Leadership skills and family formation among males. A study based on Swedish register data

Steffen Peters[1,2], Kieron Barclay[1,2,3]

[1]Max Planck Institute for Demographic Research, Rostock, Germany

[2]Stockholm University, Stockholm, Sweden

[3]Swedish Collegium for Advanced Study, Uppsala, Sweden

Abstract

Leadership skills (LS) may increase the chances of ascending to a higher rank in hierarchical social structures, which allows individuals to provide greater support for a partner and, eventually, a potential child. Moreover, LS may be beneficial within a partnership since they may be associated with a set of social skills such as communication style. Nevertheless, research on the association between LS and family formation processes (marital behavior, fertility) is relatively scarce. We explore the prospective association between LS and marriage as well as completed fertility for 650,947 males from Sweden. Poisson regression and Linear Probability models were applied for this purpose. Additionally, fixed effects models examine potential differences between within- and between-family considerations. Our findings demonstrate a positive association between LS measured at age of assignment to military service (17-20 years) and the probability to get married by age 39 or later. Furthermore, LS are positively linked with the number of children, and negatively linked with the probability to remain childless. Stratification analyses by potential moderators reveal that fertility patterns are particularly clear among males of lowest income deciles, and those who have never been married. Associations between LS and family

formation does not differ largely between educational levels. Mediation by SES measures is rather small.

Keywords: Leadership, Marriage, Completed Fertility, Male Fertility

Introduction

Previous research has increasingly examined the role of psychological factors for family formation processes (e.g. Jokela & Keltikangas-Järvinen, 2009; Peters, 2023). Recently, it has been shown that non-cognitive abilities have become more relevant for entering fatherhood among men in Sweden, with higher abilities predicting lower levels of childlessness (Aldén et al., 2022). Leadership skills (LS) belong to non-cognitive abilities and previous research suggests that LS are relevant for both economic and non-economic outcomes. For instance, LS are linked with SES indicators such as career outcomes (Floris et al., 2020; Maurer et al., 2017), earnings (Kuhn & Weinberger, 2005; Lund et al., 2007), and the probability of promotion (Kragt & Day, 2020; Maurer et al., 2017). Therefore, LS may reinforce inequalities in social positions and contribute to greater opportunities to get children due to more resources that are available for family support. Additionally, leadership may be beneficial and strengthening for partnerships, e.g. via communication or motivation skills (Porter & Baker, 2005). Therefore, LS may result in higher partnership quality, which may increase chances to enter marriage and parenthood.

However, research on the extent to which LS are associated with marriage or childbearing is scarce. To the best of our knowledge, only one study by Jokela and Keltikangas-Järvinen (2009) has looked at the association between LS in adolescence and the probability of having a first, second, and third child by age 30-39. We argue

2

that this study design can be extended by more in-depth analyses. First, we examine marriage as separate outcome in order to provide a more complete picture on the association between LS and family formation. Second, the previous study looks at fertility outcomes between ages 30-39. Therefore, their sample is relatively young, and childbearing is often not complete by the earlier ages in this range (30-39), in particular when second and third childbirths are considered. Our study is based upon complete fertility measured between ages 39 and 50, depending on the specific birth cohort. Previous research has shown that male fertility does not change much after age 40 in the Nordic context (Nisén et al., 2014), and our study design therefore allows insights into the predictive power of LS for completed fertility in Sweden. Third, the sample of the previous study is relatively small (1,313 individuals), while we make use of Swedish population register data for all men in Sweden. However, LS were only evaluated for men with higher levels of cognitive abilities (Lindqvist & Vestman, 2010). Fourth, using Swedish register data allows us to employ a fixed-effects sibling comparison design to examine whether unobserved heterogeneity explains the relationship between LS and marriage/fertility patterns or not. Finally, the large data also allows us to closely examine the role of education and income as both potential moderators and mediators.

Theoretical Background

Leadership skills (LS) can be broadly defined and typically capture skills such as organizational agility, decision quality, ethics, command skills (Floris et al., 2020), as well as acting trustworthy, individual time-management, taking initiative in different contexts, the ability to encourage others to act and networking (Boone & Peborde, 2008). These skills may be very beneficial in several life domains such as career success, or partnering and fertility. Leaderhip skills may be developed and

strengthened over the life course, and it is therefore important to consider how manifestations of LS in early adulthood influence later life course events taking a life course perspective.

Leadership skills in the life course perspective

Leadership skills (LS) almost certainly reflect both nature and nurture, which is reflected in recent theoretical approaches suggesting that LS are a mix between genetics and learned skills (Benmira & Agboola, 2021; Hunt & Fedynich, 2018). Therefore, some part of LS may be built up over life course, whereas other parts of LS cannot be taught (Gunn, 2000; Malakyan, 2014), suggesting stability in LS over time to some extent. One may further argue that LS from earlier stages of life can be considered as 'early life experience', i.e. time-constant factor, that may affect future processes such as skill developments, career paths, and family formation processes. For instance, individuals who served as captain in a sports team in young ages may have learned to take responsibility and motivate other team members. These skills will most likely not get lost over time, and may be helpful in other life situations, e.g. in a later job, in which one may qualify oneself as group leader via acquired leadership skills. This may lead to a higher social status, which will also be beneficial on a partner market and increase fertility chances. Such a pathway is in line with the life course perspective, according to which LS from younger ages may shape later life outcomes.

Furthermore, LS may be considered as a set of social skills since leaders typically need a team that they can guide in order to serve as a leader. One key competence may be to treat team members with respect and listen carefully to their opinion in order to keep their motivation high. Individuals continue to live within a social environment

4

throughout their entire life (although the social environment itself may change, of course), i.e. LS may always be developed over time at any point in life. For instance, people may learn to lead a sports team (e.g. in adolescence), a group of peers in group works on educational paths (e.g. in young adulthood), or a project team at work once one has gained more experience (e.g. in adulthood). Taking leadership responsibilities may come along with certain expectations, e.g. regarding gender, or age. For instance, to lead a team within a company may require a certain amount of skills and experiences, and it may take some time to achieve these skills so that a group/project leader may be expected to have a certain age.

Leadership skills and family formation via non-socio-economic factors

Although not scientifically well-explored, LS might be associated with partnering processes, which, in turn, predict marriage and childbearing. Indeed, previous research has shown that partnerships may be strengthened by leadership facets of one or both partners (Weiss et al., 2002). This suggests that LS may be desirable for a potential partner, i.e. LS may predict the chances to enter a romantic relationship.

There are different types of leadership that may be attractive for different people on the partner market. For instance, a more traditional definition understands leaders as (selected) individuals who stand at the top of a hierarchy, do not share the power with (many) others, are charismatic and have obtained a strong mix of skills and expertise (Allred & Hancock, 2015). This may be particularly desired by women for a potential partner since they tend to search for a dominant and protective partner more than males do (Buss, 1994; Regan & Berscheid, 1997). One strength of such a partner may be to motivate people, which has been a key argument on how leadership may be

linked with romantic relationships (Porter & Baker, 2005). Motivational skills may be beneficial for a potential parent. For instance, the ability to motivate others may help with the child's academic motivation, e.g. by explaining the value to learn, or rewarding good school grades (Garn et al., 2012).

Similarly, (traditional) leaders may be good in decision-making. A person who struggles with taking decisions may wish for a partner that takes decisions on the couple level. For instance, if a person has two promising job opportunities but cannot decide which option to choose, a partner with strong decision-making skills may help. These abilities among potential partners may be desired by some individuals, according to individual preferences and attitudes.

