cousins'. An individual might not have any maternal cousins either because their parent was an only child, or because all aunts and uncles were childless. The sample is also restricted to those with male cousins in order to have health outcomes from conscription data. This reduces the sample size from

*Mortality*

To study mortality, we use survival analysis in the form of Cox proportional hazard regression (Cox 1972). The proportional hazards model is expressed as:

$$h\,(t \mid \; X_{1,\ldots,}X_k) \; = h_0(t)exp\left(\sum_{j=1}^{k} \quad \beta_j X_j(t)\right)$$

where is the hazard rate for individuals with characteristics at time t; is the baseline hazard at time *t*; and , *j* = 1, ... , *k* are the estimated coefficients. Because the failure event in our analysis is the death of the individual, the baseline hazard of our model, , is age. Individuals are censored on first migration out of Sweden, at death, or in 2017 - whichever comes first. We estimate the following three models:

$$log\;h(t) \; = \beta_1 SGSBO \times Blended \; + \beta_2 Sex + \beta_3 BirthYear$$

$$log\;h(t) \; = \beta_1 SGSBO \times Blended \; + \beta_2 Sex + \beta_3 BirthYear \; + \beta_4 Childhood$$

$$log\;h(t) \; = \beta_1 SGSBO \times Blended \; + \beta_2 Sex + \beta_3 BirthYear \; + \beta_4 Childhood + \beta_5 Adulthood$$

where is the log hazard of mortality, *SGSBO x Blended* is our nine-category sibling group size and birth order variable interacted with a binary variable for whether the index person had any maternal or paternal half-siblings or not (yielding 18 discrete categories), *Sex* is a binary variable for biological sex, *BirthYear* is a categorical variable for year of birth (1940,1941,...,1960), and *Childhood* is a vector of covariates that relate to the childhood environment including categorical variables for maternal and paternal age at the time of birth of the index person, categorical variables for maternal and paternal educational attainment, and categorical variables for maternal and paternal socioeconomic status (drawn from the 1960 census). Finally, *Adulthood* is a vector of covariates related to important sociodemographic and socioeconomic factors measured before age 50, including binary variables for whether the mother or father had died before age 50, marital status at age 50, the index person's own educational attainment, the index person's own socioeconomic status taken from the 1990 census, and the number of children that the index person had by age 50 (0,1,...,6+). Because the Swedish multigenerational register starts at 1932, we were unable to obtain information on maternal grandmothers for the older cohorts in the mortality sample, therefore we did not run cousin fixed effects for the mortality outcome.

## Results

Table 2 shows sample sizes and descriptive statistics for our analysis samples, using both the military conscription data and the mortality register. There were proportionally more non-blended only children in the earlier cohorts born 1940-1960 (11.9%), compared with those born 1965-1975 (6.1%). This disparity is largely consistent with the whole population calculations in Figure 2, however our sample from 1965-1975 is composed of only men. The share of children that grew up in blended families was 14.1% in the mortality sample, and 24.7% in the conscription sample, reflecting increased family complexity across cohorts. Similarly, the share of only children from blended families increased from 4.9% in the mortality sample to 9.5% in the conscription sample. The proportion of children with three or more siblings also declined in the later cohorts. In families without half-siblings, fitness and height mean averages were generally lower among only children than those with siblings, except for those in sibling groups of four or more. Only children had the highest rates of overweight and obesity and mortality compared with any other group in both blended and non-blended families. We also show a more detailed set of descriptive tables in the appendix Tables S1-S3 where all variables in our analysis are cross-tabulated by family size, birth order and blended status. In the conscription data (Tables S1-S2), and mortality data (Table S3) non-blended only children were more likely to be born to older mothers than children with one sibling (indicating the age at first birth was higher for mothers with one child). In the conscription data, non-blended only children were more likely to be born of parents with lower levels of educational attainment than non-blended children with siblings. Both blended and non-blended only children had the lowest mean number of children at age 50 compared with other groups, and also have a relatively high proportion with never married status at age 50.

All models show results according to sibling group size and birth order, taking 'real' only children (i.e. with no full or half-siblings) (OC) as a reference category. The remaining 8 sibling group/birth order categories labels indicate birth order (First, Middle, Last – F, M, L), and sibling group size. For example, a first-born child from a three-sibling group is labelled F/3. In Figures 3-6 we distinguish non-blended families with blue circles and blended families with orange squares. Full model results for all outcomes are shown in appendix tables S4-S7.

### Health outcomes in the military conscription register

In Figures 3, 4 and 5, Model 1 – the baseline model - is only adjusted for birth year. Model 2, in addition to birth year, includes controls for parents' education, socio-economic status, age at the time of birth, whether either parent died before the child was aged 17, and whether the parents divorced before the child was aged 16. Model 3 includes the same adjustment as model 2, but run on a sub-sample described in the methods and including maternal grandmother FE, in other words, comparing sets of maternal cousins to one another.

#### *Physical health at ages 17-20*

Figure 3 shows the results for height z-scores for men aged 17-20. The estimates from model 1 show that, among the non-blended families, only children had significantly lower height scores than children from sibling groups of two and three children. On the other hand, only children without any half-siblings were substantially advantaged in height compared with those from 4+ sibling groups. Blended only children had significantly lower height scores than non-blended

**Table 2:** Sample and study outcomes according to blended status, sibling group size and birth order.

| | | Conscription sample (born 1965-1975) | | | | | Mortality sample (1940-1960) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample size | | Height (cm) | Fitness (watts) | Overweight/Obese | Sample size | | Mortality Rate | Deaths |
| | Sibling group size/ birth order | *N* | *%* | *Mean* | *Mean* | *%* | *N* | *%* | *10^-6* | *N* |
| NOT BLENDED | Only child | 32,700 | 6.1 | 179.4 | 296.5 | 14.3 | 227,188 | 11.9 | 2.0 | 29,202 |
| | First / 2 | 100,462 | 18.9 | 179.7 | 303.7 | 11.1 | 296,614 | 15.5 | 1.6 | 30,068 |
| | Last / 2 | 99,958 | 18.8 | 179.7 | 301.7 | 11.1 | 288,680 | 15.1 | 1.6 | 28,048 |
| | First / 3 | 38,386 | 7.2 | 179.5 | 303.0 | 10.6 | 147,994 | 7.7 | 1.6 | 14,640 |
| | Middle / 3 | 38,526 | 7.2 | 179.5 | 302.1 | 9.7 | 148,569 | 7.8 | 1.6 | 14,750 |
| | Last /3 | 41,612 | 7.8 | 179.5 | 298.1 | 12.3 | 126,541 | 6.6 | 1.6 | 11,219 |
| | First / 4+ | 9,432 | 1.8 | 179.0 | 297.1 | 11.6 | 82,147 | 4.3 | 1.9 | 9,810 |
| | Middle / 4+ | 23,837 | 4.5 | 178.6 | 292.6 | 10.9 | 247,955 | 13.0 | 1.8 | 28,485 |
| | Last / 4+ | 16,345 | 3.1 | 179.0 | 290.6 | 13.8 | 75,508 | 4.0 | 1.6 | 6,496 |
| BLENDED | Only child | 50,699 | 9.5 | 179.0 | 293.7 | 13.8 | 93,767 | 4.9 | 2.0 | 10,007 |
| | First / 2 | 26,902 | 5.1 | 179.2 | 296.4 | 12.4 | 44,284 | 2.3 | 1.8 | 4,297 |
| | Last / 2 | 25,436 | 4.8 | 179.1 | 294.1 | 11.8 | 35,203 | 1.8 | 1.8 | 3,289 |
| | First / 3 | 6,494 | 1.2 | 178.7 | 293.0 | 11.7 | 19,736 | 1.0 | 1.9 | 2,000 |
| | Middle / 3 | 6,493 | 1.2 | 178.9 | 291.0 | 10.8 | 17,110 | 0.9 | 1.8 | 1,634 |
| | Last /3 | 7,205 | 1.4 | 178.9 | 290.1 | 12.5 | 12,578 | 0.7 | 1.7 | 1,116 |
| | First / 4+ | 1,531 | 0.3 | 178.6 | 288.0 | 13.1 | 11,194 | 0.6 | 2.1 | 1,314 |
| | Middle / 4+ | 3,929 | 0.7 | 178.1 | 282.5 | 11.6 | 27,971 | 1.5 | 2.0 | 3,183 |
| | Last / 4+ | 2,712 | 0.5 | 178.6 | 284.3 | 13.0 | 7,047 | 0.4 | 1.7 | 617 |
| TOTAL | | 532,659 | 100.0 | 179.4 | 298.7 | 11.7 | 1,910,086 | 100 | 1.74 | 200,175 |

only children. For all other sibling group/birth order categories, children from blended families had lower height. After adjustment for parental characteristics (model 2), some of the differences between non-blended only children and those with full siblings diminished, and non-blended only children were only disadvantaged relative to non-blended first-borns from a 2-child sibling group. In model 2, a monotonic decrease in height with birth order becomes more evident for sibling groups 2 and 3. In model 3 using cousin fixed effects, the differences between non-blended and blended children (including only children) are fully attenuated, but the confidence intervals are larger due to reduced sample size.

**Figure 3: Results for standardised height scores among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-1975.**

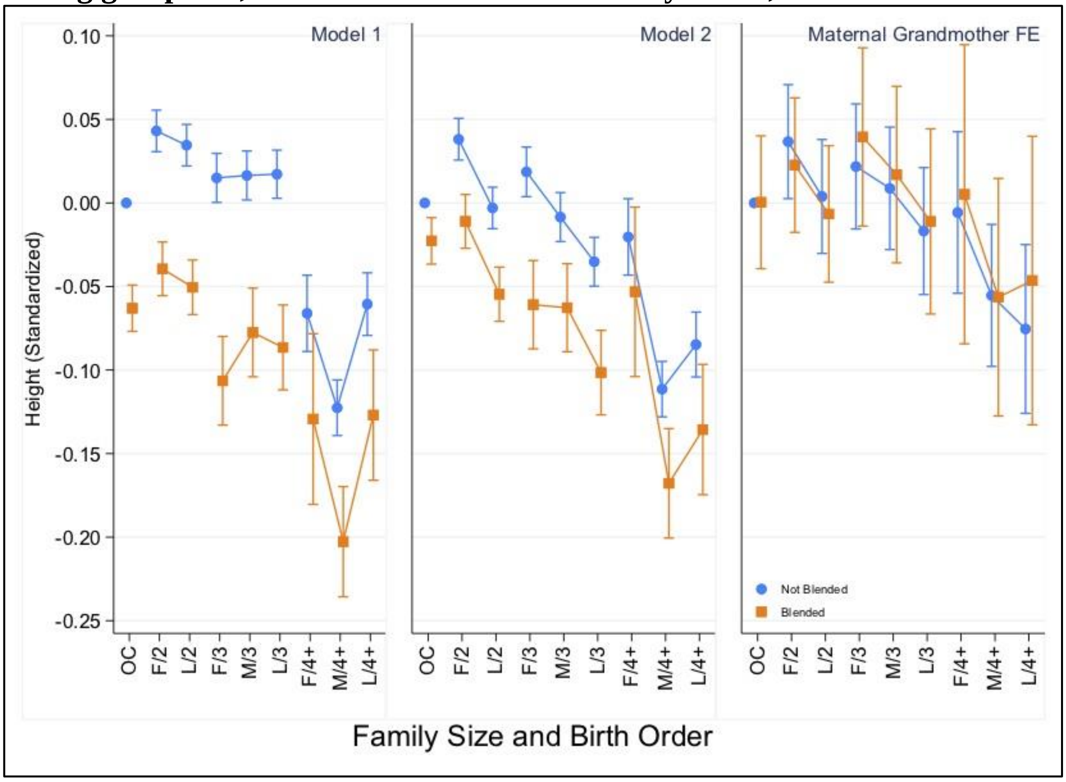



Figure 4 shows the results from linear probability models estimating the probability of being overweight or obese at ages 17-20. Model 1 shows that only children had significantly higher probabilities of being overweight/obese compared with nearly every other sibship constellation, except for blended last-born children of larger sibling groups. In model 2 adjusted for parental characteristics among non-blended families the differences between only children and those from larger sibling groups became smaller, whilst the gap has widened between non-blended and blended only children. In fully adjusted models, the difference between non-blended only children and non-blended children with 1 sibling was equivalent to 2-3 percentage points (a sizeable effect given that the sample average was 11.7%)  As above, in models 1 and 2 non-blended only children do significantly worse in their health outcomes compared with blended only children. There was also a positive relationship between higher birth order and risk of overweight/obesity. Model 3, additionally adjusted for maternal grandmother fixed effects, shows approximately the same pattern of only child disadvantage, with somewhat smaller differences between non-blended and blended only children.

**Figure 4: Results for overweight and obesity among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-1975**

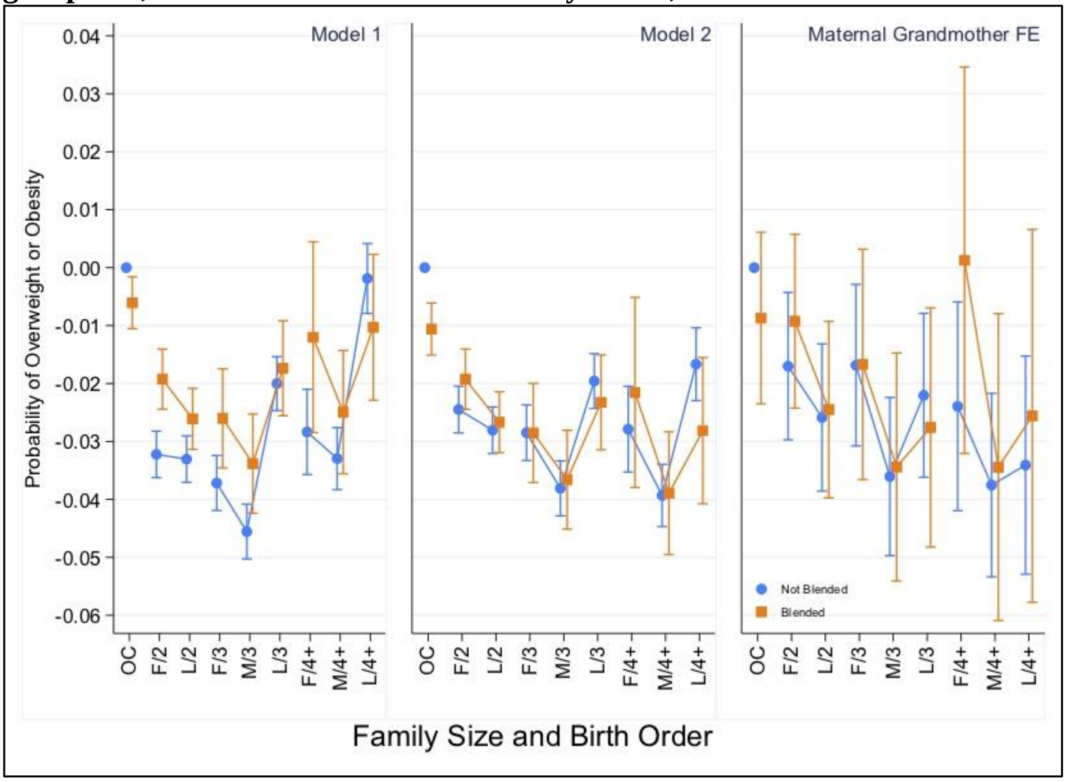
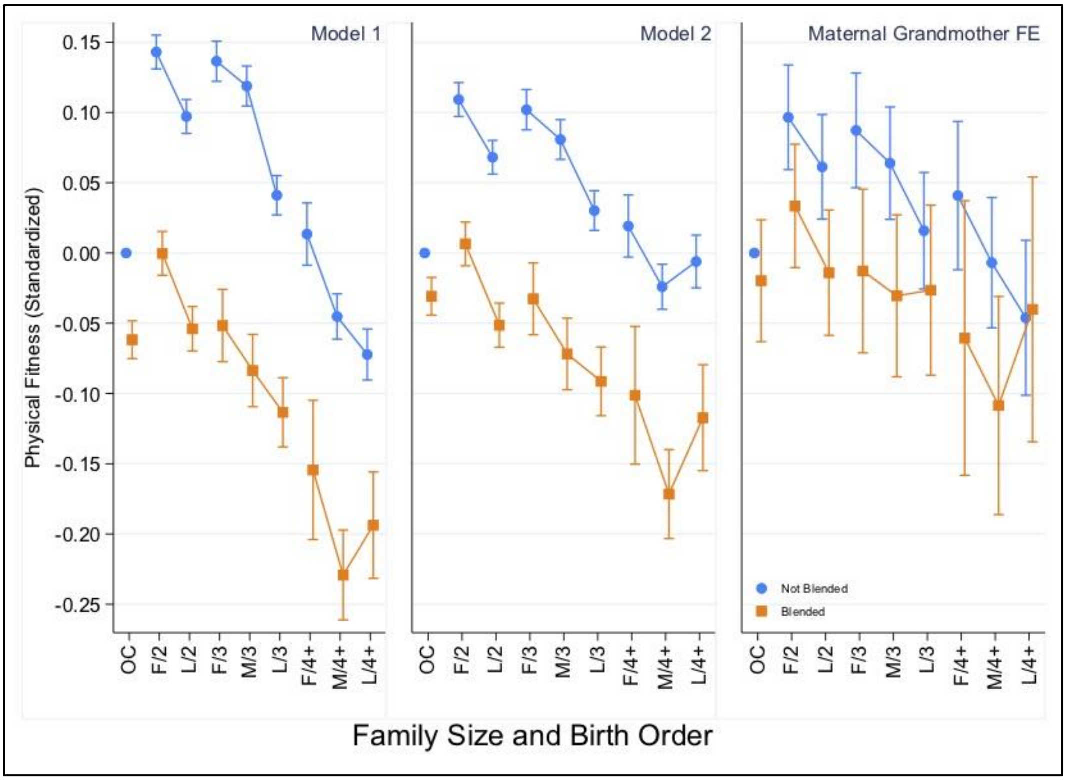



Figure 5 displays the results for standardised fitness scores at age 17-20, and shows that only children, regardless of their blended status, have poorer fitness than non-blended children from two-and three-sibling groups, and similarly low fitness scores as non-blended children from siblings groups of four or more. In model 2, the disparity between only children and those with siblings attenuated, but only children still had approximately 10% of a standard deviation lower fitness scores compared with first-borns with one sibling. In models 1 and 2, blended children had significantly lower fitness than children from non-blended families, and blended only children had worse outcomes than only children with no half-siblings. Regardless of blended status, there was a negative relationship between birth order and fitness score. Model 3 using cousin fixed effects, shows some attenuation of the differences non-blended and blended children, shows approximately the same pattern of effects between only children and those with siblings as in model 2.