Another leadership type is called 'servant leadership' (Allred & Hancock, 2015). Servant leaders consider the interests of others in order to find the best fitting solution to a problem and support individuals in their development (Greenleaf, 2002; Sullivan, 2009). A servant leader may contain other strengths that may be attractive on the partner market, at least to a certain group of individuals. For instance, the communication style within a relationship may play an important role for stabilizing the partnership (e.g. how much to tell the partner, or involving the partner into decision-making processes) (Porter & Baker, 2005). For instance, a respectful communication style, which allows both partners to bring their interests and standpoints in, may be desired in a serious romantic relationship since this may show potential for a happy and long-term connection. Similarly, servant leaders share the power with others, which may strengthen the relationship to a partner (Allred & Hancock, 2015). If the power is shared within a partnership (instead of one person deciding everything), both partners may feel confident to shape the relationship and the family life to some extent

according to own desires without ignoring the preferences of the other partner. This may lead to higher relationship satisfaction.

The considerations above have shown how LS may influence partnership, but they may easily be translated to fertility outcomes as well. For instance, one person may be considered as servant leader, i.e. may follow a communication style(?) that considers the interests of all family members. Such a person may be considered as great parent since the offspring may learn these communication skills, which may be desired by the partner. As another example, a leader in the traditional sense may take responsibility for the child(ren), not being afraid of taking (wrong) decisions. This may also be desired by individuals when raising a child. Assuming that individuals begin a romantic relationship with a partner that contains the desired leadership type in communication, decision-making etc., LS may be positively linked with family formation outcomes. As mentioned, studies on leadership and family formation processes are rare. However, first evidence points at a positive association between leadership and being in a romantic relationship (Miller et al., 2009), and between LS and fertility (Jokela & Keltikangas-Järvinen, 2009).

Leadership skills and family formation via socio-economic status

The association between leadership skills (LS) and family formation may be both mediated and moderated by SES, which is usually related to access to goods and resources, and determines the support for a family (Cummins, 2006). This may be particularly true for males, and since our study is restricted to men we mainly focus on associations among men in this literature overview. Previous research suggests a mediating role of SES for the link between LS and family formation. On the one hand,

LS and SES are positively associated with each other. For instance, managers consider job applicants to fit better to a job if they demonstrate higher LS (Stone et al., 2018). Additionally, Maurer and colleagues (2017) have shown that motivation to develop LS can increase leadership capacity, and this may be linked with increasing income. This is in line with previous research that has found a positive association between leadership facets (that were particularly present among males) and income in Norway (Lund et al., 2007). Furthermore, previous research focusing on males has found a positive relationship between holding leading positions in high school (e.g. captain of a sports team, president of a club) and the likelihood to get a managerial position 9-13 years after leaving high school (Kuhn & Weinberger, 2005).

As a second SES indicator, income may also mediate the relationship between LS and family formation. Previous studies have shown a positive association between holding leader positions in adolescence and later life income levels (Hopp & Pruschak, 2023; Kuhn & Weinberger, 2005). Furthermore, income is positively associated with marriage, in particular among men (Kanazawa, 2003; Shafer & James, 2013). Similarly, income is positively associated with the onset of a serious relationship (Rapp, 2018), and the entry into a stable partnership for males in high-income countries (Kalmijn, 2011; Kuo & Raley, 2016; Schneider et al., 2018; Shafer & James, 2013). Additionally, income is positively linked with fertility among males in high-income countries (Hopcroft, 2006, 2015; Nettle & Pollet, 2008; Stulp et al., 2016). However, this positive association has attenuated over time in both the US (Bar et al., 2018) and European countries (Skirbekk, 2008). Positive associations between income and childbearing can also be found in the Nordic countries (Andersson & Scott, 2007; Jalovaara & Fasang, 2020). For instance, Swedish men with lower income are more likely to remain childless by age 40 and this relationship has persisted across cohorts

(Chudnovskaya, 2019). Moreover, higher cumulated earnings up to middle adulthood are connected with higher offspring counts across cohorts in Sweden (Kolk, 2019; Kolk & Barclay, 2021). Kolk and Barclay (2021) furthermore explored the mediating role that income can take regarding the association between IQ and fertility. The authors have found that income can at least partly explain the variation in this link (Kolk & Barclay, 2021) and, similar to our study, may serve as mediator.

Additionally, SES indicators may also moderate the association between LS and family formation. LS may vary by education and income, and these factors may shape the relationship between LS and family formation. As Horishna and colleagues have shown (2019), social work graduates score higher on LS than under-graduates from the same field. However, it remains unclear whether this correlation is based on education or potential age effects. Those analyses are based on cross-sectional data and, therefore, no conclusions about causality can be drawn. Education, in turn, is positively associated with union formation among men. For instance, mothers from the US are more likely to marry the fathers of their child if those men have higher educational levels (Sassler et al., 2014). Furthermore, a positive relationship between education and chances to marry has been well-established for men (Schneider, 2011; Shafer & James, 2013). This positive association may stem from an increasing relevance of education for marital behavior across cohorts in the second half of the 20th century (Sweeney, 2002). Furthermore, men from European countries with higher educational levels are more likely to enter partnership unions than men with lower education (Kalmijn, 2011). In line with these partnering patterns, lowest educational levels are linked with lowest cohort fertility rates among males from Sweden and the other Scandinavian countries (Jalovaara et al., 2019).

As shown above, there is strong evidence for a positive association between SES factors and family formation among males in Sweden, i.e. high levels of education and income promote marriage and fertility. Therefore, providing resources appears to be linked with benefits on the partner market for men. Men with lower income or educational levels may be disadvantaged in finding a partner and getting children so that other characteristics such as personality or certain skills may be more relevant for family formation processes. Men with lower resources may compensate for their SES-related disadvantage through psychological qualities such as leadership skills. Therefore, other factors such as LS may be more relevant in decision-making regarding marriage and fertility behavior. Therefore, we expect both that (A) the effect of LS on family formation will be mediated by education and income, and that (B) there will be a stronger net association between LS and family formation among men with lower levels of education and income in comparison to men with higher levels of education and income.

Confounding by shared family factors

Previous research has developed increasing interest in family factors as determinants for family formation processes. It has been shown that marital behavior is associated with parental SES (Brons et al., 2021; South, 2001), parental divorce (Erola et al., 2012; Wolfinger, 2003), or family structure (South, 2001). Fertility outcomes are linked with siblings' fertility behavior (Buyukkececi & Leopold, 2021; Kuziemko, 2006; Lyngstad & Prskawetz, 2010; Murphy, 2013), the presence of siblings (Cools & Kaldager Hart, 2017; Murphy & Knudsen, 2002) and birth order (Morosow & Kolk, 2020). Genetics may also influence fertility behavior (Kohler et al., 1999; Mills et al., 2018; Mills & Tropf, 2015). Furthermore, fertility patterns across generations are linked

with each other, potentially via intergenerational transmissions of fertility preferences and attitudes (Anderton et al., 1987; Johnson & Stokes, 1976).

Apart from fertility behavior, cognitive and psychological factors such as LS may also be determined by family background. Previous research has shown that genetics are linked with leadership (De Neve et al., 2013). Additionally, leadership is linked with parental education (Brunello & De Paola, 2013), paternal education (Özcan et al., 2019), and parents' leadership styles (Hartman & Harris, 1992). Furthermore, it has been found that leadership is associated with birth order (Andeweg & Berg, 2003) and the gender of the sibling (Brunello & De Paola, 2013). Consequently, family background factors shape both leadership and family formation processes. Potential associations between LS and family formation may disappear when controlling for shared background information within families, and we aim to address this issue using sibling fixed effects models.

Cohabitation and marriage in Sweden

In Sweden, marriage has traditionally been the predominant family structure; however, recent trends indicate a growing significance of cohabitation (Duvander & Kridahl, 2020). It is no longer uncommon for individuals to remain unmarried until the age of 40, with only around 50% choosing to marry by this milestone (Palmo, 2015). The average age for a first marriage has risen over the past decades to 36.4 years for men and 34.5 years for women (Statistics Sweden, 2024). As a result, the concept of marriage in Sweden is evolving, shifting away from conventional life course stages or resource protection, and more towards the expression of individual attitudes and intentions (Duvander & Kridahl, 2020). Cohabitation, often initiated in the early 20s, is

frequently the initial form of partnership and a precursor to marriage (Duvander & Kridahl, 2020; Palmo, 2015). Rather than being an alternative to marriage, cohabitation is more commonly viewed as an alternative to being single, given that the majority of new partnership unions in Sweden are formed through cohabitation (Thomson & Bernhardt, 2010).