**Figure 5: Results for standardised fitness scores among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-1975**




## Mortality results

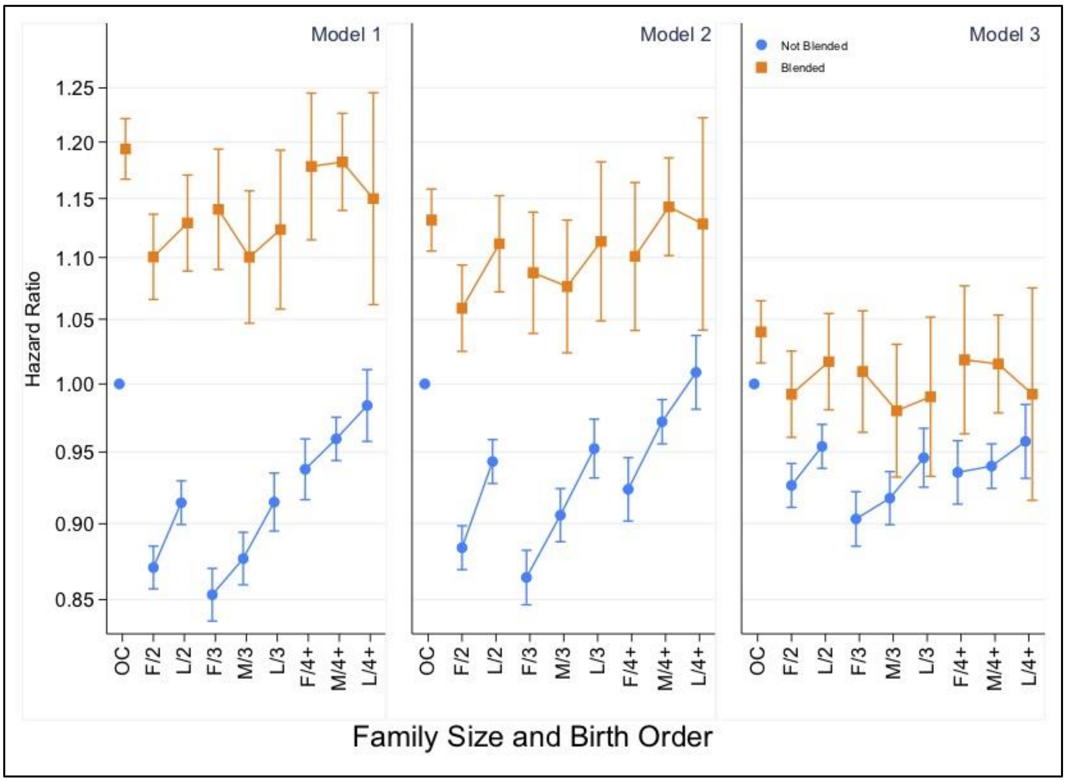
Figure 6 shows results for all-cause mortality at age 50 and over by sibling group size, birth order and blended family status. Because we found no interaction effects between sibling group size, birth order, and gender, we are showing pooled models for men and women. Model 1 shows estimates adjusted for birth year and gender, and model 2 additionally adjusts for parental characteristics parental age, education socio-economic status, and parental death before the age of 50. Model 3 additionally adjusts for life course characteristics of the child measured at age 50: civil status, attained education, socio-economic status and parity[1].

Comparing non-blended sibling groups to one another, only children have a higher mortality hazard. Non-blended children with 1 or 2 siblings, and first and middle-borns with three or more siblings have significantly lower mortality, and this effect persists after controls for parental characteristics (model 2). After adjustment for life course factors (model 3), the gap between only children and other sibling groups reduces, suggesting that some of the negative influence is mediated through family history and socio-economic factors. As in earlier analyses, blended only children have significantly worse outcomes for mortality than non-blended only children. However, this disparity reduces substantially after controls for life course factors in model 3. In fact, in all models, for nearly all sibling groups, children from blended families have higher

[1] Because the Swedish multigenerational register starts at 1932, we were unable to obtain information on maternal grandmothers for the older cohorts in the mortality sample, therefore we did not run cousin fixed effects for the mortality outcome.

mortality than those from non-blended groups, but this disadvantage reduces after adjustment for life course factors, suggesting this negative effect is mediated by poorer life course outcomes.

**Figure 6: Results for all-cause mortality at age 50+, according to sibling group size, birth order and blended family status, Swedish men and women born 1940-60, mortality 1990-2017**




## Robustness checks

For all outcomes from conscription data, as an additional robustness check, we fitted identical models using paternal grandmother FE, and these showed no substantial differences to those obtained when looking at maternal cousins. For mortality models, we fitted the same models starting the mortality follow-up at 1990, rather than age 50, and found broadly the same pattern of effects.

We also investigated the effect of using a slightly different specification of family size and half-sibling status, by classifying children into family size group based on only maternal fertility (see supplementary Figures 1-4). This would mean that an only child can only be classed as blended only child if the *father* had a child with another partner; children with half-siblings from the mother's side would be classified according to their family size based on maternal fertility. Overall, the pattern of effects was similar to those seen in the main results, with the exception that the contrast between non-blended and blended only children was attenuated in some cases to non-significance. An explanation for this could be in that this alternative specification, only children with half-siblings due to maternal fertility contribute to the estimates in higher sibling groups, rather than contribute to the difference between non-blended and blended only children.

## Discussion

This paper is the first to our knowledge to investigate the health of only children relative to children raised in multi-child sibling groups using high quality, large-scale administrative data on a range of objectively measured health outcomes. Our first aim was to assess the extent of any only child health disadvantage, relative to other sibling constellations, and our study suggests that only children in Sweden with no half-siblings are likely to be shorter, are more likely to suffer from overweight or obesity, and have lower levels of physical fitness in late adolescence compared to children from non-blended two- and three- child families, but (with the exception of overweight and obesity) have similar outcomes to those from non-blended four-child families. On the whole, at adolescence only children, regardless of half-siblings, do better on these health measures than children from larger, blended families. Our mortality analyses also show that non-blended only children have higher death rates in early old age compared to children with full biological siblings but do better than children with half-siblings. Only children with half-siblings experience consistently worse health outcomes than only children with no half-siblings.

Our second aim was to understand whether these associations are explained by any parental selection or other life course factors. After adjusting for a range of parental and family characteristics (our model 2), the pattern of associations is somewhat attenuated, suggesting that familial and social selection may play a role. In cousin fixed effects estimates, which control for many unmeasured and invariant factors shared within between maternal cousins, the pattern of effects was broadly similar, and in most cases only children remained significantly worse off than children from larger families. However, differences between only children and others were further attenuated suggesting that shared familial environmental or genetic factors may contribute to health disparities. However, the overall picture is that the health disparities experienced by only children are remarkably persistent even after robust adjustment, especially for the outcome of overweight and obesity.

Given the increasing prevalence of only children in many high-income contexts, it is important to understand the extent to which our results reflect some kind of a genuinely disadvantageous dimension of being raised as an only child, or whether these patterns may largely be attributed to differences in the types of families that have only one child versus the types of families that have multi-child sibling groups. Although we have attempted to adjust for a wide range of parental characteristics, including controlling for unobserved factors in the extended family in our fixed effects analyses, a candidate explanation for the patterns that we observe is residual confounding on parental characteristics, and particularly on unobserved dimensions of parental health. It is likely that parents of only children are negatively selected in a context such as Sweden where there is a strong two-child norm, leading to poorer outcomes for their offspring. Our adjustments for parental health were rather limited; we only adjusted for premature parental death, which is an extreme and uncommon occurrence in contemporary Sweden, and it is possible that other health and wellbeing factors prevent parity progression. For example, recent research shows that men in Sweden who are underweight, overweight, obese, and less physically fit, are less likely to make the parity transition from having one to two or more children (Barclay and Kolk 2019). These patterns have also been observed in the United States and Finland for men and women (Jokela, Elovainio, and Kivimaki 2008; Jokela et al. 2007). Less healthy men are also overrepresented amongst those who have five or more children (Barclay and Kolk 2019)which may explain part of the disadvantage of children raised in sibling groups with four or more children.

Setting aside selection as an explanation, it is also plausible that only child status confers health disadvantages. Some studies do suggest only child disadvantages in terms of educational, cognitive personality outcomes (Cameron et al. 2013b; Mancillas 2006), which may in turn lead to poorer health at adolescence. There is evidence that only children have poorer long term life course outcomes such as lower parity and higher divorce rates(Kolk 2014; Bobbitt-Zeher, Downey, and Merry 2016; Diekmann and Engelhardt 1999; Gee 1992), which are associated with poorer life course health (Barclay et al. 2016). This also points to the importance of considering both context and selection processes operating around parental fertility when assessing family effects of health.

The finding that only children have a higher BMI is consistent with previous research from a range of middle and high-income contexts with a wide degree of variation in the relative frequency of only children in the population (Datar 2017; R. H. Mosli et al. 2016; Haugaard et al. 2013; Li et al. 2017; Min et al. 2017; Cheng 2013; de Oliveira Meller et al. 2015; Wang et al. 2007). Such a consistent finding across countries with different levels of parental selection bias into only child status points to additional mechanisms rather than, or in addition to, parental selectivity. Previous work has suggested that parental feeding practices in childhood might explain this disparity (Rana H. Mosli et al. 2015). Only children experienced less maternal praise and encouragement and excessive control compared with other types of child, which is associated with unhealthy eating practices in adulthood (Rana H. Mosli et al. 2015). While not having to share parental/household resources like attention and time may benefit only children in some areas like educational outcomes (Falbo 2012), an excess of food resources for only children may be detrimental. Sharing food with siblings may prevent overeating and weight gain. However, given the importance of childhood and adolescence for life course health outcomes, this deserves further exploration, possibly by considering variation between cohorts.

One of the strengths of this study over previous studies of only children is that we have the ability to distinguish between only children with and without half-siblings. This is important because one of the hypothesised explanations for an only child disadvantage is negative selectivity (Falbo 2012), and one mechanism might be a disrupted family background which may lead to a range of adverse outcomes. We might expect only children with half-siblings to have experienced some kind of parental separation and be further disadvantaged, and indeed our results confirm substantial health differences between only children with and without half-siblings at adolescence and in later life. More generally, our results also highlight that children from blended families are persistently disadvantaged on health measures, and that some of this could be explained by poorer family and socio-economic outcomes over the life course. Another advantage of this study over some others investigating family size and child outcomes is that facilitated by a large sample size we disaggregated only children from first-borns. This underlines the striking disadvantage of only children compared with first-borns for health outcomes, which would otherwise be obscured. Future studies should try to consider only children separately from first-borns from multi-sibling groups.

There are some limitations to this study. Data restrictions prevent us from comparing life course outcomes of the same cohorts at different life stages, or of the same health outcome among different cohorts, and this must be borne in mind when reflecting on our findings as a whole. We cannot assume that our mortality sample experienced poorer health in adolescence. In addition, the proportions of only children were higher in the later cohorts, and we were unable to investigate whether increased social selection could be driving the poorer health results from conscription data, as suggested in another study (Choi and Monden 2017). It would be very useful in future to conduct studies on the same outcome over time, where social selection may have changed, or to extend our investigation to other non-health outcomes such as education, socio-economic and family factors throughout the life course. The use of cousin fixed effects, while innovative, has its limitations. While first cousins are more similar than non-related sample members, they share 12.5% of their genetic material, and grow up in different families. The sample for cousin fixed effects is necessarily restricted to sample members with aunts or uncles, and with data for the maternal grandmother. The fact that one child is an only child whilst their cousin is not could be due to differences in health or general preferences between their parents who are siblings. We do adjust for some of these factors (such as parent's premature death, health, marital status, education) but others such as personality we are unable to account for.

Despite these limitations, this study makes a significant contribution to the limited existing literature on only children's health by introducing conceptual and methodological innovations and by showing a clear adolescent health and mortality disadvantage among only children in Sweden which was attenuated but not fully explained by parental selection factors. As the subpopulation of only children is expected to continue rising, future work should build and expand on this study to analyse the later life health outcomes of only children in different contexts and/or time periods.

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# Appendices

Supplementary Table 1: Distribution of study variables according to sibling group size, birth order and blended child status, conscription data analysis sample (full population), men born 1965-75

Supplementary Table 2: Distribution of study variables according to sibling group size, birth order and blended child status, conscription data analysis sample (maternal cousin fixed effect), men born 1965-75

Supplementary Table 3: Distribution of study variables according to sibling group size, birth order and blended child status, mortality analysis sample, men and women born 1940-60

Supplementary Table 4: Full model results for standardised height scores among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-75.

Supplementary Table 5: Full model results for overweight and obesity among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-75

Supplementary Table 6: Full model results for standardised fitness scores among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-75

Supplementary Table 7: Full model results for all-cause mortality at age 50+, according to sibling group size, birth order and blended family status, Swedish men and women born 1940-60, mortality 1990-2017

Supplementary Figure 1: Results for standardised height scores among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-75 (alternative sibling group size specification).

Supplementary Figure 2: Results for overweight and obesity among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-75 (alternative sibling group size specification).

Supplementary Figure 3: Results for standardised fitness scores among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-75 (alternative sibling group size specification).

Supplementary Figure 4: Results for all-cause mortality at age 50+, according to sibling group size, birth order and blended family status, Swedish men and women born 1940-60, mortality 1990-2017 (alternative sibling group size specification).

## S1: Distribution of study variables according to sibling group size, birth order and blended child status, conscription data analysis sample (full population), men born 1965-1975

| | Sibling group size/ birth order among non-blended families | | | | | | | | | Sibling group size/ birth order among blended families | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **OC** | **F/2** | **L/2** | **F/3** | **M/3** | **L/3** | **F/4+** | **M/4+** | **L/4+** | **OC** | **F/2** | **L/2** | **F/3** | **M/3** | **L/3** | **F/4+** | **M/4+** | **L/4+** | **All** |
| | 32,700 | 100,462 | 99,958 | 38,386 | 38,526 | 41,612 | 9,432 | 23,837 | 16,345 | 50,699 | 26,902 | 25,436 | 6,494 | 6,493 | 7,205 | 1,531 | 3,929 | 2,712 | 532,659 |
| **Birth year (mean)** | 1969.8 | 1969.9 | 1970.0 | 1969.9 | 1969.7 | 1969.7 | 1970.1 | 1969.4 | 1969.0 | 1970.2 | 1970.0 | 1970.1 | 1969.7 | 1969.5 | 1969.6 | 1969.9 | 1969.2 | 1969.0 | 1969.9 |
| **Maternal age (mean)** | 27.0 | 24.4 | 28.2 | 23.2 | 26.0 | 31.1 | 22.3 | 27.3 | 34.6 | 24.7 | 23.7 | 26.9 | 22.7 | 25.3 | 29.5 | 22.4 | 26.8 | 32.9 | 26.5 |
| **Paternal age (mean)** | 29.8 | 26.9 | 31.0 | 25.8 | 28.7 | 34.2 | 25.1 | 30.6 | 38.4 | 27.8 | 27.1 | 30.4 | 26.5 | 29.1 | 33.5 | 26.6 | 31.4 | 37.6 | 29.4 |
| **Parental divorce (by age 16) %** | 14.5 | 8.8 | 12.6 | 5.4 | 8.5 | 12.5 | 3.9 | 8.4 | 11.8 | 27.5 | 45.3 | 52.0 | 38.2 | 45.6 | 51.5 | 26.8 | 39.7 | 41.3 | 17.4 |
| **Paternal death (by age 16) %** | 3.9 | 1.4 | 2.6 | 0.8 | 1.5 | 3.7 | 0.7 | 2.2 | 6.2 | 5.2 | 3.3 | 5.1 | 2.9 | 3.4 | 6.0 | 1.9 | 4.9 | 9.2 | 2.9 |
| **Maternal death (by age 16) %** | 1.7 | 0.6 | 1.0 | 0.3 | 0.6 | 1.4 | 0.3 | 0.8 | 1.9 | 2.0 | 1.3 | 2.2 | 1.1 | 1.5 | 2.6 | 0.3 | 2.2 | 3.5 | 1.1 |
| **Paternal education %** | | | | | | | | | | | | | | | | | | | |
| Primary (<9 years) | 30.6 | 23.6 | 31.1 | 22.4 | 29.5 | 38.0 | 25.3 | 40.7 | 53.6 | 27.0 | 25.8 | 31.9 | 27.8 | 34.3 | 40.5 | 31.6 | 46.3 | 55.1 | 30.2 |
| Primary (9 years) | 7.9 | 8.0 | 6.1 | 8.1 | 6.4 | 4.7 | 10.0 | 6.3 | 3.9 | 11.6 | 10.2 | 7.8 | 10.0 | 8.0 | 6.1 | 11.0 | 6.3 | 4.7 | 7.5 |
| Secondary (10-11 years) | 24.7 | 24.1 | 22.5 | 24.3 | 22.4 | 20.6 | 25.5 | 22.0 | 17.6 | 29.0 | 28.2 | 26.4 | 29.0 | 27.2 | 24.4 | 29.1 | 24.4 | 18.0 | 24.0 |
| Secondary (12 years) | 16.9 | 20.0 | 18.9 | 17.5 | 16.9 | 15.2 | 13.7 | 11.4 | 8.8 | 14.1 | 15.6 | 15.1 | 13.8 | 13.3 | 12.6 | 12.0 | 9.8 | 8.1 | 16.5 |
| Tertiary (13-15 years) | 8.2 | 10.0 | 9.1 | 9.6 | 8.5 | 7.2 | 8.3 | 5.8 | 4.0 | 7.3 | 8.3 | 7.5 | 7.4 | 6.3 | 5.4 | 5.8 | 4.3 | 3.9 | 8.3 |
| Tertiary (15+ years) | 8.8 | 12.5 | 10.5 | 15.6 | 13.7 | 11.6 | 14.2 | 10.6 | 8.4 | 7.2 | 9.4 | 8.1 | 9.4 | 8.3 | 7.5 | 7.3 | 5.6 | 5.2 | 10.8 |
| Postgraduate (16-20 years) | 0.9 | 1.4 | 1.2 | 2.2 | 2.2 | 2.0 | 2.5 | 2.1 | 1.6 | 0.7 | 1.2 | 1.2 | 1.5 | 1.5 | 1.4 | 1.5 | 1.3 | 1.1 | 1.5 |
| Missing | 2.1 | 0.4 | 0.6 | 0.4 | 0.4 | 0.8 | 0.6 | 1.2 | 2.0 | 3.3 | 1.4 | 2.1 | 1.1 | 1.1 | 2.1 | 1.7 | 2.1 | 4.0 | 1.1 |
| **Maternal education %** | | | | | | | | | | | | | | | | | | | |
| Primary (<9 years) | 21.6 | 13.8 | 22.2 | 11.8 | 18.6 | 30.3 | 15.9 | 31.6 | 48.1 | 17.7 | 14.9 | 20.9 | 15.8 | 22.7 | 31.9 | 20.4 | 36.9 | 48.9 | 20.7 |
| Primary (9 years) | 11.8 | 10.7 | 10.4 | 9.8 | 9.6 | 9.3 | 11.6 | 10.1 | 7.7 | 13.4 | 12.1 | 11.3 | 12.9 | 11.5 | 10.2 | 16.3 | 11.3 | 8.7 | 10.7 |
| Secondary (10-11 years) | 37.2 | 39.5 | 37.7 | 38.6 | 38.4 | 34.7 | 35.9 | 33.3 | 26.9 | 42.4 | 42.1 | 40.6 | 41.7 | 40.1 | 36.9 | 38.5 | 34.9 | 29.0 | 38.1 |
| Secondary (12 years) | 7.8 | 8.7 | 7.1 | 8.4 | 6.6 | 4.7 | 8.3 | 4.9 | 2.7 | 7.0 | 7.8 | 6.7 | 7.3 | 6.4 | 4.4 | 5.9 | 4.2 | 2.5 | 7.0 |
| Tertiary (13-15 years) | 9.7 | 12.1 | 10.2 | 12.6 | 10.8 | 8.6 | 10.7 | 7.7 | 5.1 | 9.3 | 10.7 | 9.5 | 9.6 | 8.4 | 7.3 | 7.3 | 5.6 | 4.1 | 10.1 |
| Tertiary (15+ years) | 11.0 | 14.6 | 11.9 | 18.1 | 15.3 | 11.8 | 16.8 | 11.3 | 7.5 | 9.1 | 11.5 | 10.2 | 11.9 | 10.1 | 8.5 | 10.5 | 6.4 | 5.6 | 12.5 |
| Postgraduate (16-20 years) | 0.4 | 0.5 | 0.4 | 0.6 | 0.5 | 0.4 | 0.5 | 0.4 | 0.3 | 0.3 | 0.5 | 0.4 | 0.5 | 0.5 | 0.2 | 0.2 | 0.3 | 0.2 | 0.4 |
| Missing | 0.5 | 0.1 | 0.2 | 0.1 | 0.2 | 0.3 | 0.3 | 0.8 | 1.8 | 0.7 | 0.4 | 0.5 | 0.3 | 0.3 | 0.7 | 0.9 | 0.5 | 1.1 | 0.4 |
| **Father SEI %[1]** | | | | | | | | | | | | | | | | | | | |
| 1 | 5.3 | 7.0 | 5.5 | 10.0 | 8.1 | 7.0 | 13.0 | 10.4 | 12.0 | 4.6 | 5.2 | 4.0 | 6.3 | 5.1 | 4.0 | 6.4 | 5.4 | 6.3 | 6.8 |
| 2 | 3.6 | 3.5 | 3.3 | 3.9 | 4.2 | 4.0 | 4.9 | 6.2 | 6.3 | 3.9 | 4.0 | 3.9 | 4.6 | 5.2 | 4.7 | 6.3 | 6.9 | 7.5 | 4.0 |
| 3 | 4.1 | 4.6 | 3.6 | 5.3 | 4.1 | 4.1 | 5.3 | 3.9 | 5.3 | 4.8 | 5.0 | 4.3 | 4.5 | 3.9 | 3.9 | 5.0 | 4.2 | 5.2 | 4.4 |
| 4 | 0.4 | 0.4 | 0.3 | 0.5 | 0.3 | 0.4 | 0.5 | 0.3 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 | 0.6 | 0.4 | 0.4 | 0.7 | 0.4 |
| 5 | 0.8 | 0.8 | 0.6 | 1.1 | 0.6 | 0.8 | 1.1 | 0.5 | 0.7 | 0.9 | 1.1 | 0.8 | 0.9 | 0.7 | 0.7 | 0.8 | 0.5 | 0.8 | 0.8 |
| 6 | 17.3 | 16.6 | 19.2 | 15.1 | 15.4 | 21.8 | 12.3 | 11.9 | 18.1 | 17.0 | 16.9 | 17.3 | 13.9 | 14.6 | 17.4 | 12.6 | 10.7 | 14.2 | 17.1 |
| 7 | 40.3 | 37.4 | 39.9 | 34.2 | 35.8 | 39.1 | 30.6 | 34.9 | 40.8 | 42.2 | 41.1 | 42.7 | 42.1 | 43.3 | 45.6 | 39.7 | 46.2 | 50.3 | 39.0 |
| 8 | 1.2 | 1.1 | 0.9 | 1.3 | 1.0 | 0.7 | 1.4 | 0.8 | 0.7 | 2.4 | 1.9 | 1.8 | 1.9 | 1.9 | 1.3 | 2.0 | 1.4 | 0.9 | 1.3 |
| 9 | 0.7 | 0.8 | 0.9 | 0.8 | 0.9 | 1.0 | 0.7 | 0.7 | 0.8 | 0.8 | 1.0 | 1.1 | 0.8 | 0.9 | 1.0 | 0.6 | 0.8 | 1.0 | 0.9 |
| 10 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 |
| 11 | 9.6 | 13.6 | 12.6 | 14.1 | 15.3 | 9.9 | 10.8 | 10.4 | 3.7 | 6.5 | 8.4 | 8.7 | 8.3 | 8.6 | 7.2 | 5.3 | 5.2 | 3.0 | 11.0 |
| 12 | 6.7 | 7.1 | 7.3 | 6.7 | 7.8 | 5.8 | 5.9 | 6.7 | 2.7 | 7.1 | 7.0 | 7.7 | 7.7 | 8.6 | 7.7 | 7.8 | 8.4 | 5.4 | 6.9 |
| 13 | 10.0 | 7.1 | 5.9 | 7.1 | 6.4 | 5.3 | 13.6 | 13.2 | 8.3 | 9.3 | 7.9 | 6.9 | 8.3 | 6.9 | 5.8 | 13.1 | 9.9 | 4.6 | 7.5 |
| **Mother SEI %[1]** | | | | | | | | | | | | | | | | | | | |
| 1 | 4.4 | 6.9 | 4.7 | 8.8 | 6.2 | 5.2 | 10.2 | 7.3 | 10.7 | 4.4 | 5.3 | 3.8 | 6.0 | 4.3 | 3.4 | 6.6 | 4.7 | 5.2 | 5.9 |
| 2 | 2.2 | 2.4 | 1.8 | 2.8 | 2.1 | 2.2 | 3.5 | 3.5 | 5.1 | 3.4 | 3.0 | 2.3 | 3.9 | 3.1 | 2.5 | 3.2 | 4.3 | 5.4 | 2.6 |
| 3 | 3.8 | 5.1 | 3.6 | 5.9 | 4.2 | 3.4 | 5.9 | 3.7 | 4.8 | 5.0 | 5.1 | 4.1 | 5.1 | 4.0 | 3.4 | 4.5 | 3.3 | 4.1 | 4.4 |
| 4 | 0.3 | 0.4 | 0.2 | 0.6 | 0.3 | 0.3 | 0.6 | 0.3 | 0.5 | 0.5 | 0.5 | 0.4 | 0.6 | 0.4 | 0.3 | 0.4 | 0.2 | 0.5 | 0.4 |
| 5 | 0.5 | 1.0 | 0.6 | 1.4 | 0.8 | 0.6 | 1.4 | 0.6 | 0.7 | 0.8 | 0.9 | 0.7 | 1.1 | 0.5 | 0.5 | 1.1 | 0.5 | 0.4 | 0.8 |
| 6 | 33.0 | 27.2 | 36.6 | 22.7 | 28.5 | 35.5 | 18.6 | 21.5 | 24.1 | 24.7 | 24.9 | 29.7 | 20.5 | 24.0 | 29.0 | 18.2 | 18.9 | 21.4 | 28.8 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 24.1 | 27.1 | 22.4 | 28.2 | 23.1 | 25.0 | 27.1 | 25.1 | 33.2 | 35.3 | 32.5 | 28.9 | 34.0 | 31.6 | 28.9 | 32.4 | 30.7 | 37.6 | 27.1 |
| 8 | 5.8 | 5.1 | 6.2 | 5.0 | 7.1 | 6.5 | 4.5 | 7.3 | 4.4 | 6.4 | 6.0 | 7.9 | 5.7 | 8.3 | 9.4 | 7.1 | 10.9 | 8.7 | 6.1 |
| 9 | 0.3 | 0.4 | 0.2 | 0.5 | 0.3 | 0.4 | 0.7 | 0.4 | 0.5 | 0.5 | 0.6 | 0.4 | 0.7 | 0.3 | 0.4 | 0.2 | 0.1 | 0.5 | 0.4 |
| 10 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 |
| 11 | 10.1 | 12.5 | 12.6 | 12.2 | 14.9 | 10.5 | 9.1 | 10.3 | 3.9 | 5.8 | 8.0 | 9.1 | 7.8 | 9.0 | 8.3 | 5.8 | 7.0 | 3.2 | 10.7 |
| 12 | 5.4 | 4.5 | 4.7 | 4.6 | 5.6 | 4.7 | 4.8 | 6.3 | 3.4 | 6.8 | 5.8 | 6.6 | 6.3 | 7.5 | 7.6 | 7.8 | 9.1 | 7.6 | 5.3 |
| 13 | 10.2 | 7.5 | 6.4 | 7.4 | 6.8 | 5.6 | 13.6 | 13.8 | 8.7 | 6.5 | 7.3 | 6.1 | 8.4 | 6.8 | 6.2 | 12.5 | 10.1 | 5.3 | 7.5 |

[1] Key to SEI categories: 1: Entrepreneurs in agriculture, forestry, etc, 2: Workers in agriculture, forestry, etc, 3: Entrepreneurs in the industrial, commercial, transport and service professions, 4: Entrepreneurs in the free profession (doctors, lawyers, etc.), 5: Company executives (employees), 6: Officials (supervisors, technicians, office and trade staff, etc.), 7: Workers other than group 2, 8: Employees in the service profession, 9: Military, 10: Persons with unidentifiable professions, 11: Students (non-work), 12: Other non-employed or students, 13: Missing

**S2: Distribution of study variables according to sibling group size, birth order and blended child status, conscription data analysis sample (maternal cousin fixed effect), men born 1965-1975**