Data and Variables

Data

Our analyses are based on Swedish register data. Swedish residents obtain a unique identification number each, through which information from different sources (e.g. fertility, marital behavior) can be linked. Birth data was taken from administrative registers on fertility. Leadership skills (LS) as our explanatory variable of interest was measured for all men with relatively high scores on the IQ test at earlier stages of the military conscription (Lindqvist & Vestman, 2010) between 1983-1997. All young males were obliged to attend military recruitment during that time period but women were not. We restrict the analytical sample to men who were 17-20 years of age at time of recruitment, which captures the vast majority of the male population (98%) from the considered cohorts (1963-1979). Thus, our analytical sample is relatively homogeneous and contains information of 650,947 males who have been registered in Sweden throughout the entire time between military recruitment and most recent available data (2018). Men who emigrated from Sweden or died before age 39 were excluded from the analyses. The age range for measurement of marital behavior and completed fertility in our analytical sample is between 39 and 55 years, depending on birth cohort. This allows us to include as much marriage and fertility information as

possible, while independent variables are either fixed (e.g. family background), measured at military recruitment (LS, cognitive ability), or at exact age 39 (cumulated income, highest education). The age of 39 years can be considered as reasonable age for getting married and fertility completion. Although men can still get married and have children after this age, previous research has shown that marriage rates are low beyond age 40 (Ohlsson-Wijk, 2014), and fertility patterns remain relatively stable after age 40 (Barclay & Kolk, 2020; Nisén et al., 2014). We furthermore conducted robustness checks using age 45 and 50 as fertility threshold and patterns remain stable. Multigenerational registers were used to derive information on full siblings and family background via identification numbers of both mothers and fathers. For the fixed effects approach, only full siblings with same registered mothers and fathers were considered. This allows us to control for unobserved heterogeneity based on genetics, parental education and other shared background information. Administrative registers provided us with marital status and educational level. Cumulative income was calculated based upon annual tax registers.

The register data allow us to examine the association between personality facets and family formation on the population level whereas previous studies – to the best of our knowledge – only looked at this link using survey data. While surveys usually face selection effects or non-response-bias, population registers also capture individuals who would not be willing or capable (e.g. disadvantaged men) to respond to surveys. Therefore, we can consider (almost) the entire male population instead of a subsample. This is an important advantage of our data because males with certain characteristics (e.g. low cognitive ability) may be more likely to refuse participation in surveys and, for instance, to remain childless over time, which would result in biased estimates. Since

we consider (almost) the entire Swedish male population (no matter whether LS were measured or not), the statistical power of our analyses is very high.

Our data provide some further advantages compared to previous research. For instance, LS are assessed by psychologists and not by self-reports that may be more subjective (Jokela & Keltikangas-Järvinen, 2009). Furthermore, Jokela and Keltikangas-Järvinen (2009) could follow their participants for 18 years but the youngest individuals were 12 years of age at the first observation, i.e. they were followed until age 30, when fertility is often incomplete. In this study we follow individuals throughout almost the entire fertility history starting at young ages from military recruitment (17-20 years) until age 39 and higher. Furthermore, register data allow us to consider family background by comparing siblings, which was not possible in previous work on this topic.

Outcomes

There are two outcomes of our study. First, we explore the association between LS and the probability to get married by age 39. Second, we examine the association between LS and completed fertility. Completed fertility is measured as both the number of children (range: 0-22) and childlessness by age 39 or older.

Leadership skills in the military conscription data

Our main explanatory variable represents the leadership skills (LS) of each young man at time of military enrolment. The Swedish military has collected LS of the recruits for a long time in order to find suitable males for both the military service and more

responsible roles in the army (Lindqvist & Vestman, 2010; Ludvigsson et al., 2022). For this purpose, young males were selected for evaluation of their leadership skills based upon their scores in preceding examinations during the enlistment process (IQ test, physical tests, etc.) (Ministry of Defense Sweden, 1984). All conscripts were interviewed by well-trained psychologists (Lindqvist & Vestman, 2010; Ludvigsson et al., 2022). The semi-structured interviews lasted for ca. 20-30 minutes (Ludvigsson et al., 2022) and the psychologists received clear instructions for how they should conduct the interviews, e.g. speaking with neutral language and to give no advice on potential military assignments (Lindqvist & Vestman, 2010).

The assessment of leadership is based upon what the military have called a 'command assessment' (Ministry of Defense Sweden, 1984). The command assessment has been described as an evaluation of social adaptation and personality. Factors assessed by the interviewer include responsibility, social relations, independence, initiative and stability (Ministry of Defense Sweden, 1984). The basis for interviews is obtained from the answers to questions in a questionnaire submitted by the enrollee on the first day of enlistment (Lindqvist & Vestman, 2010). The information in this form relates to childhood and the home environment, the enlistee's educational and occupational situation, leisure activities, as well as emotional and other psychological factors (Ministry of Defense Sweden, 1984). The emphasis of the interview is always on clarifying the enlistee's relationships across different social contexts. For instance, leadership qualities are identified by evaluating the social role within different relationships (Ministry of Defense Sweden, 1984). Characteristics such as dominance, agility, initiative, responsibility, independence, outgoing attitude, etc. build up a stronger leadership profile (Ministry of Defense Sweden, 1984). Furthermore, interviewers were asked to pose the question 'What do you think of your ability to lead

a group of peers?' in each interview (Lindqvist & Vestman, 2010). Recruits were selected as officers in the army depending on their LS scores during conscription, and attending leadership training is mandatory for all selected males, regardless of their own motivations to become an officer (Ministry of Defense Sweden, 1984).

Psychologists are further asked to consider the previous experiences and/or future life plans of the enlistees in order to evaluate their LS (Lindqvist & Vestman, 2010). Therefore, LS are evaluated according to the social context and the life course perspective, in line with the theoretical elaborations above. For instance, recruits were asked about their school and work experience, corresponding environments, relationships with family members, or career plans (Lindqvist & Vestman, 2010).

The meaning of LS for the military during the conscription tests stems from the hierarchical structure within the army. The vast majority (about 90%) of the officers belong to lower positions within the military hierarchy and stay for a relatively short period of time (ca. one year) (Grönqvist & Lindqvist, 2015). About one third of the recruited males from each birth cohort are trained for these lower officer positions (Grönqvist & Lindqvist, 2015). Therefore, the military measures not only LS but also cognitive skills and personality factors, such as social maturity or emotional stability.

Each young male has to go through a fixed procedure of tests and interviews during military conscription in order to prove his (mental and physical) capability for serving in the army (*Mönstringshandboken*, 2021). Cognitive skills were measured at the beginning of the conscription (*Mönstringshandboken*, 2021), and the test results are available for the psychologists during the interviews (Ludvigsson et al., 2022). Further details about the psychological interviews (e.g. the aims, measures, reliability) can be found in the appendix.

A very important consideration is that LS were only systematically measured for males from the top half of the IQ distribution (Lindqvist & Vestman, 2010) and less than 1% of the men with IQ scores of 1 to 4 have obtained a LS score (Table 1). LS scores are important for role assignment within the military. For instance, sergeants must have scored with 6 or higher, and lieutenants with 7 or higher during the conscription tests (Ludvigsson et al., 2022).

Receiving higher scores on cognitive skills, serving as military officer and attending corresponding training programs may have beneficial implications for non-military career outcomes in later life stages as well. For instance, the probability to be a manager outside of military between 30 and 40 years is higher for individuals who scored higher on cognitive skills at military conscription, and who served as upper officer within the military (Grönqvist & Lindqvist, 2015). Furthermore, conscripts with higher scores on cognitive skills or from higher officer positions are more likely to obtain tertiary education after military service (Grönqvist & Lindqvist, 2015). These findings suggest that military officers, i.e. conscripts with higher LS, are advantaged in the civilian, non-military, labor market. This may be due to certain skills that recruits achieve during training programs for serving as officers within the army. These skills and the resulting better position on the civil labor market may also bring advantages on the partner market.