| | Sibling group size/ birth order among non-blended families | | | | | | | | | Sibling group size/ birth order among blended families | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **OC** | **F/2** | **L/2** | **F/3** | **M/3** | **L/3** | **F/4+** | **M/4+** | **L/4+** | **OC** | **F/2** | **L/2** | **F/3** | **M/3** | **L/3** | **F/4+** | **M/4+** | **L/4+** | **All** |
| **N** | 4,001 | 35,163 | 34,219 | 17,336 | 19,683 | 13,622 | 4,246 | 11,350 | 3,391 | 8,511 | 9,988 | 9,308 | 2,984 | 3,279 | 2,532 | 687 | 1,842 | 728 | 182,870 |
| **Height (cm)(mean)** | 179.3 | 179.7 | 179.7 | 179.6 | 179.7 | 179.7 | 179.3 | 179.0 | 179.2 | 178.9 | 179.1 | 179.1 | 178.8 | 178.9 | 178.9 | 178.7 | 178.3 | 178.4 | 179.5 |
| **Fitness (watts) (mean)** | 298.5 | 304.8 | 305.3 | 303.3 | 304.3 | 302.5 | 298.9 | 296.4 | 296.8 | 292.6 | 296.7 | 296.3 | 292.1 | 292.9 | 294.3 | 287.4 | 283.6 | 288.3 | 301.2 |
| **Overweight/Obese %** | 13.8 | 10.3 | 11.0 | 9.9 | 9.2 | 12.3 | 10.4 | 10.6 | 13.9 | 13.9 | 12.3 | 12.0 | 11.0 | 10.4 | 12.8 | 13.0 | 11.3 | 14.3 | 11.0 |
| **Birth year (mean)** | 1970.0 | 1969.1 | 1971.0 | 1968.9 | 1970.0 | 1971.2 | 1969.0 | 1969.8 | 1971.0 | 1970.0 | 1969.5 | 1970.8 | 1969.0 | 1969.7 | 1970.9 | 1969.2 | 1969.5 | 1970.6 | 1970.0 |
| **Maternal age (mean)** | 25.7 | 24.1 | 27.4 | 23.1 | 25.8 | 29.6 | 22.3 | 26.5 | 31.9 | 23.5 | 23.3 | 25.8 | 22.5 | 24.8 | 28.0 | 22.4 | 25.9 | 30.2 | 25.6 |
| **Paternal age (mean)** | 28.5 | 26.7 | 30.1 | 25.6 | 28.4 | 32.6 | 25.1 | 29.7 | 35.7 | 26.6 | 26.6 | 29.3 | 26.0 | 28.5 | 31.8 | 26.5 | 30.4 | 35.3 | 28.5 |
| **Parental divorce (by age 16) %** | 14.2 | 8.2 | 12.3 | 5.0 | 8.0 | 12.9 | 3.4 | 7.7 | 14.5 | 25.1 | 45.8 | 55.6 | 38.6 | 46.8 | 57.9 | 26.4 | 40.8 | 49.5 | 16.8 |
| **Paternal death (by age 16) %** | 2.9 | 1.3 | 2.1 | 0.8 | 1.4 | 2.7 | 0.8 | 1.8 | 4.2 | 5.4 | 3.5 | 4.5 | 2.8 | 3.2 | 4.9 | 1.6 | 5.1 | 7.7 | 2.3 |
| **Maternal death (by age 16) %** | 0.5 | 0.2 | 0.3 | 0.1 | 0.1 | 0.3 | 0.1 | 0.1 | 0.4 | 0.5 | 0.3 | 0.3 | 0.3 | 0.4 | 0.6 | 0.2 | 0.2 | 0.3 | 0.2 |
| **Paternal education %** | | | | | | | | | | | | | | | | | | | |
| Primary (<9 years) | 31.5 | 25.4 | 29.0 | 24.7 | 28.8 | 35.5 | 27.7 | 38.6 | 49.3 | 28.7 | 27.5 | 30.0 | 29.8 | 33.8 | 38.4 | 33.8 | 45.2 | 50.1 | 29.8 |
| Primary (9 years) | 8.3 | 7.5 | 6.5 | 7.2 | 6.3 | 4.9 | 8.1 | 5.5 | 3.7 | 11.2 | 9.6 | 8.6 | 9.6 | 8.4 | 7.4 | 11.6 | 7.3 | 5.6 | 7.2 |
| Secondary (10-11 years) | 26.8 | 24.2 | 23.0 | 23.8 | 22.8 | 21.7 | 24.5 | 22.7 | 19.6 | 30.2 | 28.0 | 27.4 | 29.7 | 27.9 | 24.8 | 30.0 | 24.5 | 20.9 | 24.3 |
| Secondary (12 years) | 15.4 | 19.8 | 19.4 | 17.8 | 17.2 | 15.6 | 14.1 | 12.3 | 10.1 | 13.3 | 15.7 | 15.5 | 13.7 | 13.3 | 12.6 | 11.4 | 10.1 | 9.1 | 16.8 |
| Tertiary (13-15 years) | 8.0 | 10.1 | 9.6 | 9.5 | 8.8 | 8.0 | 8.0 | 6.4 | 4.5 | 6.9 | 8.6 | 7.8 | 6.5 | 6.6 | 6.3 | 5.0 | 3.9 | 4.8 | 8.6 |
| Tertiary (15+ years) | 7.9 | 11.6 | 11.1 | 14.5 | 13.8 | 11.9 | 14.6 | 11.8 | 10.2 | 5.9 | 8.5 | 8.0 | 8.5 | 8.0 | 7.6 | 6.8 | 6.0 | 4.8 | 11.1 |
| Postgraduate (16-20 years) | 0.7 | 1.2 | 1.1 | 2.3 | 2.2 | 2.2 | 2.9 | 2.5 | 2.0 | 0.7 | 1.1 | 1.2 | 1.6 | 1.5 | 1.5 | 0.9 | 1.1 | 1.8 | 1.6 |
| Missing | 1.5 | 0.2 | 0.3 | 0.2 | 0.2 | 0.3 | 0.1 | 0.3 | 0.7 | 3.1 | 1.1 | 1.5 | 0.7 | 0.6 | 1.3 | 0.6 | 2.0 | 2.9 | 0.6 |
| **Maternal education %** | | | | | | | | | | | | | | | | | | | |
| Primary (<9 years) | 22.1 | 15.0 | 18.4 | 13.1 | 17.0 | 24.1 | 15.0 | 26.0 | 37.5 | 18.2 | 14.9 | 17.8 | 16.6 | 21.0 | 28.5 | 21.8 | 32.8 | 39.3 | 18.5 |
| Primary (9 years) | 11.4 | 10.6 | 10.2 | 9.5 | 9.1 | 8.8 | 10.6 | 9.6 | 8.4 | 13.8 | 12.6 | 11.4 | 13.8 | 12.1 | 10.6 | 16.5 | 11.6 | 10.0 | 10.5 |
| Secondary (10-11 years) | 40.0 | 40.4 | 39.6 | 40.2 | 39.6 | 38.3 | 38.1 | 36.8 | 34.1 | 44.7 | 43.8 | 42.3 | 42.4 | 41.2 | 38.6 | 39.3 | 36.9 | 35.6 | 40.0 |
| Secondary (12 years) | 7.2 | 8.2 | 7.5 | 7.4 | 6.8 | 4.9 | 7.9 | 5.3 | 3.5 | 6.9 | 7.2 | 7.1 | 7.4 | 6.6 | 5.1 | 5.0 | 4.7 | 3.0 | 7.0 |
| Tertiary (13-15 years) | 8.9 | 11.8 | 11.0 | 12.0 | 11.0 | 9.9 | 11.3 | 8.9 | 6.2 | 8.2 | 10.4 | 10.0 | 8.6 | 8.9 | 7.8 | 6.7 | 6.6 | 4.4 | 10.5 |
| Tertiary (15+ years) | 9.9 | 13.6 | 12.8 | 17.2 | 16.0 | 13.6 | 16.6 | 12.9 | 9.9 | 7.9 | 10.5 | 11.0 | 10.7 | 9.7 | 9.0 | 10.6 | 7.1 | 7.1 | 13.1 |
| Postgraduate (16-20 years) | 0.3 | 0.4 | 0.4 | 0.5 | 0.4 | 0.5 | 0.5 | 0.5 | 0.3 | 0.2 | 0.4 | 0.4 | 0.4 | 0.5 | 0.2 | | 0.1 | 0.1 | 0.4 |
| Missing | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.4 | 0.1 |
| **Father SEI %**[1] | | | | | | | | | | | | | | | | | | | |
| 1 | 6.6 | 7.3 | 6.3 | 10.4 | 9.1 | 7.4 | 13.9 | 11.9 | 9.9 | 5.4 | 5.7 | 4.6 | 6.5 | 5.3 | 4.3 | 7.0 | 6.2 | 6.7 | 7.6 |
| 2 | 4.7 | 3.7 | 3.7 | 4.3 | 4.4 | 4.7 | 5.7 | 6.7 | 7.6 | 4.6 | 4.7 | 4.3 | 4.9 | 5.7 | 5.2 | 7.9 | 7.4 | 7.6 | 4.5 |
| 3 | 4.5 | 4.5 | 3.8 | 5.2 | 4.5 | 3.7 | 5.8 | 4.1 | 3.7 | 5.0 | 5.3 | 5.0 | 4.1 | 3.6 | 3.4 | 5.1 | 4.1 | 4.0 | 4.4 |
| 4 | 0.4 | 0.3 | 0.3 | 0.5 | 0.4 | 0.3 | 0.5 | 0.4 | 0.3 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.4 | 0.4 | 0.2 | 0.3 | 0.4 |
| 5 | 0.4 | 0.7 | 0.6 | 0.9 | 0.6 | 0.4 | 1.0 | 0.5 | 0.2 | 0.6 | 0.9 | 0.7 | 0.9 | 0.7 | 0.6 | 0.6 | 0.5 | 0.4 | 0.6 |
| 6 | 14.6 | 16.2 | 16.8 | 14.4 | 14.8 | 16.4 | 12.0 | 12.0 | 15.2 | 15.2 | 16.4 | 16.0 | 13.0 | 13.4 | 14.3 | 13.5 | 11.0 | 12.2 | 15.4 |
| 7 | 44.5 | 39.6 | 40.8 | 35.7 | 37.2 | 40.3 | 33.6 | 38.6 | 44.9 | 44.4 | 42.7 | 43.8 | 44.8 | 46.3 | 47.7 | 41.9 | 47.9 | 52.3 | 40.3 |
| 8 | 1.1 | 1.1 | 1.0 | 1.1 | 1.0 | 0.7 | 1.3 | 0.9 | 0.8 | 2.6 | 1.9 | 1.9 | 2.1 | 1.9 | 1.6 | 2.2 | 1.3 | 0.8 | 1.2 |
| 9 | 0.9 | 0.8 | 0.9 | 0.8 | 0.9 | 1.1 | 0.5 | 0.8 | 0.9 | 0.6 | 0.9 | 1.0 | 0.5 | 0.6 | 0.8 | 1.0 | 0.9 | 0.7 | 0.9 |
| 10 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.0 | 0.3 | 0.2 | 0.3 | 0.1 |
| 11 | 10.3 | 14.9 | 14.9 | 16.4 | 16.2 | 14.6 | 14.3 | 12.9 | 8.7 | 6.2 | 8.6 | 9.1 | 9.9 | 9.2 | 9.4 | 6.1 | 5.8 | 5.1 | 13.3 |
| 12 | 7.5 | 8.1 | 8.5 | 7.7 | 8.3 | 8.3 | 7.0 | 8.3 | 5.7 | 7.8 | 7.3 | 8.2 | 7.9 | 8.8 | 9.6 | 8.4 | 10.2 | 8.2 | 8.1 |
| 13 | 4.5 | 2.8 | 2.4 | 2.8 | 2.5 | 2.1 | 4.3 | 2.9 | 1.9 | 7.0 | 5.0 | 4.7 | 4.7 | 3.9 | 2.9 | 5.5 | 4.4 | 1.4 | 3.2 |
| **Mother SEI %**[1] | | | | | | | | | | | | | | | | | | | |
| 1 | 7.4 | 8.2 | 6.4 | 9.8 | 7.5 | 5.3 | 11.9 | 8.5 | 7.3 | 6.9 | 6.5 | 5.3 | 6.5 | 5.8 | 4.5 | 8.6 | 5.8 | 5.2 | 7.3 |
| 2 | 3.5 | 2.7 | 2.4 | 3.1 | 2.3 | 2.1 | 3.7 | 3.6 | 4.8 | 4.8 | 3.7 | 3.1 | 4.9 | 3.8 | 2.8 | 3.9 | 4.9 | 5.0 | 3.0 |
| 3 | 4.3 | 5.2 | 4.4 | 5.9 | 4.7 | 2.9 | 6.7 | 4.4 | 3.1 | 5.6 | 5.8 | 5.1 | 5.5 | 5.0 | 3.4 | 4.8 | 3.0 | 2.3 | 4.8 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 0.2 | 0.4 | 0.3 | 0.5 | 0.4 | 0.2 | 0.7 | 0.5 | 0.2 | 0.4 | 0.6 | 0.5 | 0.6 | 0.4 | 0.3 | 0.4 | 0.2 | 0.1 | 0.4 |
| 5 | 0.3 | 0.8 | 0.6 | 1.2 | 0.9 | 0.4 | 1.5 | 0.7 | 0.2 | 0.9 | 0.9 | 0.8 | 1.0 | 0.6 | 0.5 | 1.3 | 0.7 | 0.3 | 0.8 |
| 6 | 30.7 | 28.7 | 33.1 | 23.4 | 28.6 | 33.4 | 20.8 | 23.9 | 26.8 | 20.5 | 24.3 | 26.9 | 20.8 | 23.4 | 26.4 | 19.7 | 20.3 | 22.3 | 27.8 |
| 7 | 29.4 | 28.1 | 25.4 | 28.9 | 25.4 | 23.5 | 30.2 | 28.0 | 31.1 | 39.6 | 36.0 | 33.1 | 37.4 | 35.1 | 31.9 | 38.0 | 34.2 | 36.3 | 28.8 |
| 8 | 7.4 | 5.7 | 6.6 | 5.9 | 7.4 | 8.5 | 5.7 | 8.8 | 8.5 | 7.1 | 6.5 | 7.9 | 6.6 | 8.5 | 10.3 | 8.2 | 12.4 | 12.6 | 7.0 |
| 9 | 0.4 | 0.4 | 0.3 | 0.5 | 0.4 | 0.2 | 0.6 | 0.5 | 0.4 | 0.6 | 0.5 | 0.4 | 0.5 | 0.4 | 0.2 | 0.2 | 0.1 | 0.3 | 0.4 |
| 10 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.3 | 0.4 | 0.3 | 0.1 |
| 11 | 10.4 | 14.4 | 15.0 | 15.3 | 16.3 | 16.9 | 12.2 | 13.1 | 9.7 | 6.0 | 8.6 | 9.8 | 9.0 | 9.2 | 11.3 | 7.1 | 8.6 | 5.6 | 13.4 |
| 12 | 5.2 | 4.3 | 4.6 | 4.6 | 5.4 | 5.6 | 4.7 | 6.8 | 6.5 | 6.6 | 5.5 | 5.9 | 6.1 | 6.7 | 7.5 | 7.0 | 8.4 | 8.4 | 5.3 |
| 13 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 0.8 | 0.6 | 1.1 | 1.4 | 1.0 |

[1] Key to SEI categories: 1: Entrepreneurs in agriculture, forestry, etc, 2: Workers in agriculture, forestry, etc, 3: Entrepreneurs in the industrial, commercial, transport and service professions, 4: Entrepreneurs in the free profession (doctors, lawyers, etc.), 5: Company executives (employees), 6: Officials (supervisors, technicians, office and trade staff, etc.), 7: Workers other than group 2, 8: Employees in the service profession, 9: Military, 10: Persons with unidentifiable professions, 11: Students (non-work), 12: Other non-employed or students, 13: Missing

## S3: Distribution of study variables according to sibling group size, birth order and blended child status, mortality analysis sample, men and women born 1940-1960