The Swedish military provides information about LS on a scale ranging from 1 (low skills) to 9 (high skills). Therefore, LS are included as categorical variable in our models using the middle category (score 5) as reference group. There is an additional '0' category, which has to be considered with caution since relatively many males belong to this category and it remains unclear how individuals were assigned to this group. We decided to combine score 0 with the group of missing values since additional

analyses have revealed that estimates for the '0' category and the 'Missing' category are very similar (see Fig. A1 and A2).

Cognitive skills

The Swedish military collected information on LS mainly for men who scored in the top half of the IQ distribution. Cognitive skills are measured as scale ranging from 1 (low skills) to 9 (high skills), and this information also comes from the military enlistment. Table 1 below provides an overview of the tabulation between LS and IQ scores. It seems obvious that the vast majority of young men with scores from 1-4 on the cognitive ability scale were not assessed on their LS (99% and more) and, therefore, received a missing value on LS. It is important to keep this in mind when we examine the association between LS scores (that are non-missing) and family formation.

		Cognitive Ability										
		Missing (%)	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)	N (total)
	Missing	97.38	99.00	99.79	99.68	99.34	3.29	2.69	2.34	2.08	2.13	**256,421**
	1	0.23	0.07	0.02	0.02	0.01	1.25	0.77	0.65	0.49	0.53	**3,737**
	2	0.31	0.08	0.04	0.03	0.05	4.65	3.19	2.55	2.21	2.21	**14,471**
	3	0.45	0.08	0.03	0.05	0.08	10.07	7.30	5.79	4.97	4.65	**31,919**
LS	*4*	0.29	0.14	0.04	0.08	0.12	19.82	15.74	12.95	10.92	9.63	**66,133**
	5	0.48	0.26	0.03	0.07	0.16	29.29	27.56	24.05	20.68	17.67	**109,384**
	6	0.41	0.17	0.04	0.04	0.13	19.45	23.50	24.72	24.60	23.55	**93,611**
	7	0.21	0.15	0.02	0.02	0.07	9.53	14.37	18.90	21.54	23.26	**62,036**
	8	0.20	0.04	0.00	0.01	0.03	2.33	4.22	6.82	10.43	12.99	**22,085**
	9	0.04	0.00	0.00	0.00	0.01	0.33	0.67	1.23	2.07	3.38	**4,111**
	N (total)	9,595	21,237	45,297	69,975	100,321	154,534	108,761	80,72	47,409	26,059	663,908

Table 1: Leadership Skills according to Cognitive Ability (column percentages)

Variation by SES and marital status

We consider income as important moderator and mediator for the link between LS and family formation. Since income can vary for individuals over time, we cumulated earnings for each individual by age 39 and included the logarithm of it in our models. Income has been adjusted for inflation in both approaches using data provided by Statistics Sweden (*SCB CPI*, 2022).

Furthermore, education – measured as highest educational level obtained by age 39 (1 "No Basic Education", 2 "Primary", 3 "Lower Secondary", 4 "Upper Secondary", 5 "Post-Secondary", 6 "Tertiary", 7 "Doctor") – is included as potential moderator and mediator in our models. Again, we conducted additional analyses using mediation approach a) (LPM) and mediation approach b) (KHB). Moreover, LS were regressed on educational outcomes in later life. For simplification purposes and due to particular interest in the transition to highest education, we used a binary-coded indicator (0 "Lower than Tertiary", 1 "Tertiary and higher"). Additionally, we stratified our main models according to completed educational level (moderation), grouped as follows: "Primary or lower"; "Secondary"; and "Post-Secondary or higher". Civil (relationship) status may also serve as moderator for the LS-fertility link. Consequently, we included marital status as binary coded variable in our models (0 "Never married", 1 "Ever married") and used this variable both as an outcome as well as a stratification factor for our main effects.

Additional Covariates

We also control for birth order (1-16) in our models since this variable is linked with several factors of relevance in our study such as intelligence (Barclay, 2015; Rohrer et al., 2015). Additionally, psychological factors such as personality or skills may differ by

birth order since firstborns receive full parental attention, at least for some time (Sulloway, 1996). Furthermore, we control for sibling group size (1-18). Both birth order and sibling group size were created using full family information, i.e. sisters were involved in counts. Additionally, we include the year of birth (1963-1979) in order to control for potential birth cohort effects since several factors may have changed over time. For instance, LS and their meaning for couples may have changed over decades. While LS may have been particularly important among older cohorts due to the standard of more traditional family forms, in which the husband may have taken major decisions, LS among couples from younger cohorts may have been more balanced.

Statistical Models

We applied Poisson regression models in order to examine the association between LS and the number of children by age 39 and higher. The models are based on following equation:

$$log(E[Y_i|X_i]) = \beta_0 + \beta_1 leadership_i + \beta_2 cognitive_i + \beta_3 \ln(income)_i + \beta_4 education_i +$$
$$\beta_5 married_i + \beta_6 birth\_year_i + \beta_7 birth\_order_i + \beta_8 sibling\_group\_size_i \qquad (1)$$

The outcome of the Poisson regression models is the logarithm of the expected kids count *Y* for each individual *i* conditioned on the vector of all independent variables X_i. The intercept of the model is represented by β_0. The independent variable of main interest is *leadership*, which is included as categorical variable (scores 1-9) in the models as well as the covariate *cognitive* (scores 1-9). *Income* has been cumulated until age 39 and we included the logarithm of it as continuous variable in our models. The covariate *education* represents the highest educational level of the individual (1 – "No basic education" to 7 – "Doctor") and *married* is the indicator whether the male has

ever been married by 2018 (0 – "Never married", 1 – "Ever married"). The last set of covariates represents family background information: *birth_year* is a vector of dummy variables for all birth cohorts in the analytical sample (*1963-1979*), *birth_order* stands for the birth order that the individual holds within the family (constructed with information on both full male and female siblings), and *sibling_group_size* provides information on the total number of brothers and sisters (including the individual itself). The last covariate was excluded in the fixed effects models since these require variation in all explanatories between siblings by definition.

Linear probability models (LPM) were run to explore the link between explanatories and the likelihood to remain childless by age 39 and higher. The LPM of our analyses are based on the following equation:

$$Pr(Y_i = 1 | X_i = x_i) = \beta_0 + \beta_1 leadership_i + \beta_2 cognitive_i + \beta_3 \ln(income)_i +$$

$$\beta_4 education_i + \beta_5 married_i + \beta_6 birth\_year_i + \beta_7 birth\_order_i + \beta_8 sibling\_group\_size_i$$

$$(2)$$

We are interested in the binary coded information whether the individual remained childless by age 39 or higher (Y=1), or not (Y=0). Therefore, the outcome can be considered as probability to remain childless by age 39 or later. The independent variables are the same as shown in the Poisson regression models in equation (1). Again, sibling group size was excluded for fixed effects approaches. The LPM was also conducted for examining the association between LS and marital status. Compared to equation (2), only the outcome changed from "childlessness" to "marriage" by age 39 (1 if ever been married, 0 if not), and the covariate "married" has been erased.

Furthermore, we applied simple OLS regression models for additional analyses with continuous outcomes (e.g. when the association between LS and logarithm of

cumulated income was examined). Compared to equation (2), only the outcome is changed from binary to continuous.

Additionally, we explore the role of income, education and parenthood/marital status by two further analytical approaches. First, as the theoretical part of this study suggests, SES and marital status may serve as mediators for the LS-fertility link. Thus, different types of mediation analyses may have been applied as suggested by previous research (e.g. VanderWeele, 2016). We have run linear probability models (LPM) using time-varying covariates adjusting for with-individual correlations, further called mediation approach a), as well as the KHB method (mediation approach b)). However, due to computational problems, the KHB method was run on reduced samples. Further details are available in the appendix. Additionally, we ran models using income as outcome in order to explore the association between LS and cumulated income. Second, we stratified our main models according to income deciles so that the LS-fertility link is presented for each decile of cumulated income by age 39 (moderation).

Results

Descriptives

Table A1 in the Appendix gives an overview about the variables that we used in our models. Approximately 50% of the analytical sample have ever been married by age 39 (50.08%). About one fifth of our study population remains childless by age 39 and higher (20.64%), and twice as many have two children (42.82%). We group the number of children together from nine onwards with higher parities for visualization purposes only here. As outcome in our analyses, this variable is included without an open-ended category, i.e. the highest value is 22, which is observed for one individual. LS can be

considered as being approximately normally distributed with the largest number of males revealing score 5 (16.72%). However, the largest category contains males who were coded as "Missing" (37.79%). We have conducted analyses with and without the missing values to examine whether patterns are consistent (based upon listwise deletion). Further information about the variables from our models can be seen in Table A1.

Additionally, we show mean values of family formation outcomes and of further important factors according to LS scores in Table 2 below. It can be seen from these simple descriptive statistics that the number of children increases with LS with a range of 1.34 to 2.10 children. The overall population mean number of children for men in these birth cohorts in Sweden by 2018 is 1.73. The childlessness level varies across LS scores with lowest LS showing the highest proportions of childlessness (>30%). Further information with regards to other relevant characteristics such as education or income can be seen in Table 2 below.

LS	# Children	Childlessness	Cogn. Ability	Education	Income Dec.	Married	N
Missing	1.67	0.23	3.19	3.44	5.00	0.44	246,020
1	1.34	0.38	5.81	3.92	3.67	0.34	3,694
2	1.36	0.35	5.89	4.09	4.31	0.38	14,361
3	1.48	0.31	5.91	4.11	4.78	0.41	31,742
4	1.61	0.25	5.95	4.19	5.28	0.46	65,847
5	1.75	0.19	6.06	4.40	5.73	0.52	108,856
6	1.85	0.15	6.33	4.74	6.18	0.58	93,002
7	1.95	0.12	6.62	5.03	6.63	0.63	61,554
8	2.03	0.10	6.99	5.27	7.06	0.68	21,823
9	2.10	0.09	7.23	5.38	7.35	0.72	4,048
Average	1.73	0.21	5.08	4.14	5.52	0.50	650,947

Table 2: Mean Values of Relevant Factors according to Leadership Skills

Leadership Skills and Entry into Marriage

Before we focus on fertility as outcome, we want to discuss the LS-marriage association briefly. Findings are shown in Fig. 1 and demonstrate a positive association between LS and the probability of having ever been married by age 39. Whereas lowest LS scores (1-3) show a 10-20% lower probability of having ever been married by age 39, males with highest LS (7-9) show a 10-20% higher probability of marriage by age 39. These estimates do not change much when IQ is included in the models. Patterns persist, but to a lesser extent, when brothers are compared to each other (within-family analyses), and also when missing values are excluded from the analyses (using listwise deletion, Fig. A3). Additionally, potential mediation effects by income, education, and parenthood were suggested by comparing estimates from models with and without income, education and parenthood (Table A2). However, both mediation approaches a) (LPM) and b) (KHB) did not reveal large mediation effects, regardless whether the total sample was used or only siblings were compared to each other (Fig. A4-A7).
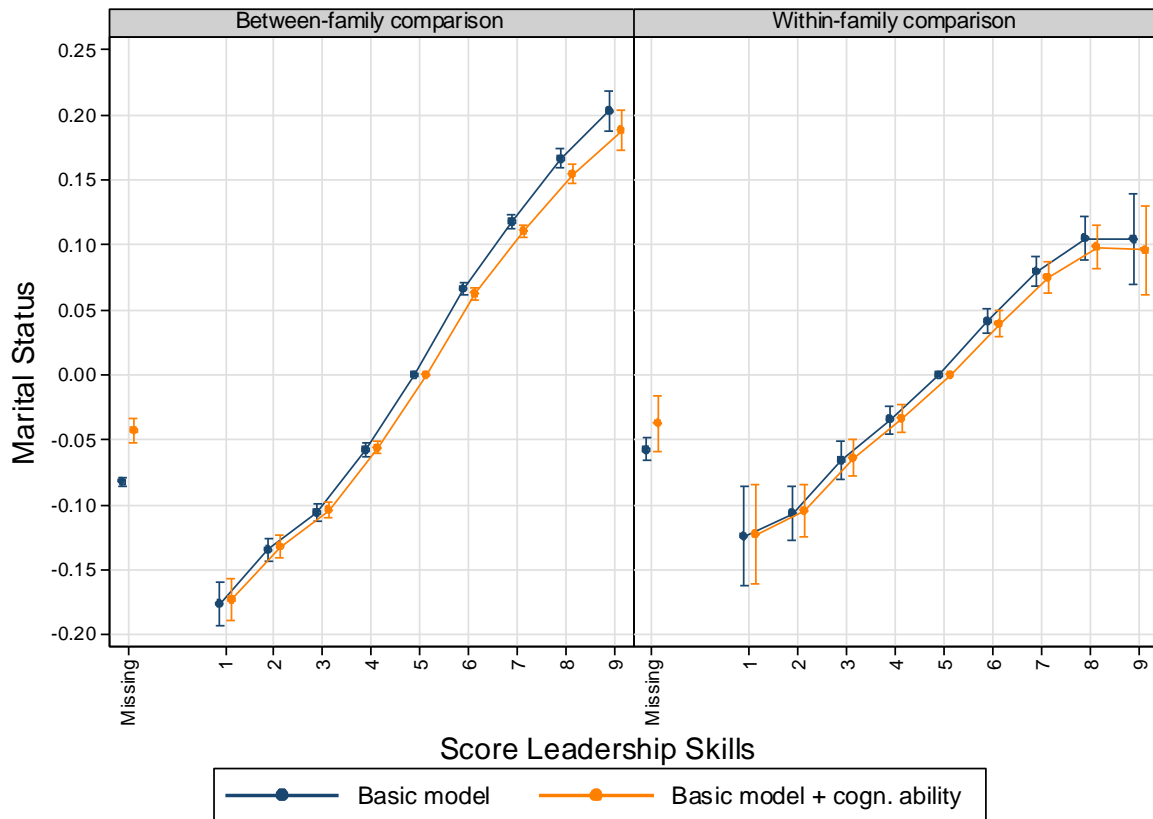
Figure 1: The relationship between leadership scores measured at ages 17-20 and the probability to get married by age 39 amongst Swedish men born 1963-1979. Linear probability models, error bars are 95% confidence intervals.
Note: Basic models control for birth year, birth order, and in case of between-family considerations for sibling group size. Results for models including cognitive ability are shown separately.

Leadership Skills and Number of Children

Figure 2 shows the LS coefficients from Poisson regression models with number of children by age 39 or later as outcome for both between- and within-family comparisons. Both models were estimated with and without mediators (income, education, marital status) but always including the other covariates (cognitive ability, birth year, birth order; sibling group size only for between-family models). Figure 2 illustrates that lower scores on LS are associated with fewer children, and higher LS scores are linked with higher offspring count. The results from the fixed effects approach (within-family comparison) do not differ much from the model based on

between-family estimations. The pattern can be described as an S-shape since the lowest scores do not differ very much compared to each other and neither do the highest LS scores. The graphs illustrate that the mediators (income, education, marital status) can explain the LS-fertility link to some extent, in particular with respect to between-family considerations. When mediators are excluded, the curve is steeper and differences according to LS in number of children are relatively large, e.g. males with lowest LS scores have approximately 0.25 fewer children on average compared to males with LS scores of 5 in the between-family comparison. Regarding models that include SES indicators and marital status, the general pattern remains but the magnitudes are smaller. For instance, males with lowest LS scores (1, 2 or 3) at time of military recruitment have around 0.1 fewer children compared to the reference group (score 5). This represents a reduction in offspring count of ca. 5.8% compared to the average number of children in the overall population (1.73). The general patterns remain similar but to a slightly lower extent when comparing male siblings to each other (within-family comparison). Full regression estimates are shown in Table A3. Similar patterns have also been found from additional analyses using age 45 and 50 (Fig. A8-A9) and listwise deletion of missing values (Fig. A10).