| | Sibling group size/ birth order among non-blended families | | | | | | | | | Sibling group size/ birth order among blended families | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **OC** | **F/2** | **L/2** | **F/3** | **M/3** | **L/3** | **F/4+** | **M/4+** | **L/4+** | **OC** | **F/2** | **L/2** | **F/3** | **M/3** | **L/3** | **F/4+** | **M/4+** | **L/4+** | **All** |
| **N** | 227,188 | 296,614 | 288,680 | 147,994 | 148,569 | 126,541 | 82,147 | 247,955 | 75,508 | 32,205 | 40,451 | 30,352 | 30,935 | 24,946 | 16,966 | 25,701 | 55,777 | 11,557 | 1,910,086 |
| **Mortality rate (10-)** | 1.97 | 1.65 | 1.64 | 1.62 | 1.63 | 1.56 | 1.85 | 1.83 | 1.57 | 1.99 | 1.85 | 1.75 | 1.98 | 1.77 | 1.61 | 2.06 | 1.99 | 1.68 | 1.74 |
| **Deaths (N)** | 29,202 | 30,068 | 28,048 | 14,640 | 14,750 | 11,219 | 9,810 | 28,485 | 6,496 | 3,643 | 4,153 | 2,772 | 3,350 | 2,333 | 1,341 | 3,004 | 5,939 | 922 | 200,175 |
| **Female %** | 49.1 | 48.9 | 49.0 | 48.5 | 48.5 | 48.9 | 49.2 | 49.2 | 49.0 | 49.5 | 49.6 | 49.0 | 49.1 | 49.2 | 49.3 | 49.9 | 49.5 | 48.8 | 49.0 |
| **Birth year (mean)** | 1948.6 | 1949.8 | 1950.4 | 1949.9 | 1950.0 | 1951.2 | 1948.8 | 1949.4 | 1951.9 | 1950.9 | 1951.5 | 1952.5 | 1951.6 | 1952.3 | 1953.5 | 1951.0 | 1952.0 | 1953.9 | 1950.1 |
| **Maternal age (mean)** | 30.0 | 26.0 | 31.3 | 24.3 | 28.1 | 33.6 | 23.0 | 28.8 | 36.2 | 27.4 | 23.9 | 30.1 | 22.1 | 26.7 | 32.3 | 21.0 | 27.2 | 34.9 | 28.5 |
| **Paternal age (mean)** | 33.1 | 29.2 | 34.6 | 27.7 | 31.6 | 37.2 | 26.9 | 33.0 | 40.3 | 30.5 | 27.6 | 33.1 | 26.1 | 30.3 | 35.2 | 25.5 | 31.3 | 38.1 | 32.0 |
| **Paternal death by age 50 %** | 64.5 | 47.8 | 66.1 | 42.8 | 56.1 | 74.6 | 43.0 | 63.7 | 84.5 | 55.8 | 48.9 | 64.7 | 46.8 | 58.5 | 72.0 | 47.2 | 64.0 | 81.2 | 59.3 |
| **Maternal death by age 50 %** | 38.7 | 22.8 | 37.8 | 18.7 | 27.8 | 45.6 | 17.8 | 33.1 | 58.1 | 41.3 | 27.8 | 44.6 | 22.0 | 32.7 | 49.1 | 21.0 | 37.0 | 61.1 | 32.8 |
| **Paternal education %** | | | | | | | | | | | | | | | | | | | |
| Primary (<9 years) | 40.1 | 45.2 | 39.4 | 47.8 | 44.4 | 38.1 | 56.9 | 49.5 | 37.8 | 40.9 | 44.7 | 43.6 | 48.0 | 48.3 | 46.4 | 53.9 | 53.1 | 46.5 | 44.5 |
| Primary (9 years) | 2.6 | 3.4 | 2.8 | 3.5 | 3.0 | 2.5 | 3.1 | 2.2 | 1.5 | 3.8 | 4.0 | 3.3 | 3.9 | 3.4 | 2.9 | 3.5 | 2.8 | 2.2 | 2.9 |
| Secondary (10-11 years) | 12.0 | 15.3 | 12.0 | 14.9 | 12.4 | 9.6 | 13.0 | 9.0 | 6.3 | 15.6 | 17.2 | 13.9 | 17.0 | 14.4 | 11.7 | 16.1 | 12.0 | 9.0 | 12.4 |
| Secondary (12 years) | 6.8 | 10.7 | 8.0 | 9.9 | 8.1 | 5.9 | 6.6 | 4.3 | 2.9 | 9.7 | 10.8 | 8.7 | 10.2 | 8.8 | 7.0 | 7.6 | 5.3 | 4.1 | 7.6 |
| Tertiary (13-15 years) | 2.3 | 4.1 | 2.9 | 3.9 | 3.1 | 2.1 | 2.4 | 1.5 | 1.0 | 4.2 | 4.4 | 3.4 | 4.0 | 3.3 | 2.8 | 2.9 | 1.9 | 1.4 | 2.8 |
| Tertiary (15+ years) | 2.0 | 4.7 | 3.5 | 7.0 | 5.5 | 4.1 | 5.3 | 3.1 | 2.3 | 4.1 | 4.5 | 3.9 | 4.1 | 3.8 | 3.2 | 3.1 | 2.3 | 1.9 | 4.0 |
| Postgraduate (16-20 years) | 0.2 | 0.4 | 0.3 | 0.9 | 0.6 | 0.5 | 0.9 | 0.5 | 0.3 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.5 |
| Missing | 34.1 | 16.1 | 31.1 | 12.2 | 22.8 | 37.2 | 11.9 | 30.0 | 47.8 | 21.3 | 13.9 | 22.7 | 12.3 | 17.6 | 25.7 | 12.6 | 22.3 | 34.6 | 25.5 |
| **Maternal education %** | | | | | | | | | | | | | | | | | | | |
| Primary (<9 years) | 51.0 | 52.9 | 51.2 | 53.0 | 54.0 | 51.7 | 62.4 | 63.5 | 56.5 | 46.8 | 48.9 | 51.4 | 50.6 | 54.5 | 55.8 | 58.0 | 63.5 | 61.4 | 54.6 |
| Primary (9 years) | 5.7 | 8.0 | 6.6 | 7.9 | 7.1 | 6.1 | 6.6 | 4.8 | 4.0 | 6.7 | 7.6 | 6.5 | 7.4 | 6.7 | 5.7 | 6.7 | 5.1 | 4.1 | 6.5 |
| Secondary (10-11 years) | 15.6 | 22.3 | 17.0 | 22.7 | 18.7 | 14.1 | 18.9 | 12.8 | 9.0 | 22.7 | 26.6 | 20.8 | 28.3 | 23.9 | 18.8 | 25.3 | 18.6 | 12.8 | 18.0 |
| Secondary (12 years) | 1.5 | 2.5 | 1.8 | 2.7 | 2.2 | 1.7 | 1.8 | 1.2 | 0.9 | 2.8 | 3.0 | 2.2 | 2.6 | 2.2 | 1.7 | 1.9 | 1.3 | 1.1 | 1.9 |
| Tertiary (13-15 years) | 1.6 | 3.1 | 2.1 | 3.9 | 2.9 | 1.9 | 2.7 | 1.5 | 1.1 | 3.3 | 3.7 | 2.5 | 3.7 | 2.8 | 1.8 | 2.5 | 1.5 | 1.0 | 2.4 |
| Tertiary (15+ years) | 1.4 | 3.3 | 2.1 | 4.8 | 3.4 | 2.2 | 3.6 | 1.9 | 1.2 | 2.8 | 3.6 | 2.4 | 3.5 | 2.4 | 1.8 | 2.4 | 1.4 | 1.0 | 2.6 |
| Postgraduate (16-20 years) | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 |
| Missing | 23.2 | 7.8 | 19.2 | 4.8 | 11.6 | 22.2 | 4.0 | 14.2 | 27.2 | 14.8 | 6.4 | 14.1 | 3.8 | 7.5 | 14.3 | 3.1 | 8.6 | 18.7 | 14.0 |
| **Father SEI %**[1] | | | | | | | | | | | | | | | | | | | |
| 1 | 7.0 | 7.9 | 9.6 | 11.1 | 12.5 | 14.5 | 15.4 | 18.6 | 20.4 | 3.7 | 3.1 | 4.9 | 3.3 | 4.9 | 6.6 | 4.1 | 8.0 | 10.8 | 10.9 |
| 2 | 3.1 | 2.9 | 3.1 | 3.7 | 3.7 | 3.9 | 6.4 | 7.4 | 6.9 | 2.5 | 2.7 | 3.5 | 3.1 | 3.8 | 4.4 | 5.2 | 7.5 | 7.2 | 4.2 |
| 3 | 8.5 | 8.2 | 9.3 | 7.9 | 8.8 | 9.4 | 7.6 | 8.1 | 8.6 | 8.6 | 7.7 | 8.3 | 7.2 | 8.1 | 8.8 | 6.6 | 7.4 | 8.1 | 8.4 |
| 4 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 0.9 | 0.9 | 1.1 | 1.7 | 1.2 | 1.4 | 1.1 | 1.2 | 1.4 | 0.7 | 0.7 | 0.9 | 1.0 |
| 5 | 1.9 | 2.6 | 2.8 | 2.5 | 2.8 | 3.0 | 1.6 | 1.4 | 1.7 | 2.3 | 1.8 | 2.1 | 1.4 | 1.7 | 2.1 | 1.0 | 0.9 | 1.2 | 2.2 |
| 6 | 25.2 | 30.2 | 27.7 | 27.5 | 25.7 | 23.3 | 18.4 | 14.7 | 14.2 | 27.7 | 27.0 | 26.0 | 23.3 | 22.6 | 20.9 | 17.2 | 13.9 | 13.2 | 23.8 |
| 7 | 46.3 | 41.8 | 40.7 | 40.1 | 39.6 | 38.3 | 42.0 | 41.7 | 39.7 | 43.1 | 45.7 | 44.9 | 48.8 | 48.3 | 47.3 | 53.2 | 51.5 | 48.8 | 42.4 |
| 8 | 1.3 | 0.9 | 1.1 | 0.9 | 0.9 | 1.1 | 0.8 | 0.9 | 1.1 | 1.8 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.5 | 1.4 | 1.4 | 1.1 |
| 9 | 0.7 | 1.1 | 1.0 | 1.2 | 1.1 | 1.1 | 0.9 | 0.7 | 0.7 | 1.6 | 1.6 | 1.4 | 1.4 | 1.4 | 1.2 | 1.2 | 0.9 | 0.9 | 1.0 |
| 10 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 |
| 11 | 0.2 | 0.4 | 0.1 | 0.6 | 0.2 | 0.1 | 0.6 | 0.2 | 0.1 | 0.7 | 0.9 | 0.3 | 1.1 | 0.5 | 0.2 | 1.0 | 0.5 | 0.4 | 0.3 |
| 12 | 3.0 | 1.2 | 2.0 | 1.2 | 1.5 | 2.6 | 1.4 | 2.7 | 4.0 | 4.2 | 4.5 | 3.3 | 5.1 | 3.6 | 3.5 | 5.6 | 4.9 | 4.7 | 2.4 |
| 13 | 2.0 | 2.0 | 1.5 | 2.4 | 1.9 | 1.4 | 4.1 | 2.7 | 1.5 | 2.2 | 2.2 | 2.3 | 2.5 | 2.3 | 2.2 | 2.7 | 2.4 | 2.3 | 2.1 |
| **Mother SEI %**[1] | | | | | | | | | | | | | | | | | | | |
| 1 | 6.6 | 7.7 | 9.4 | 10.9 | 12.4 | 14.3 | 15.3 | 18.7 | 20.4 | 2.9 | 2.8 | 4.5 | 3.5 | 4.8 | 6.4 | 4.9 | 8.0 | 10.7 | 10.8 |
| 2 | 2.7 | 2.7 | 2.9 | 3.4 | 3.5 | 3.7 | 6.1 | 7.2 | 6.6 | 1.4 | 2.0 | 2.5 | 2.6 | 3.2 | 3.5 | 4.8 | 6.4 | 5.9 | 3.9 |
| 3 | 8.0 | 7.8 | 8.9 | 7.6 | 8.5 | 9.0 | 7.3 | 7.8 | 8.2 | 5.7 | 5.5 | 6.7 | 5.6 | 6.8 | 7.6 | 5.1 | 6.1 | 6.8 | 7.9 |
| 4 | 0.6 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 0.8 | 0.8 | 1.0 | 0.8 | 0.7 | 0.8 | 0.7 | 0.9 | 1.0 | 0.6 | 0.6 | 0.7 | 0.9 |
| 5 | 1.5 | 2.2 | 2.4 | 2.2 | 2.4 | 2.6 | 1.4 | 1.3 | 1.5 | 1.1 | 1.3 | 1.5 | 1.0 | 1.3 | 1.5 | 0.7 | 0.7 | 1.0 | 1.9 |
| 6 | 32.3 | 35.2 | 31.7 | 30.9 | 28.4 | 25.8 | 20.4 | 16.1 | 15.7 | 38.7 | 36.7 | 32.0 | 30.9 | 27.4 | 24.4 | 20.4 | 16.0 | 14.9 | 27.9 |
| 7 | 36.5 | 35.2 | 34.6 | 35.4 | 35.3 | 33.7 | 38.5 | 38.5 | 35.8 | 27.1 | 32.2 | 33.9 | 35.9 | 37.4 | 36.1 | 41.0 | 41.5 | 38.4 | 35.9 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 6.5 | 4.1 | 5.0 | 3.4 | 4.0 | 4.8 | 3.1 | 3.5 | 4.5 | 10.6 | 8.5 | 8.7 | 8.3 | 8.1 | 9.0 | 9.1 | 8.6 | 9.2 | 5.1 |
| 9 | 0.4 | 0.8 | 0.7 | 0.9 | 0.9 | 0.9 | 0.7 | 0.6 | 0.5 | 0.5 | 0.7 | 0.8 | 0.8 | 0.8 | 0.7 | 0.6 | 0.6 | 0.6 | 0.7 |
| 10 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 11 | 0.1 | 0.2 | 0.1 | 0.4 | 0.2 | 0.1 | 0.4 | 0.2 | 0.1 | 0.5 | 0.6 | 0.2 | 0.8 | 0.3 | 0.2 | 0.8 | 0.4 | 0.3 | 0.2 |
| 12 | 2.9 | 1.4 | 1.9 | 1.6 | 1.6 | 2.5 | 1.9 | 2.9 | 4.2 | 8.2 | 7.1 | 6.7 | 8.1 | 7.3 | 8.0 | 9.9 | 9.2 | 9.9 | 3.0 |
| 13 | 1.8 | 1.9 | 1.4 | 2.4 | 1.8 | 1.3 | 4.0 | 2.6 | 1.4 | 2.4 | 1.7 | 1.7 | 1.7 | 1.6 | 1.5 | 1.9 | 1.8 | 1.7 | 1.9 |
| **Own Education (%)** | | | | | | | | | | | | | | | | | | | |
| Primary (<9 years) | 10.6 | 8.1 | 9.0 | 9.4 | 10.7 | 9.5 | 15.1 | 17.5 | 11.7 | 8.0 | 7.9 | 6.8 | 8.8 | 8.0 | 6.9 | 12.2 | 12.6 | 8.5 | 10.8 |
| Primary (9 years) | 10.3 | 9.6 | 11.0 | 10.4 | 11.5 | 12.5 | 11.6 | 13.6 | 15.6 | 13.4 | 13.6 | 15.1 | 15.4 | 16.7 | 17.3 | 17.1 | 19.3 | 20.3 | 12.1 |
| Secondary (10-11 years) | 31.5 | 30.7 | 33.0 | 31.3 | 33.2 | 34.3 | 33.9 | 36.4 | 37.6 | 35.2 | 37.1 | 37.9 | 39.1 | 39.2 | 39.4 | 40.8 | 41.5 | 42.3 | 33.9 |
| Secondary (12 years) | 14.6 | 14.3 | 13.5 | 13.1 | 12.3 | 12.2 | 11.1 | 9.9 | 10.5 | 13.2 | 12.5 | 12.0 | 11.3 | 11.1 | 11.5 | 10.0 | 9.1 | 10.2 | 12.5 |
| Tertiary (13-15 years) | 13.8 | 15.5 | 14.7 | 14.6 | 13.6 | 13.8 | 11.9 | 10.4 | 11.5 | 13.2 | 13.0 | 13.0 | 12.0 | 12.0 | 11.8 | 9.9 | 8.9 | 9.7 | 13.3 |
| Tertiary (15+ years) | 17.8 | 20.2 | 17.6 | 19.6 | 17.3 | 16.4 | 15.2 | 11.4 | 12.1 | 15.5 | 14.9 | 14.0 | 12.4 | 12.0 | 12.1 | 9.1 | 7.9 | 8.2 | 16.1 |
| Postgraduate (16-20 years) | 1.3 | 1.4 | 1.2 | 1.6 | 1.3 | 1.2 | 1.1 | 0.7 | 0.7 | 1.1 | 0.9 | 0.9 | 0.7 | 0.7 | 0.6 | 0.5 | 0.4 | 0.4 | 1.1 |
| Missing | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.2 | 0.4 | 0.3 | 0.3 | 0.3 | 0.2 |
| **Own Socioeconomic Attainment [2] %** | | | | | | | | | | | | | | | | | | | |
| 1 | 5.0 | 4.9 | 5.4 | 5.5 | 6.0 | 6.1 | 7.4 | 8.7 | 8.5 | 5.2 | 5.6 | 6.1 | 6.7 | 6.9 | 7.5 | 8.2 | 9.7 | 9.2 | 6.3 |
| 2 | 13.1 | 12.9 | 13.8 | 14.1 | 14.7 | 15.2 | 17.1 | 19.1 | 18.4 | 15.3 | 16.4 | 16.4 | 17.9 | 18.2 | 18.5 | 20.7 | 21.5 | 21.8 | 15.4 |
| 3 | 8.2 | 8.5 | 9.4 | 9.1 | 10.2 | 10.2 | 10.6 | 12.2 | 12.1 | 8.7 | 9.3 | 10.0 | 10.0 | 10.8 | 11.1 | 11.1 | 12.0 | 12.2 | 9.9 |
| 4 | 3.8 | 4.3 | 4.5 | 4.4 | 4.8 | 4.8 | 4.8 | 5.1 | 5.1 | 4.8 | 5.2 | 5.4 | 5.5 | 5.8 | 5.7 | 5.7 | 5.7 | 5.6 | 4.7 |
| 5 | 5.8 | 5.1 | 5.5 | 4.8 | 5.0 | 5.3 | 4.5 | 4.6 | 5.1 | 5.4 | 5.2 | 5.5 | 4.9 | 5.3 | 5.3 | 4.3 | 4.7 | 5.3 | 5.1 |
| 6 | 11.4 | 10.5 | 10.6 | 9.3 | 9.2 | 9.4 | 8.0 | 7.5 | 8.2 | 10.4 | 9.8 | 10.2 | 8.8 | 8.8 | 9.2 | 7.8 | 7.1 | 7.8 | 9.5 |
| 7 | 20.6 | 22.0 | 20.5 | 20.7 | 19.6 | 18.8 | 17.4 | 15.2 | 15.4 | 17.6 | 17.1 | 16.7 | 15.2 | 15.3 | 14.6 | 12.5 | 11.5 | 11.7 | 18.8 |
| 8 | 12.3 | 12.9 | 11.1 | 12.0 | 10.5 | 10.0 | 9.4 | 6.7 | 6.9 | 9.7 | 8.8 | 8.2 | 7.2 | 6.6 | 6.5 | 5.3 | 4.4 | 3.9 | 10.1 |
| 9 | 2.3 | 2.3 | 2.1 | 2.1 | 1.9 | 1.7 | 1.7 | 1.3 | 1.2 | 1.6 | 1.5 | 1.4 | 1.5 | 1.3 | 1.2 | 1.1 | 0.9 | 0.8 | 1.8 |
| 10 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 | 0.0 | 0.2 |
| 11 | 4.3 | 4.3 | 4.5 | 4.5 | 4.7 | 4.5 | 4.7 | 4.8 | 4.4 | 4.6 | 4.4 | 4.4 | 4.6 | 4.4 | 4.0 | 4.4 | 4.2 | 4.1 | 4.5 |
| 12 | 1.2 | 1.2 | 1.3 | 1.6 | 1.7 | 1.8 | 1.7 | 1.9 | 1.9 | 0.6 | 0.6 | 0.7 | 0.4 | 0.7 | 0.8 | 0.7 | 0.9 | 1.0 | 1.4 |
| 13 | 3.5 | 4.0 | 3.7 | 4.3 | 4.0 | 3.9 | 4.1 | 3.9 | 3.9 | 5.3 | 5.9 | 5.1 | 6.0 | 5.7 | 5.3 | 6.3 | 5.9 | 5.3 | 4.1 |
| 14 | 8.2 | 7.0 | 7.5 | 7.4 | 7.7 | 8.0 | 8.6 | 8.8 | 9.0 | 10.6 | 10.1 | 9.8 | 11.0 | 10.3 | 10.2 | 11.9 | 11.6 | 11.4 | 8.3 |
| **Total children (mean)** | 1.8 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 2.1 | 2.1 | 2.0 | 1.8 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 2.1 | 2.1 | 2.0 | 1.9 |
| **Own civil status at age 50** % | | | | | | | | | | | | | | | | | | | |
| Unmarried | 34.7 | 31.8 | 30.8 | 31.9 | 32.1 | 29.6 | 34.0 | 34.4 | 30.0 | 33.0 | 31.7 | 32.1 | 31.5 | 31.8 | 32.3 | 32.3 | 33.6 | 32.9 | 32.3 |
| Married | 47.9 | 50.4 | 52.0 | 50.2 | 50.1 | 53.2 | 47.5 | 47.4 | 52.5 | 45.3 | 45.6 | 46.8 | 44.9 | 45.8 | 46.8 | 43.3 | 43.2 | 45.2 | 49.3 |
| Divorced | 16.1 | 16.5 | 16.0 | 16.7 | 16.6 | 16.0 | 17.2 | 16.8 | 16.4 | 20.5 | 21.6 | 20.0 | 22.5 | 21.2 | 19.9 | 23.0 | 21.9 | 20.7 | 17.1 |
| Widowed | 1.3 | 1.2 | 1.2 | 1.2 | 1.3 | 1.2 | 1.4 | 1.4 | 1.1 | 1.2 | 1.1 | 1.2 | 1.1 | 1.2 | 1.0 | 1.4 | 1.3 | 1.2 | 1.3 |

[1] Key to parental SEI categories: 1: Entrepreneurs in agriculture, forestry, etc, 2: Workers in agriculture, forestry, etc, 3: Entrepreneurs in the industrial, commercial, transport and service professions, 4: Entrepreneurs in the free profession (doctors, lawyers, etc.), 5: Company executives (employees), 6: Officials (supervisors, technicians, office and trade staff, etc.), 7: Workers other than group 2, 8: Employees in the service profession, 9: Military, 10: Persons with unidentifiable professions, 11: Students (non-work), 12: Other non-employed or students, 13: Missing [2] Key to own socioeconomic attainment categories: 1: Unskilled employees in goods production, 2: Unskilled employees in service production, 3: Skilled employees in goods production
4: Skilled employees in service production, 5: Assistant non-manual employees, lower level, 6: Assistant non-manual employees, higher level
7: Intermediate non-manual employees, 8: Professionals and other higher non-manual employees, 9: Upper-level executives, 10: Self-employed professionals
11: Self-employed other than professionals and farmers, 12: Farmers, 13: Other non-employed, students, or military, 14: Missing,
https://www.scb.se/contentassets/22544e89c6f34ce7ac2e6fefbda407ef/english_aggregated_version_socio-economic_groups_sei-agg.pdf;
https://www.scb.se/contentassets/22544e89c6f34ce7ac2e6fefbda407ef/english_ov9999_1982a01_br_x11op8204-3.pdf

**Supplementary Table 4: Full model results for standardised height scores among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-1975.**