Figure 2: The relationship between leadership scores measured at ages 17-20 and total number of children by age 39 or later amongst Swedish men born 1963-1979. Poisson regression models, error bars are 95% confidence intervals.
Note: Models without mediators control for cognitive abilities, birth year, birth order, and in case of between-family considerations for sibling group size. Models with mediators include income, education, and marital status additionally.

Leadership Skills and Childlessness

Figure 3 below depicts the association between LS and the probability of remaining childless by age 39 or later. Again, results are shown for the total sample (between-family analyses) as well as for the sample including brothers only (within-family consideration). Graphs contain estimates from models with and without mediators. In all models, a negative trend can be seen: men with the lowest LS scores are more likely to stay childless by age 39, while higher scores on LS are associated with a lower probability of being childless. The results from models excluding income, education, and marital status show a steeper gradient in the relationship between LS and

childlessness than models including these variables, in particular in between-family analyses. According to these models, men with the lowest LS scores have almost a 20% higher probability to remain childless compared to the reference group (LS score of 5). On the other tail, men with the highest LS score have a more than 10% lower probability of being childless relative to the reference group. This pattern weakens when models control for income, education, and marital status. Nevertheless, men with the lowest LS scores have a coefficient of 0.08, which means a 38% higher probability to remain childless compared to the baseline probability (0.21). Again, fixed effects models show similar patterns but on a slightly lower level (see Table A4). Childlessness by age 45 and 50 were also examined for robustness checks, and patterns presented above persist (Fig. A11-A12).
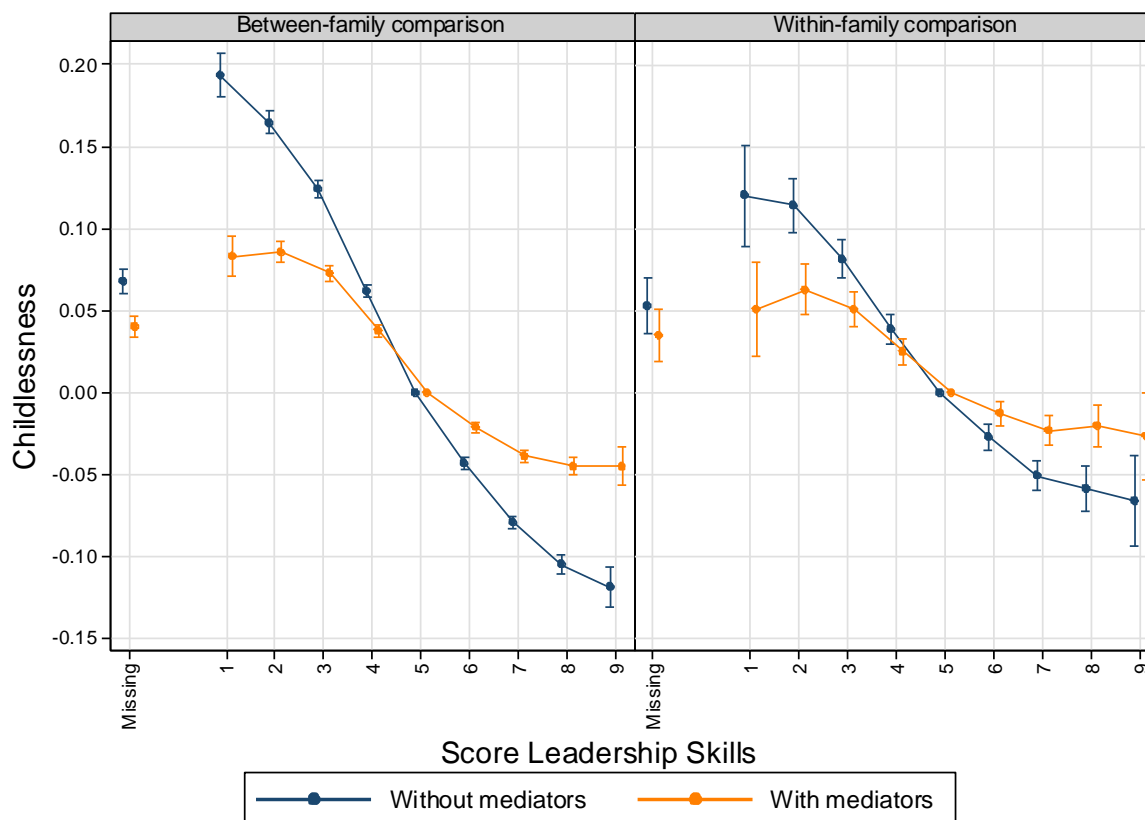
Figure 3: The relationship between leadership scores measured at ages 17-20 and probability to remain childless by age 39 or later amongst Swedish men born 1963-1979. Linear probability models, error bars are 95% confidence intervals.
Note: Models without mediators control for cognitive abilities, birth year, birth order, and in case of between-family considerations for sibling group size. Models with mediators include income, education, and marital status additionally.

The findings above demonstrate that LS scores are linked with completed fertility among males in Sweden. We aim for possible explanations of this association by examining the relationship between LS and a set of potential mediators that have been found to affect fertility as well. Therefore, we ran linear regression and linear probability models using income and educational level as outcomes and LS as an independent variable. Results are shown in the Appendix (Fig. A13-A14). In general, positive associations between LS and income/education can be seen, i.e. higher LS predict a higher cumulated income and a higher probability of receiving tertiary education by age 39. Mediation of the link between LS and fertility by SES indicators and marital status was further examined by mediation approaches a) and b) using longitudinal data for

the transitions to first, second, third, and fourth childbirth. Results are shown in Fig. A15-A18 indicating no large effects of income, education and civil status on transitions to different birth parities. However, it is shown that LS are particularly linked (positively) with the transition to second childbirth, whereas associations with other birth parities are rather weak.

The Role of Cognitive Ability

In order to explore the shown association between LS and completed fertility a bit further we ran models with and without adjustment for cognitive skills. This allows us to estimate the effect that may be explained by cognitive skills, particularly relevant for our analyses since LS were mainly collected for the males on the top half of the cognitive ability distribution. Figures A19 and A20 in the Appendix suggest that cognitive skills do not play a great role in the LS-fertility association. Estimates from both models (with and without cognitive abilities) are very similar, and this can be concluded from both between- and within-family analyses. The only exception from this pattern is the group containing missing values in the between-family considerations.

Leadership Skills and Moderators

In order to examine the role of potential moderators on the LS-fertility link further, we ran additional models including interaction terms between LS and income (as deciles), education (grouped in "Primary or lower", "Secondary", "Post-Secondary", "Missing"), and marital status ("Never married", "Ever married"). Findings are shown in Fig. 4 and 5 below (and Fig. A21, respectively).