| | | Full population sample | | Maternal ID cousin fixed effects | |
|---|---|---|---|---|---|
| **Independent variables** | | **Coefficient (SE)** | **P value** | **Coefficient (SE)** | **P value** |
| **Blended** | **Family Size/ Birth Order** | | | | |
| Non blended* | Only child (REF) | | | | |
| Non blended* | 2 / First | 0.036(0.006) | p<0.001 | 0.037(0.017) | 0.035 |
| Non blended* | 2 / Last | -0.003(0.006) | 0.584 | 0.004(0.017) | 0.823 |
| Non blended* | 3 / First | 0.016(0.008) | 0.041 | 0.022(0.019) | 0.253 |
| Non blended* | 3/ Middle | -0.01(0.007) | 0.165 | 0.009(0.019) | 0.640 |
| Non blended* | 3 / Last | -0.035(0.007) | p<0.001 | -0.017(0.019) | 0.385 |
| Non blended* | 4+ / First | -0.024(0.012) | 0.042 | -0.006(0.025) | 0.817 |
| Non blended* | 4+ / Middle | -0.113(0.008) | p<0.001 | -0.055(0.022) | 0.011 |
| Non blended* | 4+ / Last | -0.084(0.01) | p<0.001 | -0.075(0.026) | 0.003 |
| Blended* | Only child (REF) | | | | |
| Blended* | 2 / First | -0.021(0.010) | 0.030 | 0.023(0.021) | 0.270 |
| Blended* | 2 / Last | -0.023(0.010) | 0.019 | -0.007(0.021) | 0.751 |
| Blended* | 3 / First | -0.052(0.015) | 0.001 | 0.039(0.027) | 0.147 |
| Blended* | 3/ Middle | -0.026(0.015) | 0.081 | 0.017(0.027) | 0.529 |
| Blended* | 3 / Last | -0.038(0.014) | 0.008 | -0.011(0.028) | 0.695 |
| Blended* | 4+ / First | -0.008(0.028) | 0.778 | 0.005(0.046) | 0.910 |
| Blended* | 4+ / Middle | -0.029(0.018) | 0.111 | -0.056(0.036) | 0.120 |
| Blended* | 4+ / Last | -0.024(0.022) | 0.261 | -0.046(0.044) | 0.292 |
| **Blended family** | (REF: not blended) | -0.020(0.001) | 0.005 | -0.002(0.019) | 0.916 |
| **Birth year** | 1965 | -0.009(0.006) | 0.161 | -0.015(0.012) | 0.217 |
| | 1966 | -0.016(0.006) | 0.013 | -0.032(0.011) | 0.006 |
| | 1967 | -0.032(0.006) | p<0.001 | -0.038(0.011) | 0.001 |
| | 1968 | -0.021(0.006) | 0.001 | -0.021(0.011) | 0.057 |
| | 1969 | -0.007(0.006) | 0.264 | -0.014(0.011) | 0.188 |
| | 1970 (REF) | | | | |
| | 1971 | 0.027(0.006) | p<0.001 | 0.025(0.011) | 0.021 |
| | 1972 | 0.019(0.006) | 0.003 | 0.026(0.011) | 0.013 |
| | 1973 | -0.001(0.006) | 0.863 | 0.015(0.011) | 0.187 |
| | 1974 | 0.013(0.006) | 0.048 | 0.029(0.012) | 0.013 |
| | 1975 | -0.004(0.007) | 0.569 | 0.026(0.012) | 0.032 |
| **Parents divorced before age 16** | (REF: no) | -0.02(0.004) | p<0.001 | -0.01(0.009) | 0.272 |
| **Father died before age 16** | (REF: no) | -0.014(0.008) | 0.100 | 0.012(0.021) | 0.571 |
| **Mother died before age 16** | | -0.022(0.013) | 0.090 | -0.026(0.068) | 0.706 |
| **Maternal age** | 15-19 | -0.131(0.007) | p<0.001 | -0.057(0.014) | p<0.001 |
| | 20-24 | -0.064(0.004) | p<0.001 | -0.023(0.007) | 0.002 |
| | 25-29 (REF) | | | | |
| | 30-34 | 0.042(0.004) | p<0.001 | 0.020(0.009) | 0.027 |
| | 35-39 | 0.056(0.007) | p<0.001 | 0.098(0.02) | p<0.001 |
| | 40+ | 0.038(0.012) | 0.002 | 0.076(0.073) | 0.299 |
| **Paternal age** | 15-19 | -0.079(0.013) | p<0.001 | 0.027(0.025) | 0.279 |
| | 20-24 | -0.014(0.004) | 0.001 | 0.001(0.008) | 0.877 |
| | 25-29 (REF) | | | | |
| | 30-34 | 0.004(0.004) | 0.277 | 0.001(0.007) | 0.923 |
| | 35-39 | -0.011(0.006) | 0.041 | -0.011(0.012) | 0.360 |
| | 40-44 | 0.006(0.008) | 0.444 | 0.008(0.020) | 0.671 |
| | 45+ | -0.007(0.01) | 0.489 | 0.001(0.031) | 0.985 |
| **Paternal education** | Primary (<9 years) | -0.013(0.004) | 0.001 | 0.003(0.01) | 0.746 |
| | Primary (9 years) | 0.018(0.006) | 0.002 | 0.033(0.014) | 0.024 |
| | Seconday (10-11 years) (REF) | | | | |
| | Secondary (12 years) | 0.037(0.004) | p<0.001 | 0.029(0.012) | 0.012 |
| | Tertiary (13-15 years) | 0.077(0.006) | p<0.001 | 0.053(0.015) | p<0.001 |
| | Tertiary (15+ years) | 0.074(0.006) | p<0.001 | 0.029(0.016) | 0.067 |
| | Postgraduate (16-20 years) | 0.117(0.012) | p<0.001 | 0.076(0.036) | 0.037 |
| | Missing | -0.03(0.014) | 0.027 | -0.022(0.040) | 0.583 |
| **Maternal education** | Primary (<9 years) | -0.074(0.004) | p<0.001 | -0.038(0.011) | 0.001 |
| | Primary (9 years) | -0.03(0.005) | p<0.001 | -0.059(0.013) | p<0.001 |
| | Seconday (10-11 years) (REF) | | | | |
| | Secondary (12 years) | 0.044(0.006) | p<0.001 | 0.008(0.016) | 0.602 |
| | Tertiary (13-15 years) | 0.068(0.005) | p<0.001 | 0.022(0.014) | 0.109 |
| | Tertiary (15+ years) | 0.093(0.005) | p<0.001 | 0.039(0.015) | 0.009 |
| | Postgraduate (16-20 years) | 0.101(0.022) | p<0.001 | 0.155(0.065) | 0.016 |
| | Missing | -0.164(0.023) | p<0.001 | -0.119(0.133) | 0.370 |
| **Paternal SEI** | 1 | 0.049(0.006) | p<0.001 | 0.001(0.014) | 0.991 |
| | 2 | -0.006(0.007) | 0.393 | -0.021(0.017) | 0.228 |
| | 3 | -0.004(0.007) | 0.516 | -0.045(0.017) | 0.011 |
| | 4 | -0.002(0.021) | 0.911 | 0.009(0.058) | 0.876 |
| | 5 | 0.008(0.016) | 0.610 | -0.07(0.046) | 0.126 |
| | 6 | 0.016(0.004) | p<0.001 | 0.01(0.011) | 0.349 |
| | 7 (REF) | | | | |
| | 8 | -0.044(0.012) | p<0.001 | -0.057(0.031) | 0.067 |
| | 9 | 0.06(0.015) | p<0.001 | 0.104(0.041) | 0.010 |
| | 10 | -0.008(0.044) | 0.862 | 0.002(0.110) | 0.986 |
| | 11 | 0.012(0.005) | 0.020 | -0.008(0.014) | 0.565 |
| | 12 | -0.005(0.006) | 0.360 | -0.011(0.014) | 0.420 |

| | | | | | |
|---|---|---|---|---|---|
| | 13 | -0.125(0.006) | p<0.001 | -0.068(0.021) | 0.001 |
| **Maternal SEI** | 1 | 0.069(0.006) | p<0.001 | 0.020(0.020) | 0.304 |
| | 2 | -0.02(0.009) | 0.023 | 0.011(0.029) | 0.688 |
| | 3 | 0.019(0.007) | 0.006 | -0.020(0.026) | 0.438 |
| | 4 | 0.056(0.022) | 0.012 | 0.014(0.078) | 0.862 |
| | 5 | 0.07(0.016) | p<0.001 | 0.028(0.058) | 0.629 |
| | 6 | 0.055(0.004) | p<0.001 | 0.056(0.012) | p<0.001 |
| | 7 (REF) | | | | |
| | 8 | 0.012(0.006) | 0.044 | 0.047(0.016) | 0.004 |
| | 9 | 0.057(0.022) | 0.009 | 0.186(0.083) | 0.025 |
| | 10 | 0.071(0.051) | 0.164 | -0.002(0.132) | 0.991 |
| | 11 | 0.043(0.006) | p<0.001 | 0.049(0.016) | 0.002 |
| | 12 | -0.016(0.006) | 0.013 | 0.056(0.019) | 0.004 |
| | 13 | -0.1(0.007) | p<0.001 | -0.047(0.037) | 0.202 |
| **Constant** | | 0.011(0.008) | 0.205 | -0.010(0.021) | 0.624 |
| **N observations** | | 532,659 | | 182,870 | |
| **N groups** | | | | 77,897 | |

Notes: [1] Key to parental SEI categories: 1: Entrepreneurs in agriculture, forestry, etc, 2: Workers in agriculture, forestry, etc, 3: Entrepreneurs in the industrial, commercial, transport and service professions, 4: Entrepreneurs in the free profession (doctors, lawyers, etc.), 5: Company executives (employees), 6: Officials (supervisors, technicians, office and trade staff, etc.), 7: Workers other than group 2, 8: Employees in the service profession, 9: Military, 10: Persons with unidentifiable professions, 11: Students (non-work), 12: Other non-employed or students, 13: Missing

**Supplementary Table 5: Full model results for overweight and obesity among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-1975.**

| | | Full population sample | | Maternal ID cousin fixed effects | |
|---|---|---|---|---|---|
| **Independent variables** | | **Coefficient (SE)** | **P value** | **Coefficient (SE)** | **P value** |
| **Blended** | **Sibling group size/ Birth Order** | | | | |
| Non blended* | Only child (REF) | | | | |
| Non blended* | First / 2 | -0.025(0.002) | p<0.001 | -0.017(0.006) | 0.009 |
| Non blended* | Last / 2 | -0.028(0.002) | p<0.001 | -0.026(0.006) | p<0.001 |
| Non blended* | First / 3 | -0.029(0.002) | p<0.001 | -0.017(0.007) | 0.018 |
| Non blended* | Middle / 3 | -0.038(0.002) | p<0.001 | -0.036(0.007) | p<0.001 |
| Non blended* | Last /3 | -0.019(0.002) | p<0.001 | -0.022(0.007) | 0.002 |
| Non blended* | First / 4+ | -0.029(0.004) | p<0.001 | -0.024(0.009) | 0.009 |
| Non blended* | Middle / 4+ | -0.039(0.003) | p<0.001 | -0.038(0.008) | p<0.001 |
| Non blended* | Last / 4+ | -0.016(0.003) | p<0.001 | -0.034(0.010) | p<0.001 |
| Blended* | Only child (REF) | | | | |
| Blended* | First / 2 | 0.018(0.003) | p<0.001 | -0.009(0.008) | 0.226 |
| Blended* | Last / 2 | 0.014(0.003) | p<0.001 | -0.025(0.008) | 0.002 |
| Blended* | First / 3 | 0.012(0.005) | 0.013 | -0.017(0.010) | 0.100 |
| Blended* | Middle / 3 | 0.014(0.005) | 0.004 | -0.034(0.01) | 0.001 |
| Blended* | Last /3 | 0.009(0.005) | 0.063 | -0.028(0.011) | 0.009 |
| Blended* | First / 4+ | 0.018(0.009) | 0.049 | 0.001(0.017) | 0.941 |
| Blended* | Middle / 4+ | 0.012(0.006) | 0.039 | -0.034(0.014) | 0.011 |
| Blended* | Last / 4+ | 0.001(0.007) | 0.984 | -0.026(0.016) | 0.119 |
| **Blended family** | (REF: not blended) | -0.01(0.002) | p<0.001 | -0.009(0.008) | 0.250 |
| **Birth year** | 1965 | -0.02(0.002) | p<0.001 | -0.017(0.004) | p<0.001 |
| | 1966 | -0.016(0.002) | p<0.001 | -0.012(0.004) | 0.004 |
| | 1967 | -0.009(0.002) | p<0.001 | -0.010(0.004) | 0.014 |
| | 1968 | -0.005(0.002) | 0.022 | -0.005(0.004) | 0.180 |
| | 1969 | -0.001(0.002) | 0.616 | 0.002(0.004) | 0.694 |
| | 1970 (REF) | | | | |
| | 1971 | 0.006(0.002) | 0.002 | 0.01(0.004) | 0.017 |
| | 1972 | 0.013(0.002) | p<0.001 | 0.014(0.004) | 0.001 |
| | 1973 | 0.014(0.002) | p<0.001 | 0.016(0.004) | p<0.001 |
| | 1974 | 0.018(0.002) | p<0.001 | 0.02(0.004) | p<0.001 |
| | 1975 | 0.03(0.002) | p<0.001 | 0.032(0.005) | p<0.001 |
| **Parents divorced before age 16** | (REF: no) | -0.007(0.001) | p<0.001 | -0.004(0.004) | 0.203 |
| **Father died before age 16** | (REF: no) | 0.018(0.003) | p<0.001 | 0.005(0.008) | 0.508 |
| **Mother died before age 16** (REF: no) | | -0.002(0.004) | 0.606 | -0.036(0.025) | 0.153 |
| **Maternal age** | 15-19 | 0.013(0.002) | p<0.001 | -0.015(0.005) | 0.005 |
| | 20-24 | 0.005(0.001) | p<0.001 | -0.005(0.003) | 0.069 |
| | 25-29 (REF) | | | | |
| | 30-34 | 0.002(0.001) | 0.212 | 0.005(0.003) | 0.118 |
| | 35-39 | 0.002(0.002) | 0.34 | 0.017(0.007) | 0.019 |
| | 40+ | -0.004(0.004) | 0.271 | 0.01(0.027) | 0.719 |
| **Paternal age** | 15-19 | -0.001(0.004) | 0.811 | 0.019(0.009) | 0.044 |
| | 20-24 | 0.003(0.001) | 0.016 | 0.001(0.003) | 0.655 |
| | 25-29 (REF) | | | | |
| | 30-34 | 0.003(0.001) | 0.025 | 0.005(0.003) | 0.074 |
| | 35-39 | 0.008(0.002) | p<0.001 | 0.005(0.005) | 0.319 |
| | 40-44 | 0.009(0.003) | p<0.001 | 0.017(0.007) | 0.022 |
| | 45+ | 0.006(0.003) | 0.09 | 0.019(0.012) | 0.044 |
| **Paternal education** | Primary (<9 years) | 0.014(0.001) | p<0.001 | 0.004(0.004) | 0.241 |
| | Primary (9 years) | 0.001(0.002) | 0.437 | 0.007(0.005) | 0.185 |
| | Seconday (10-11 years) (REF) | | | | |
| | Secondary (12 years) | -0.015(0.001) | p<0.001 | -0.015(0.004) | p<0.001 |
| | Tertiary (13-15 years) | -0.021(0.002) | p<0.001 | -0.024(0.005) | p<0.001 |
| | Tertiary (15+ years) | -0.032(0.002) | p<0.001 | -0.019(0.006) | 0.001 |
| | Postgraduate (16-20 years) | -0.044(0.004) | p<0.001 | -0.038(0.014) | 0.005 |
| | Missing | -0.002(0.004) | 0.628 | -0.022(0.015) | 0.147 |
| **Maternal education** | Primary (<9 years) | 0.014(0.001) | p<0.001 | 0.006(0.004) | 0.138 |
| | Primary (9 years) | 0.001(0.002) | 0.38 | -0.006(0.005) | 0.246 |
| | Seconday (10-11 years) (REF) | | | | |
| | Secondary (12 years) | -0.011(0.002) | p<0.001 | -0.006(0.006) | 0.343 |
| | Tertiary (13-15 years) | -0.018(0.002) | p<0.001 | -0.008(0.005) | 0.128 |
| | Tertiary (15+ years) | -0.021(0.002) | p<0.001 | -0.018(0.006) | 0.001 |
| | Postgraduate (16-20 years) | -0.026(0.007) | p<0.001 | -0.024(0.024) | 0.326 |
| | Missing | -0.001(0.008) | 0.855 | -0.020(0.049) | 0.690 |
| **Paternal SEI** | 1 | -0.001(0.002) | 0.579 | 0.007(0.005) | 0.184 |
| | 2 | 0.019(0.002) | p<0.001 | 0.029(0.006) | p<0.001 |
| | 3 | -0.008(0.002) | p<0.001 | -0.006(0.007) | 0.320 |
| | 4 | -0.007(0.007) | 0.345 | -0.029(0.022) | 0.176 |
| | 5 | -0.023(0.005) | p<0.001 | -0.007(0.017) | 0.688 |
| | 6 | -0.019(0.001) | p<0.001 | -0.016(0.004) | p<0.001 |
| | 7 (REF) | | | | |
| | 8 | -0.006(0.004) | 0.158 | -0.017(0.012) | 0.149 |
| | 9 | -0.004(0.005) | 0.465 | -0.017(0.015) | 0.264 |
| | 10 | -0.007(0.014) | 0.638 | -0.031(0.041) | 0.451 |
| | 11 | -0.015(0.002) | p<0.001 | -0.011(0.005) | 0.036 |
| | 12 | -0.006(0.002) | 0.001 | -0.009(0.005) | 0.069 |

| | | | | | |
|---|---|---|---|---|---|
| | 13 | 0.015(0.002) | p<0.001 | -0.008(0.008) | 0.184 |
| **Maternal SEI** | 1 | -0.013(0.002) | p<0.001 | 0.003(0.007) | 0.696 |
| | 2 | 0.011(0.003) | p<0.001 | 0.019(0.011) | 0.080 |
| | 3 | -0.009(0.002) | p<0.001 | -0.012(0.010) | 0.209 |
| | 4 | -0.031(0.007) | p<0.001 | -0.012(0.029) | 0.678 |
| | 5 | -0.018(0.005) | 0.001 | -0.013(0.022) | 0.564 |
| | 6 | -0.015(0.001) | p<0.001 | -0.011(0.005) | 0.018 |
| | 7 (REF) | | | | |
| | 8 | 0.004(0.002) | 0.075 | -0.001(0.006) | 0.865 |
| | 9 | -0.011(0.007) | 0.139 | -0.009(0.031) | 0.770 |
| | 10 | -0.001(0.017) | 0.935 | 0.054(0.049) | 0.268 |
| | 11 | -0.013(0.002) | p<0.001 | -0.004(0.006) | 0.529 |
| | 12 | -0.003(0.002) | 0.148 | -0.006(0.007) | 0.386 |
| | 13 | 0.012(0.002) | p<0.001 | 0.005(0.014) | 0.733 |
| **Constant** | | 0.150(0.003) | p<0.001 | 0.145(0.008) | p<0.001 |
| **N observations** | | 532,659 | | 182,870 | |
| **N groups** | | | | 77,897 | |

Notes: [1] Key to parental SEI categories: 1: Entrepreneurs in agriculture, forestry, etc, 2: Workers in agriculture, forestry, etc, 3: Entrepreneurs in the industrial, commercial, transport and service professions, 4: Entrepreneurs in the free profession (doctors, lawyers, etc.), 5: Company executives (employees), 6: Officials (supervisors, technicians, office and trade staff, etc.), 7: Workers other than group 2, 8: Employees in the service profession, 9: Military, 10: Persons with unidentifiable professions, 11: Students (non-work), 12: Other non-employed or students, 13: Missing