Figure 4 refers to the interaction between LS and income in deciles regarding childlessness based upon both between- and within-family models. Whereas males from the lowest income deciles have the highest probabilities of being childless by age 39 or later, men from the highest income groups are less likely to stay childless by this age. But not only the magnitudes are different across income deciles. The coefficients across LS scores also differ within income groups. In general, lower LS scores are linked with higher probabilities, and higher LS are associated with lower probabilities to remain childless. Most distinct patterns can be observed in lower income deciles. Figure A22 in the Appendix shows the corresponding patterns with regards to offspring counts. Figures A23 and A24 demonstrate the interaction between LS and education as well as between LS and marital status regarding number of children as fertility outcome.
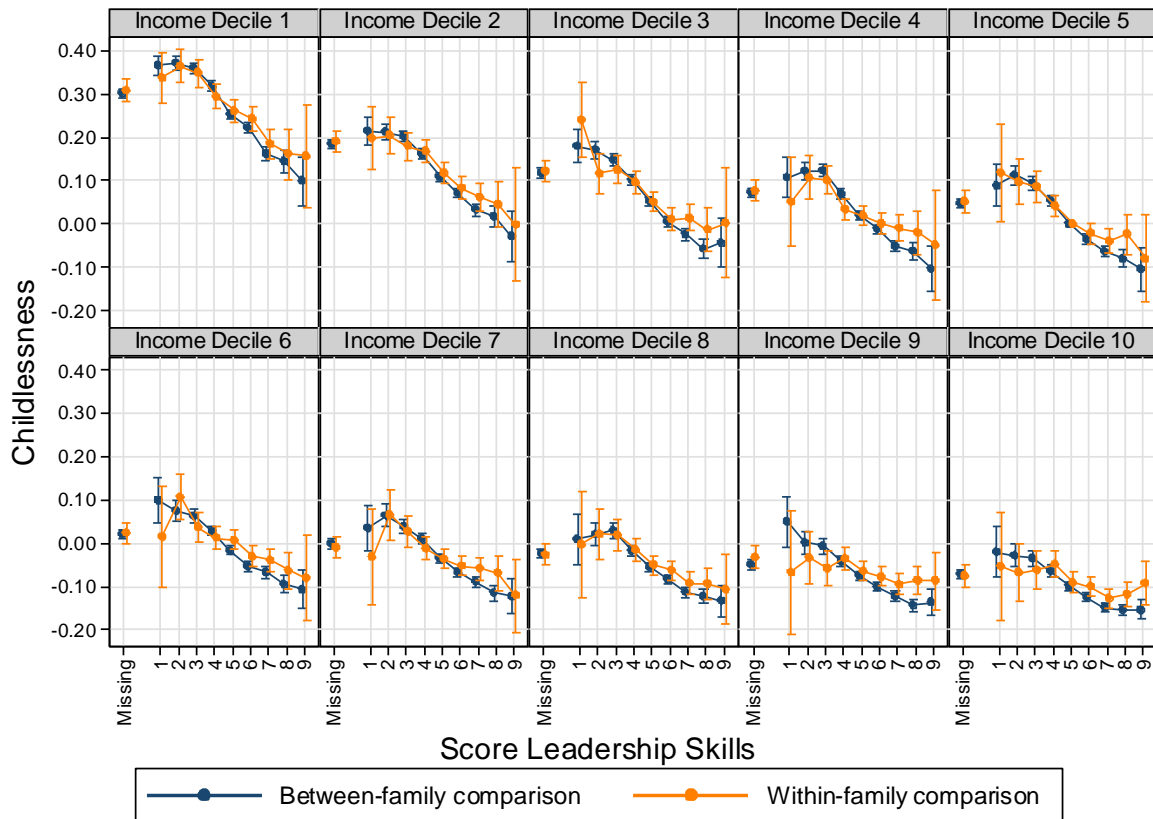
Figure 4: The relationship between leadership scores measured at ages 17-20 and the probability to remain childless by age 39 and higher amongst Swedish men born 1963-1979. Linear probability models by income deciles, error bars are 95% confidence intervals.
Note: Models control for cognitive ability, birth year, birth order, and in case of between-family considerations for sibling group size.

The association between LS and childlessness by age 39 and higher according to marital status is shown in Fig. 5. Estimates from between-family considerations are very similar to the ones from within-family models. Findings for men who ever got married demonstrate that LS do not seem to play a great role with regards to the probability to remain childless. Negative associations between LS and childlessness (coefficients between 0.06 and -0.04) are rather marginal compared to the reference group (LS=5). These correlations are attenuated when controlled for shared factors. With respect to males who have never been married, there is a clear relationship between LS and fertility. Men with lowest LS scores (1, 2, 3) show a more than 35% (within-family) or 40% (between-family) higher probability to remain childless by age

39 and higher compared to the reference group (LS score 5, ever married). Highest LS scores (7, 8, 9) are still positively linked to childlessness but to a smaller extent (coefficients of 0.15-0.2). These results suggest that LS play an important role for partnership formation, which shapes fertility differences. Findings with respect to offspring counts are shown in Figure A24 in Appendix.
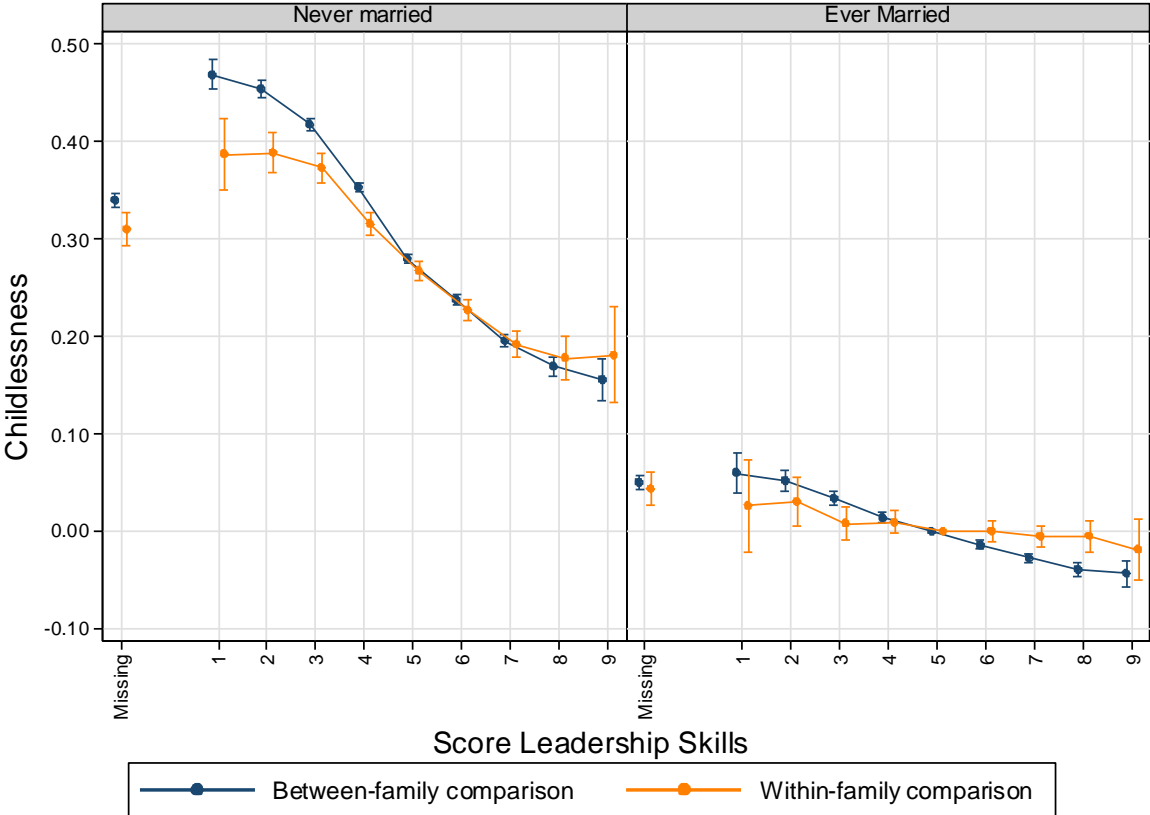

Figure 5: The relationship between leadership scores measured at ages 17-20 and the probability to remain childless by age 39 and higher amongst Swedish men born 1963-1979. Linear probability models by marital status, error bars are 95% confidence intervals.
Note: Models control for cognitive ability, birth year, birth order, and in case of between-family considerations for sibling group size.

Discussion

Conclusions

Our study examines the relationship between leadership skills (LS) and family formation among males in Sweden. Swedish register data allowed us to analyze the extent to which LS scores (measured at time of military conscription) are linked with marriage, number of children and childlessness by age 39 and higher. Findings from Poisson Regression and Linear Probability models have shown a positive association between LS and the probability of getting married by age 39. Additionally, higher LS are linked with a higher offspring count and lower levels of childlessness, and lower LS are associated with fewer children and higher levels of childlessness.