**Supplementary Table 6: Full model results for standardised fitness scores among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-1975**

| | | Full population sample | | Maternal ID cousin fixed effects | |
|---|---|---|---|---|---|
| **Independent variables** | | **Coefficient (SE)** | **P value** | **Coefficient (SE)** | **P value** |
| **Blended** | **Sibling group size/ Birth Order** | | | | |
| Non blended* | Only child (REF) | | | | |
| Non blended* | First / 2 | 0.099(0.006) | p<0.001 | 0.097(0.019) | p<0.001 |
| Non blended* | Last / 2 | 0.066(0.006) | p<0.001 | 0.061(0.019) | 0.001 |
| Non blended* | First / 3 | 0.087(0.007) | p<0.001 | 0.087(0.021) | p<0.001 |
| Non blended* | Middle / 3 | 0.072(0.007) | p<0.001 | 0.064(0.020) | 0.002 |
| Non blended* | Last /3 | 0.032(0.007) | p<0.001 | 0.016(0.021) | 0.454 |
| Non blended* | First / 4+ | 0.002(0.011) | 0.838 | 0.041(0.027) | 0.129 |
| Non blended* | Middle / 4+ | -0.031(0.008) | p<0.001 | -0.007(0.024) | 0.771 |
| Non blended* | Last / 4+ | 0.001(0.001) | 0.972 | -0.046(0.028) | 0.101 |
| Blended* | Only child (REF) | | | | |
| Blended* | First / 2 | -0.045(0.009) | p<0.001 | 0.033(0.022) | 0.135 |
| Blended* | Last / 2 | -0.060(0.001) | p<0.001 | -0.014(0.023) | 0.537 |
| Blended* | First / 3 | -0.080(0.015) | p<0.001 | -0.013(0.030) | 0.666 |
| Blended* | Middle / 3 | -0.094(0.015) | p<0.001 | -0.03(0.029) | 0.300 |
| Blended* | Last /3 | -0.063(0.014) | p<0.001 | -0.026(0.031) | 0.391 |
| Blended* | First / 4+ | -0.077(0.027) | 0.004 | -0.060(0.050) | 0.225 |
| Blended* | Middle / 4+ | -0.095(0.018) | p<0.001 | -0.109(0.040) | 0.006 |
| Blended* | Last / 4+ | -0.062(0.021) | 0.003 | -0.040(0.048) | 0.404 |
| **Blended family** | (REF: not blended) | -0.017(0.007) | p<0.001 | -0.020(0.022) | 0.372 |
| **Birth year** | 1965 | -0.744(0.006) | p<0.001 | -0.779(0.013) | p<0.001 |
| | 1966 | -0.347(0.006) | p<0.001 | -0.373(0.013) | p<0.001 |
| | 1967 | -0.056(0.006) | p<0.001 | -0.074(0.012) | p<0.001 |
| | 1968 | -0.034(0.006) | p<0.001 | -0.053(0.012) | p<0.001 |
| | 1969 | -0.074(0.006) | p<0.001 | -0.096(0.012) | p<0.001 |
| | 1970 (REF) | | | | |
| | 1971 | -0.023(0.006) | p<0.001 | -0.041(0.012) | 0.001 |
| | 1972 | -0.081(0.006) | p<0.001 | -0.095(0.012) | p<0.001 |
| | 1973 | -0.090(0.006) | p<0.001 | -0.101(0.012) | p<0.001 |
| | 1974 | -0.181(0.006) | p<0.001 | -0.185(0.013) | p<0.001 |
| | 1975 | -0.200(0.006) | p<0.001 | -0.195(0.013) | p<0.001 |
| **Parents divorced before age 16** | (REF: no) | -0.107(0.004) | p<0.001 | -0.072(0.010) | p<0.001 |
| **Father died before age 16** | (REF: no) | -0.037(0.008) | p<0.001 | -0.052(0.023) | 0.023 |
| **Mother died before age 16** | (REF: no) | -0.022(0.013) | p<0.001 | -0.084(0.074) | 0.257 |
| **Maternal age** | 15-19 | -0.092(0.007) | p<0.001 | -0.011(0.016) | 0.481 |
| | 20-24 | -0.041(0.004) | p<0.001 | 0.002(0.008) | 0.778 |
| | 25-29 (REF) | | | | |
| | 30-34 | 0.006(0.004) | 0.179 | -0.004(0.01) | 0.663 |
| | 35-39 | 0.001(0.007) | 0.978 | 0.038(0.021) | 0.073 |
| | 40+ | -0.006(0.012) | 0.579 | -0.032(0.080) | 0.689 |
| **Paternal age** | 15-19 | -0.052(0.012) | p<0.001 | 0.024(0.027) | 0.378 |
| | 20-24 | -0.014(0.004) | 0.001 | -0.005(0.009) | 0.585 |
| | 25-29 (REF) | | | | |
| | 30-34 | -0.019(0.004) | p<0.001 | -0.011(0.008) | 0.177 |
| | 35-39 | -0.044(0.005) | p<0.001 | -0.048(0.013) | p<0.001 |
| | 40-44 | -0.074(0.008) | p<0.001 | -0.087(0.022) | p<0.001 |
| | 45+ | -0.104(0.01) | p<0.001 | -0.069(0.034) | 0.043 |
| **Paternal education** | Primary (<9 years) | -0.055(0.004) | p<0.001 | -0.032(0.011) | 0.003 |
| | Primary (9 years) | -0.015(0.006) | 0.006 | 0.017(0.016) | 0.287 |
| | Secondary (10-11 years) (REF) | | | | |
| | Secondary (12 years) | 0.067(0.004) | p<0.001 | 0.064(0.013) | p<0.001 |
| | Tertiary (13-15 years) | 0.11(0.005) | p<0.001 | 0.088(0.016) | p<0.001 |
| | Tertiary (15+ years) | 0.123(0.006) | p<0.001 | 0.121(0.018) | p<0.001 |
| | Postgraduate (16-20 years) | 0.122(0.012) | p<0.001 | 0.143(0.040) | p<0.001 |
| | Missing | -0.066(0.013) | p<0.001 | -0.079(0.044) | 0.074 |
| **Maternal education** | Primary (<9 years) | -0.094(0.004) | p<0.001 | -0.039(0.012) | 0.001 |
| | Primary (9 years) | -0.037(0.005) | p<0.001 | -0.013(0.014) | 0.34 |
| | Secondary (10-11 years) (REF) | | | | |
| | Secondary (12 years) | 0.055(0.005) | p<0.001 | 0.059(0.017) | 0.001 |
| | Tertiary (13-15 years) | 0.104(0.005) | p<0.001 | 0.053(0.015) | p<0.001 |
| | Tertiary (15+ years) | 0.138(0.005) | p<0.001 | 0.105(0.016) | p<0.001 |
| | Postgraduate (16-20 years) | 0.135(0.021) | p<0.001 | 0.064(0.071) | 0.362 |
| | Missing | -0.142(0.023) | p<0.001 | -0.285(0.145) | 0.049 |
| **Paternal SEI[1]** | 1 | -0.010(0.006) | 0.064 | -0.029(0.016) | 0.064 |
| | 2 | -0.012(0.007) | 0.086 | 0.015(0.019) | 0.441 |
| | 3 | 0.015(0.007) | 0.021 | 0.002(0.019) | 0.904 |

| | | | | | |
|---|---|---|---|---|---|
| | 4 | 0.004(0.021) | 0.856 | -0.079(0.063) | 0.213 |
| | 5 | 0.030(0.015) | 0.049 | -0.079(0.05) | 0.116 |
| | 6 | 0.023(0.004) | p<0.001 | 0.031(0.012) | 0.011 |
| | 7 (REF) | | | | |
| | 8 | -0.023(0.012) | 0.055 | -0.031(0.034) | 0.360 |
| | 9 | 0.117(0.015) | p<0.001 | 0.081(0.044) | 0.068 |
| | 10 | -0.07(0.042) | 0.101 | -0.095(0.120) | 0.431 |
| | 11 | 0.033(0.005) | p<0.001 | 0.035(0.015) | 0.020 |
| | 12 | 0.002(0.005) | 0.689 | -0.015(0.015) | 0.301 |
| | 13 | -0.068(0.006) | p<0.001 | -0.013(0.023) | 0.576 |
| **Maternal SEI[1]** | 1 | 0.037(0.006) | p<0.001 | -0.037(0.022) | 0.084 |
| | 2 | -0.021(0.009) | 0.013 | 0.026(0.031) | 0.411 |
| | 3 | 0.037(0.007) | p<0.001 | -0.023(0.028) | 0.407 |
| | 4 | 0.023(0.022) | 0.286 | -0.273(0.085) | 0.001 |
| | 5 | 0.069(0.015) | p<0.001 | -0.119(0.064) | 0.062 |
| | 6 | 0.055(0.004) | p<0.001 | 0.027(0.014) | 0.047 |
| | 7 (REF) | | | | |
| | 8 | 0.002(0.006) | 0.721 | -0.013(0.018) | 0.460 |
| | 9 | 0.093(0.021) | p<0.001 | 0.007(0.091) | 0.942 |
| | 10 | -0.026(0.049) | 0.601 | -0.281(0.144) | 0.051 |
| | 11 | 0.054(0.005) | p<0.001 | -0.016(0.018) | 0.370 |
| | 12 | -0.012(0.006) | 0.048 | -0.009(0.021) | 0.656 |
| | 13 | -0.047(0.006) | p<0.001 | 0.001(0.040) | 0.976 |
| **Constant** | | 0.157(0.008) | p<0.001 | 0.169(0.024) | p<0.001 |
| **N observations** | | 532,659 | | 182,870 | |
| **N groups** | | | | 77,897 | |

Notes: [1] Key to parental SEI categories: 1: Entrepreneurs in agriculture, forestry, etc, 2: Workers in agriculture, forestry, etc, 3: Entrepreneurs in the industrial, commercial, transport and service professions, 4: Entrepreneurs in the free profession (doctors, lawyers, etc.), 5: Company executives (employees), 6: Officials (supervisors, technicians, office and trade staff, etc.), 7: Workers other than group 2, 8: Employees in the service profession, 9: Military, 10: Persons with unidentifiable professions, 11: Students (non-work), 12: Other non-employed or students, 13: Missing

**Supplementary Table 7: Full model results for all-cause mortality at age 50+, according to sibling group size, birth order and blended family status, Swedish men and women born 1940-60, mortality 1990-2017**

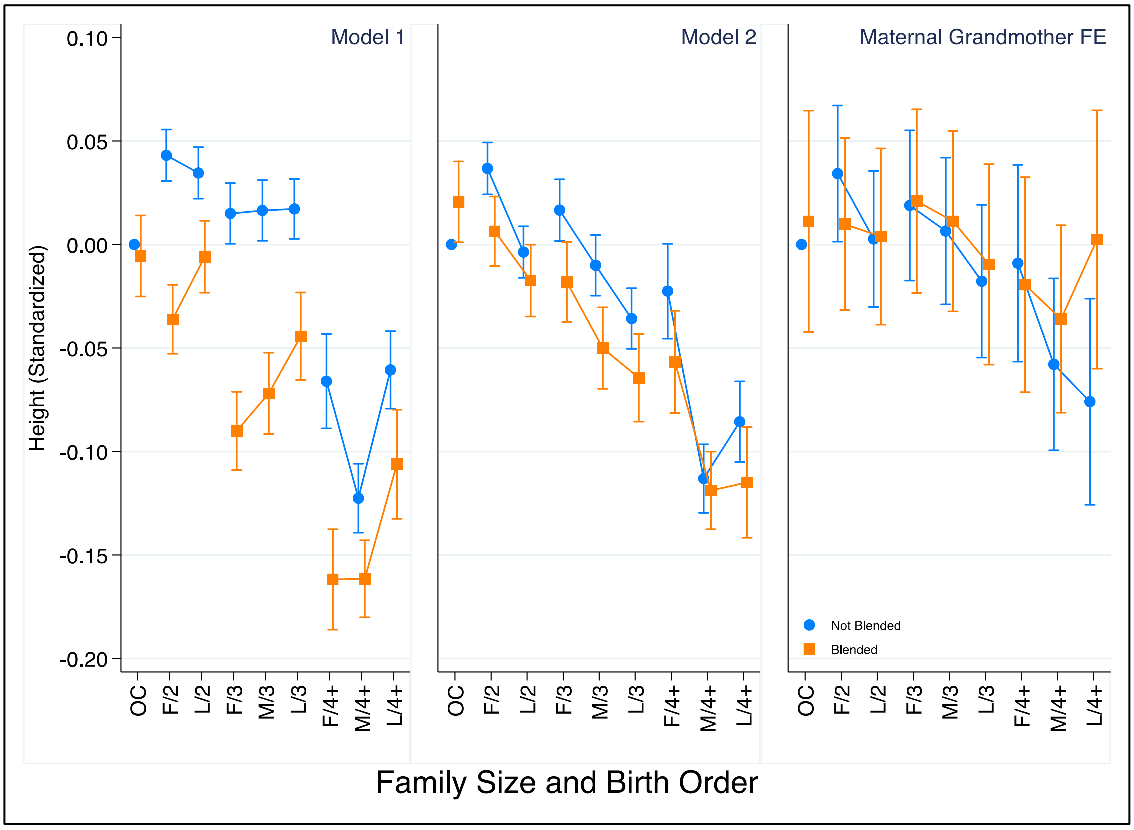
| | | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|---|
| **Independent variables** | | **Coefficient (SE)** | **P value** | **Coefficient (SE)** | **P value** | **Coefficient (SE)** | **P value** |
| **Blended** | **Sibling group size/ Birth Order** | | | | | | |
| Non blended* | Only child (REF) | | | | | | |
| Non blended* | First / 2 | 0.871(0.007) | p<0.001 | 0.884(0.007) | p<0.001 | 0.926(0.008) | p<0.001 |
| Non blended* | Last / 2 | 0.914(0.008) | p<0.001 | 0.943(0.008) | p<0.001 | 0.954(0.008) | p<0.001 |
| Non blended* | First / 3 | 0.853(0.009) | p<0.001 | 0.864(0.009) | p<0.001 | 0.903(0.009) | p<0.001 |
| Non blended* | Middle / 3 | 0.877(0.009) | p<0.001 | 0.906(0.009) | p<0.001 | 0.918(0.009) | p<0.001 |
| Non blended* | Last /3 | 0.915(0.010) | p<0.001 | 0.952(0.011) | p<0.001 | 0.946(0.011) | p<0.001 |
| Non blended* | First / 4+ | 0.938(0.011) | p<0.001 | 0.924(0.011) | p<0.001 | 0.936(0.011) | p<0.001 |
| Non blended* | Middle / 4+ | 0.959(0.008) | p<0.001 | 0.972(0.008) | 0.001 | 0.940(0.008) | p<0.001 |
| Non blended* | Last / 4+ | 0.984(0.014) | 0.239 | 1.009(0.014) | 0.538 | 0.958(0.014) | 0.002 |
| Blended* | Only child (REF) | 1.194(0.014) | p<0.001 | 1.131(0.014) | p<0.001 | 1.040(0.012) | 0.001 |
| Blended* | First / 2 | 1.101(0.018) | p<0.001 | 1.059(0.018) | 0.001 | 0.992(0.016) | 0.643 |
| Blended* | Last / 2 | 1.129(0.021) | p<0.001 | 1.111(0.021) | p<0.001 | 1.017(0.019) | 0.364 |
| Blended* | First / 3 | 1.141(0.026) | p<0.001 | 1.087(0.025) | p<0.001 | 1.009(0.024) | 0.689 |
| Blended* | Middle / 3 | 1.100(0.028) | p<0.001 | 1.076(0.027) | 0.004 | 0.980(0.025) | 0.429 |
| Blended* | Last /3 | 1.123(0.034) | p<0.001 | 1.113(0.034) | p<0.001 | 0.990(0.030) | 0.754 |
| Blended* | First / 4+ | 1.178(0.033) | p<0.001 | 1.101(0.031) | 0.001 | 1.018(0.029) | 0.523 |
| Blended* | Middle / 4+ | 1.182(0.022) | p<0.001 | 1.143(0.021) | p<0.001 | 1.015(0.019) | 0.423 |
| Blended* | Last / 4+ | 1.150(0.047) | 0.001 | 1.128(0.046) | 0.003 | 0.992(0.041) | 0.851 |
| **Gender** | (REF: male) | 0.668(0.003) | p<0.001 | 0.666(0.003) | p<0.001 | 0.665(0.003) | p<0.001 |
| **Birth year** | 1940 (REF) | | | | | | |
| | 1941 | 0.998(0.011) | 0.839 | 1.008(0.011) | 0.484 | 1.018(0.012) | 0.113 |
| | 1942 | 0.977(0.011) | 0.042 | 0.998(0.011) | 0.879 | 1.033(0.012) | 0.004 |
| | 1943 | 0.986(0.011) | 0.205 | 1.016(0.012) | 0.175 | 1.055(0.012) | p<0.001 |
| | 1944 | 0.976(0.011) | 0.031 | 1.010(0.012) | 0.388 | 1.061(0.012) | p<0.001 |
| | 1945 | 0.925(0.011) | p<0.001 | 0.965(0.012) | 0.003 | 1.025(0.012) | 0.043 |
| | 1946 | 0.918(0.011) | p<0.001 | 0.963(0.012) | 0.002 | 1.029(0.013) | 0.022 |
| | 1947 | 0.902(0.011) | p<0.001 | 0.951(0.012) | p<0.001 | 1.028(0.013) | 0.036 |
| | 1948 | 0.882(0.011) | p<0.001 | 0.936(0.012) | p<0.001 | 1.020(0.014) | 0.148 |
| | 1949 | 0.857(0.012) | p<0.001 | 0.913(0.013) | p<0.001 | 0.994(0.014) | 0.671 |
| | 1950 | 0.864(0.012) | p<0.001 | 0.925(0.013) | p<0.001 | 1.003(0.015) | 0.844 |
| | 1951 | 0.861(0.013) | p<0.001 | 0.926(0.014) | p<0.001 | 0.991(0.015) | 0.568 |
| | 1952 | 0.804(0.012) | p<0.001 | 0.869(0.014) | p<0.001 | 0.923(0.015) | p<0.001 |
| | 1953 | 0.801(0.013) | p<0.001 | 0.870(0.015) | p<0.001 | 0.912(0.015) | p<0.001 |
| | 1954 | 0.797(0.014) | p<0.001 | 0.867(0.015) | p<0.001 | 0.899(0.016) | p<0.001 |
| | 1955 | 0.804(0.014) | p<0.001 | 0.878(0.016) | p<0.001 | 0.905(0.017) | p<0.001 |
| | 1956 | 0.754(0.014) | p<0.001 | 0.826(0.016) | p<0.001 | 0.843(0.016) | p<0.001 |
| | 1957 | 0.738(0.015) | p<0.001 | 0.809(0.017) | p<0.001 | 0.825(0.017) | p<0.001 |
| | 1958 | 0.706(0.015) | p<0.001 | 0.774(0.017) | p<0.001 | 0.789(0.018) | p<0.001 |
| | 1959 | 0.702(0.016) | p<0.001 | 0.769(0.018) | p<0.001 | 0.779(0.019) | p<0.001 |
| | 1960 | 0.694(0.017) | p<0.001 | 0.758(0.019) | p<0.001 | 0.767(0.02) | p<0.001 |
| **Maternal age** | 15-19 | 1.086(0.014) | p<0.001 | 1.083(0.014) | p<0.001 | 1.086(0.014) | p<0.001 |
| | 20-24 | 1.036(0.007) | p<0.001 | 1.034(0.007) | p<0.001 | 1.036(0.007) | p<0.001 |
| | 25-29 (REF) | | | | | | |
| | 30-34 | 0.970(0.007) | p<0.001 | 0.964(0.007) | p<0.001 | 0.970(0.007) | p<0.001 |
| | 35-39 | 0.967(0.01) | 0.001 | 0.944(0.009) | p<0.001 | 0.967(0.01) | 0.001 |
| | 40+ | 0.949(0.014) | p<0.001 | 0.895(0.013) | p<0.001 | 0.949(0.014) | p<0.001 |
| **Paternal age** | 15-19 | 1.073(0.028) | 0.006 | 1.092(0.028) | 0.001 | 1.073(0.028) | 0.006 |
| | 20-24 | 1.029(0.009) | 0.001 | 1.035(0.009) | p<0.001 | 1.029(0.009) | 0.001 |
| | 25-29 (REF) | | | | | | |
| | 30-34 | 0.961(0.007) | p<0.001 | 0.953(0.007) | p<0.001 | 0.961(0.007) | p<0.001 |
| | 35-39 | 0.935(0.008) | p<0.001 | 0.909(0.008) | p<0.001 | 0.935(0.008) | p<0.001 |
| | 40-44 | 0.935(0.011) | p<0.001 | 0.884(0.010) | p<0.001 | 0.935(0.011) | p<0.001 |
| | 45+ | 0.923(0.013) | p<0.001 | 0.858(0.012) | p<0.001 | 0.923(0.013) | p<0.001 |
| **Paternal education** | Primary (<9 years) | 1.037(0.009) | p<0.001 | 0.993(0.008) | 0.430 | 1.037(0.009) | p<0.001 |
| | Primary (9 years) | 1.068(0.018) | p<0.001 | 1.044(0.017) | 0.009 | 1.068(0.018) | p<0.001 |
| | Secondary (10-11 years) (REF) | | | | | | |
| | Secondary (12 years) | 0.972(0.012) | 0.024 | 0.989(0.012) | 0.376 | 0.972(0.012) | 0.024 |
| | Tertiary (13-15 years) | 0.949(0.018) | 0.006 | 0.996(0.019) | 0.811 | 0.949(0.018) | 0.006 |
| | Tertiary (15+ years) | 0.926(0.017) | p<0.001 | 1.003(0.018) | 0.872 | 0.926(0.017) | p<0.001 |
| | Postgraduate (16-20 years) | 0.869(0.044) | 0.005 | 0.985(0.050) | 0.769 | 0.869(0.044) | 0.005 |
| | Missing | 1.100(0.011) | p<0.001 | 1.025(0.010) | 0.014 | 1.100(0.011) | p<0.001 |
| **Maternal education** | Primary (<9 years) | 1.069(0.008) | p<0.001 | 0.996(0.007) | 0.580 | 1.069(0.008) | p<0.001 |
| | Primary (9 years) | 1.005(0.012) | 0.649 | 0.997(0.012) | 0.822 | 1.005(0.012) | 0.649 |
| | Secondary (10-11 years) (REF) | | | | | | |
| | Secondary (12 years) | 0.984(0.021) | 0.456 | 1.016(0.022) | 0.457 | 0.984(0.021) | 0.456 |
| | Tertiary (13-15 years) | 0.901(0.020) | p<0.001 | 0.958(0.021) | 0.049 | 0.901(0.020) | p<0.001 |
| | Tertiary (15+ years) | 0.874(0.020) | p<0.001 | 0.961(0.022) | 0.075 | 0.874(0.020) | p<0.001 |
| | Postgraduate (16-20 years) | 0.749(0.103) | 0.035 | 0.802(0.110) | 0.109 | 0.749(0.103) | 0.035 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Missing | 1.104(0.011) | p<0.001 | 0.992(0.010) | 0.439 | 1.104(0.011) | p<0.001 |
| **Paternal SEI [1]** | 1 | 0.838(0.020) | p<0.001 | 0.865(0.020) | p<0.001 | 0.838(0.020) | p<0.001 |
| | 2 | 1.025(0.021) | 0.227 | 1.015(0.021) | 0.464 | 1.025(0.021) | 0.227 |
| | 3 | 0.952(0.015) | 0.002 | 0.994(0.016) | 0.682 | 0.952(0.015) | 0.002 |
| | 4 | 0.956(0.042) | 0.298 | 1.034(0.045) | 0.437 | 0.956(0.042) | 0.298 |
| | 5 | 0.982(0.034) | 0.597 | 1.052(0.037) | 0.143 | 0.982(0.034) | 0.597 |
| | 6 | 0.969(0.009) | p<0.001 | 1.021(0.009) | 0.020 | 0.969(0.009) | p<0.001 |
| | 7 (REF) | | | | | | |
| | 8 | 1.122(0.011) | p<0.001 | 1.080(0.011) | p<0.001 | 1.122(0.011) | p<0.001 |
| | 9 | 1.007(0.049) | 0.889 | 1.065(0.052) | 0.190 | 1.007(0.049) | 0.889 |
| | 10 | 1.104(0.13) | 0.401 | 1.059(0.126) | 0.630 | 1.104(0.130) | 0.401 |
| | 11 | 1.103(0.092) | 0.238 | 1.078(0.089) | 0.363 | 1.103(0.092) | 0.238 |
| | 12 | 1.120(0.016) | p<0.001 | 1.047(0.015) | 0.001 | 1.120(0.016) | p<0.001 |
| | 13 | 1.049(0.021) | 0.017 | 1.028(0.021) | 0.168 | 1.049(0.021) | 0.017 |
| **Maternal SEI [1]** | 1 | 0.920(0.021) | p<0.001 | 0.939(0.022) | 0.007 | 0.920(0.021) | p<0.001 |
| | 2 | 1.016(0.020) | 0.421 | 0.970(0.019) | 0.120 | 1.016(0.020) | 0.421 |
| | 3 | 0.927(0.014) | p<0.001 | 0.941(0.014) | p<0.001 | 0.927(0.014) | p<0.001 |
| | 4 | 0.898(0.036) | 0.007 | 0.928(0.037) | 0.061 | 0.898(0.036) | 0.007 |
| | 5 | 0.836(0.027) | p<0.001 | 0.933(0.030) | 0.029 | 0.836(0.027) | p<0.001 |
| | 6 | 0.888(0.008) | p<0.001 | 0.962(0.009) | p<0.001 | 0.888(0.008) | p<0.001 |
| | 7 (REF) | | | | | | |
| | 8 | 0.937(0.020-) | 0.002 | 0.979(0.020) | 0.321 | 0.937(0.020) | 0.002 |
| | 9 | 0.945(0.039) | 0.166 | 1.012(0.041) | 0.773 | 0.945(0.039) | 0.166 |
| | 10 | 1.157(0.121) | 0.163 | 1.066(0.113) | 0.548 | 1.157(0.121) | 0.163 |
| | 11 | 0.893(0.063) | 0.109 | 0.881(0.062) | 0.071 | 0.893(0.063) | 0.109 |
| | 12 | 1.072(0.016) | p<0.001 | 1.021(0.015) | 0.171 | 1.072(0.016) | p<0.001 |
| | 13 | 1.033(0.019) | 0.081 | 1.042(0.020) | 0.031 | 1.033(0.019) | 0.081 |
| **Father died before age 16** | (REF: no) | | | | | 1.209(0.006) | p<0.001 |
| **Mother died before age 16** | (REF: no) | | | | | 1.226(0.006) | p<0.001 |
| **Own civil status** | Single | | | | | 1.267(0.007) | p<0.001 |
| | Married (REF) | | | | | | |
| | Divorced | | | | | 1.623(0.010) | p<0.001 |
| | Widowed | | | | | 1.424(0.026) | p<0.001 |
| **Own Education** | Primary (<9 years) | | | | | 1.111(0.007) | p<0.001 |
| | Primary (9 years) | | | | | 1.135(0.008) | p<0.001 |
| | Secondary (10-11 years) (REF) | | | | | | |
| | Secondary (12 years) | | | | | 0.850(0.007) | p<0.001 |
| | Tertiary (13-15 years) | | | | | 0.782(0.007) | p<0.001 |
| | Tertiary (15+ years) | | | | | 0.687(0.007) | p<0.001 |
| | Postgraduate (16-20 years) | | | | | 0.534(0.016) | p<0.001 |
| | Missing | | | | | 1.911(0.050) | p<0.001 |
| **Own SEI[2]** | 1 (REF) | | | | | | |
| | 2 | | | | | 0.955(0.010) | p<0.001 |
| | 3 | | | | | 0.871(0.009) | p<0.001 |
| | 4 | | | | | 0.849(0.013) | p<0.001 |
| | 5 | | | | | 0.889(0.012) | p<0.001 |
| | 6 | | | | | 0.814(0.009) | p<0.001 |
| | 7 | | | | | 0.792(0.009) | p<0.001 |
| | 8 | | | | | 0.811(0.010) | p<0.001 |
| | 9 | | | | | 0.791(0.016) | p<0.001 |
| | 10 | | | | | 1.083(0.057) | 0.128 |
| | 11 | | | | | 0.865(0.011) | p<0.001 |
| | 12 | | | | | 0.753(0.017) | p<0.001 |
| | 13 | | | | | 1.232(0.016) | p<0.001 |
| | 14 | | | | | 1.791(0.018) | p<0.001 |
| **Total children** | 0 | | | | | 1.655(0.011) | p<0.001 |
| | 1 | | | | | 1.262(0.008) | p<0.001 |
| | 2 (REF) | | | | | | |
| | 3 | | | | | 0.992(0.007) | 0.201 |
| | 4 | | | | | 1.063(0.011) | p<0.001 |
| | 5 | | | | | 1.119(0.020) | p<0.001 |
| | 6+ | | | | | 1.217(0.030) | p<0.001 |
| **N observations** | | 1,910,086 | | 1,910,086 | | 1,910,086 | |

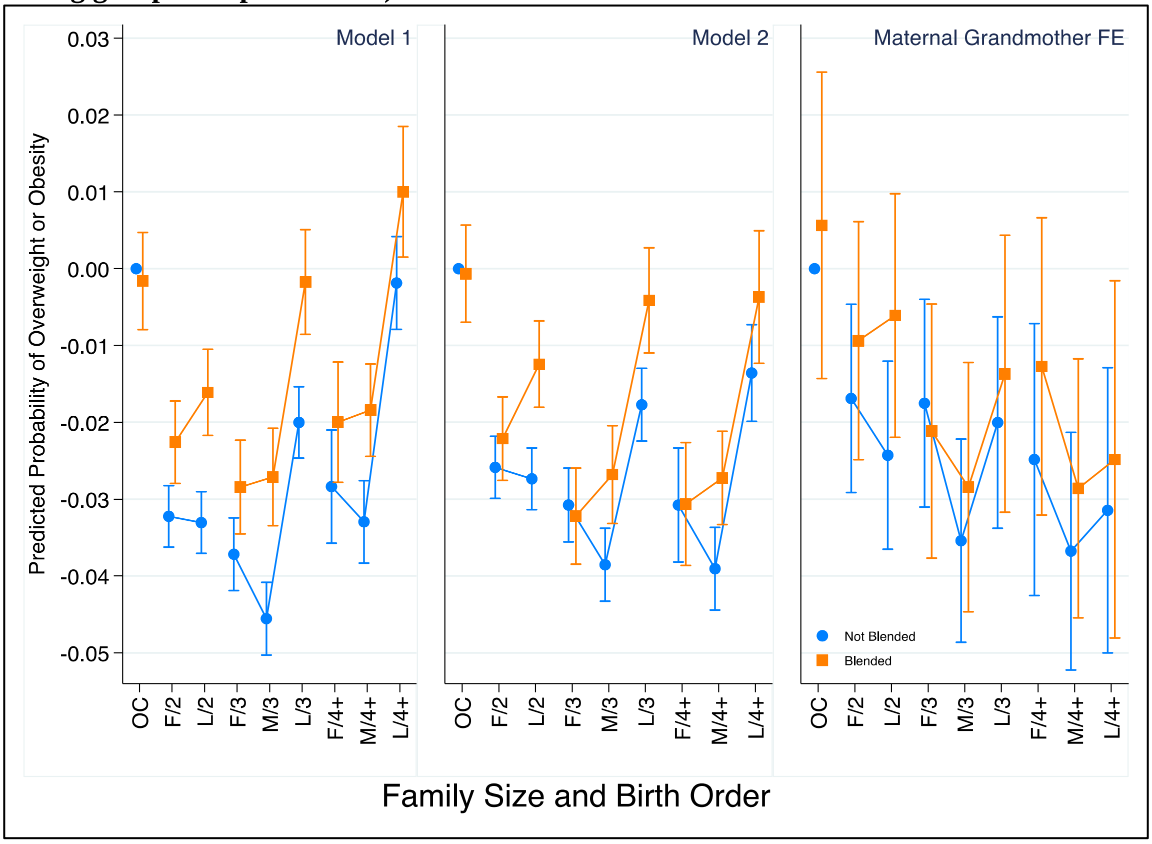
[1] Key to parental SEI categories: 1: Entrepreneurs in agriculture, forestry, etc, 2: Workers in agriculture, forestry, etc, 3: Entrepreneurs in the industrial, commercial, transport and service professions, 4: Entrepreneurs in the free profession (doctors, lawyers, etc.), 5: Company executives (employees), 6: Officials (supervisors, technicians, office and trade staff, etc.), 7: Workers other than group 2, 8: Employees in the service profession, 9: Military, 10: Persons with unidentifiable professions, 11: Students (non-work), 12: Other non-employed or students, 13: Missing [2] Key to own socioeconomic attainment categories: 1: Unskilled employees in goods production, 2: Unskilled employees in service production, 3: Skilled employees in goods production 4: Skilled employees in service production, 5: Assistant non-manual employees, lower level, 6: Assistant non-manual employees, higher level7: Intermediate non-manual employees, 8: Professionals and other higher non-manual employees, 9: Upper-level executives, 10: Self-employed professionals11: Self-employed other than professionals and farmers, 12: Farmers, 13: Other non-employed, students, or military, 14: Missing,

https://www.scb.se/contentassets/22544e89c6f34ce7ac2e6fefbda407ef/english_aggregated_version_socio-economic_groups_sei-agg.pdf;
https://www.scb.se/contentassets/22544e89c6f34ce7ac2e6fefbda407ef/english_ov9999_1982a01_br_x11op8204-3.pdf

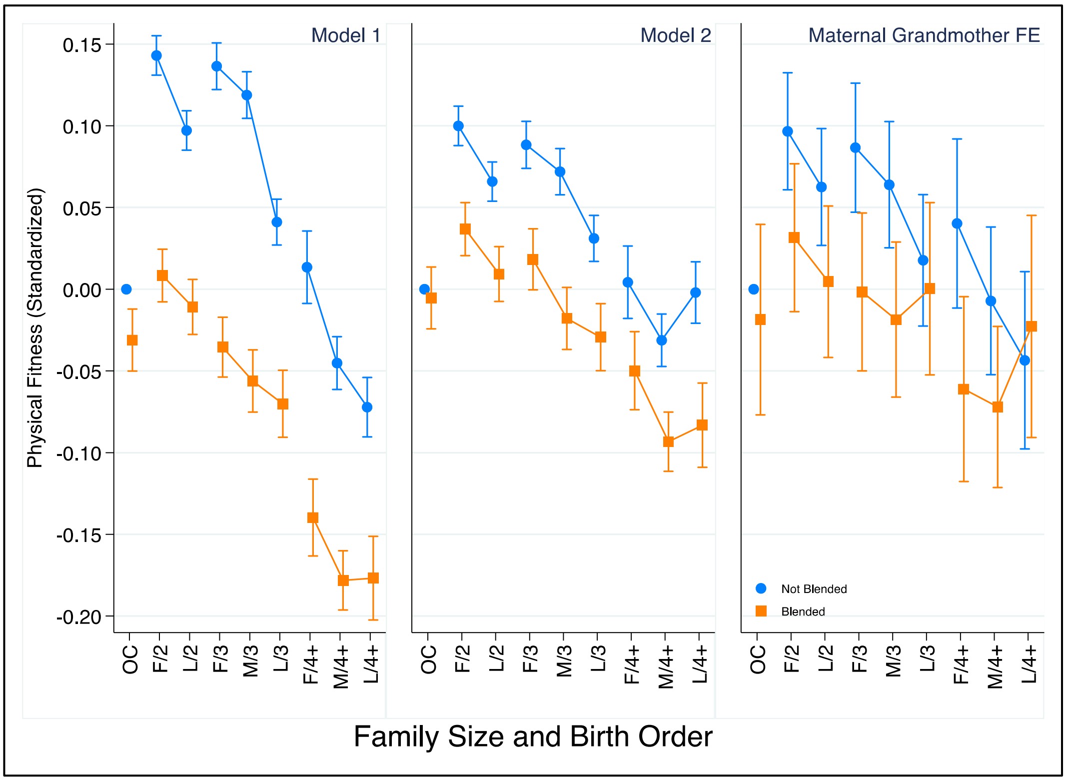
**Supplementary Figure 1: Results for standardised height scores among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-1975 (alternative sibling group size specification).**



**Supplementary Figure 2: Results for overweight and obesity among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-1975 (alternative sibling group size specification).**



**Supplementary Figure 3: Results for standardised fitness scores among men at age 17-20, according to sibling group size, birth order and blended family status, Swedish men born 1965-1975 (alternative sibling group size specification).**



**Supplementary Figure 4: Results for all-cause mortality at age 50+, according to sibling group size, birth order and blended family status, Swedish men and women born 1940-60, mortality 1990- 2017 (alternative sibling group size specification).**