In general, our results show associations in (reversed) S-shape patterns in full models including all covariates. Comparisons between within-family (fixed effects approach) and between-family considerations indicate no strong differences in the link between LS and family formation processes, indicating that differences in family formation by LS scores are not strongly driven by shared family background factors. However, fertility differences by income decile and marital status are evident. The association between LS and fertility appears particularly stronger among men in lower income deciles, and men who have never been married but not so strong differences have been found according to educational level. Additional analyses have shown that men with low income and high education show steeper positive slopes in the personality-fertility link, indicating that this subgroup is driving the observed patterns particularly well (Fig. A25-A26). This indicates important moderating roles of the socio-economic indicators and marital status for the LS-fertility link.

The mediating role is suggested by comparing coefficients from models with and without potential mediators (income, education, parenthood/marital status). However, mediation approaches a) (LPM) and b) (KHB) based on longitudinal data do not support this conclusion. Mediation effects of SES and marital status/parenthood are

rather small, and there are several potential explanations for this. First, the time order of mediators and family formation outcomes may be reversed for many individuals. For instance, the majority of children was born outside of marriage in the most recent decades in Sweden (Eurostat, 2018), i.e. the mediation effect of marriage for the LS-fertility link may be rather limited. Similarly, income may increase stronger after entering parenthood, which suggests that LS may predict fertility leading to higher income levels. Previous research has supported this idea of the so called fatherhood premium effect for the Swedish context, i.e. men benefit particularly strong from entering fatherhood by increasing income (Angelov et al., 2016; Bygren et al., 2021). This may partly explain why no large mediation effects could have been observed.

Moreover, it may be possible that even small effects may cumulate over time to a larger effect, as suggested in the LPM using cross-sectional data at the end of fertility history. This association may also get back to other unmeasured factors. For instance, LS may be an attractive trait on the partner market so that leaders are more likely to be in a partnership than non-leaders (Miller et al., 2009). Furthermore, leadership can be seen as important factor for relationship success, e.g. by beneficial effects of a leader's communication skills (Porter & Baker, 2005). This would increase the chances of getting married and getting children. Furthermore, mediation analyses have revealed that LS are particularly strongly linked with the transition to second childbirth. This may indicate that LS of Swedish men are of particular relevance for this birth parity. Potential explanations must remain speculative but it may be rather common to get at least one child so that LS of the potential fathers do not play a great role. Getting a second child may be stronger affected by parental skills, and having high LS may be beneficial for males since women may consider the partner's LS useful for raising more than one child.

It is important to interpret these findings cautiously since a large number of males was not assessed regarding their LS. It seems that mainly individuals on the top half of the cognitive skills distribution have been evaluated according to their LS. To keep individuals with missing values on LS in our analyses, we include them as a separate category in our statistical analyses. Although the results do not allow us to evaluate the relationship between LS and the various outcomes that we study for the men with missing values, we can see that men who have missing values on LS have similar fertility patterns to men who have low leadership scores.

Limitations and Strengths

Our study has both strengths and limitations. One of the most important weaknesses of our analyses is it that we cannot examine the relationship between LS and family formation for women in Sweden since information on LS have only been available for men who attended the military recruitment. Additionally, there is evidence that kin effects on own fertility are potentially important as different relatives (and different ties) might affect individuals' fertility differently. For instance, older brothers may influence women's fertility differently than older sisters do (Sear et al., 2003). Apart from sisters who had to be ignored using Swedish register data, we could not capture other social influences by peer groups (e.g. friends) that may play an important role as well.

Another limitation relates to the reciprocal link between LS and potential mediators. We could examine the association between LS measured at military recruitment and income, education as well as marital status by age 39. This analytical approach is in line with previous research. For instance, personality may predict career development (Silver & Spilerman, 1990) and occupation indicators such as income, in particular if

the personality facets fit to the job demands (Denissen et al., 2018). However, we had to neglect the reverse relationship between mediators and LS since no changes in LS over time have been recorded. Previous research suggests that personality facets may change due to certain life events in younger adulthood, e.g. the first romantic relationship or the transition to work or university (Bleidorn et al., 2018). Additionally, previous research has shown that personality changes may be observed over time, in particular when it is measured by interviews instead of questionnaires (Hopwood & Bleidorn, 2018). Nevertheless, LS was measured in early adulthood, and this obviates any concerns about reverse causality driving the association that we observe between LS scores and fertility.

On the other hand, our study has a number of strengths. Due to the unique identification number that each individual in Sweden obtains, we could link LS from military service data with a number of socio-demographically relevant factors such as fertility, marital status, or education. The power of our data furthermore allowed us to compare male siblings to each other in order to examine whether within-family analyses reveal differences compared to between-family considerations.

Another strength of our study is it to explore the prospective association between LS measured at age of military recruitment (17-20 years) and virtually completed family formation in mid-adulthood (age 39 and higher). One previous study by Jokela and Keltikangas-Järvinen (2009) reveals a similar study design on fertility. However, the sample of the authors was coming from the Cardiovascular Risk in Young Finns Study and, therefore, was much smaller, with about 1,300 participants. Furthermore, the participants in their study were aged 30-39. Contrary, our analyses were based on males who were 39 years or older and, therefore, could be considered as having largely completed fertility.

Register data from Sweden has further advantages over survey data. For instance, surveys usually suffer from selection biases since some individuals may reject participation for various reasons. These individuals may reveal specific patterns with regards to our research interest. For instance, disadvantaged males may be both more likely to reject survey participation and less likely to get children. These would bias the results in analyses based on survey data. We must condition our analyses on males with higher cognitive abilities since only these men received a score according to their LS. Contrary to other studies using survey data, we are aware of the reasons behind the missing values on LS. We controlled for cognitive abilities in our models and have not found very large differences compared to models without this factor. Nevertheless, it is possible that we are underestimating the effect of LS on fertility. As shown in Fig. A27 and A28, scores from the top half of the IQ distribution show a positive linear association with LS. Lower IQ scores are linked with lower LS scores but uncertainty for this group is higher (IQ score 1 is very rare in our data so that these estimates are not very reliable). Therefore, the negative association between lower LS scores and fertility from our analyses may even be underestimated since low IQ and low LS may be detrimental on the partner market.

Outlook

Although the LS-fertility link could be explored on a population-level based on Swedish register data among males, there is still much room to examine this specific association further. For instance, it would be interesting to explore the leadership-fertility link among women as well since previous research suggests that females reveal different, even stronger, associations with fertility (Jokela & Keltikangas-Järvinen, 2009). Furthermore, there are more personality facets that may deserve more attention in

fertility research. The Swedish Military Enlistment data provide further information on intensity (self-motivation, frequency and intensity of leisure time activities), social maturity (extraversion, social network size, responsibility, independence), emotional stability (ability to manage nervousness and stress), and psychological energy (perseverance, concentration) (Bihagen et al., 2013) that may affect childbearing as well. Additionally, personality may affect other important life outcomes with respect to family formation, e.g. marital behavior. The personality-fertility link may also be explored in other cultural contexts, in particular considering the differences in the association between SES and fertility in the Scandinavian countries on the one hand and other (high-income) countries on the other.

References

Aldén, L., Boschini, A. D., & Sundström, M. (2022). Who Becomes a Father? The Rising Importance of Non-Cognitive Ability. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4207533

Allred, K. W., & Hancock, C. L. (2015). Reconciling Leadership and Partnership: Strategies to Empower Professionals and Families. *Young Children*, *70*(2), 46–53.

Andersson, G., & Scott, K. (2007). Childbearing dynamics of couples in a universalistic welfare state: The role of labor-market status, country of origin, and gender. *Demographic Research*, *17*, 897–938. https://doi.org/10.4054/DemRes.2007.17.30

Anderton, D. L., Tsuya, N. O., Bean, L. L., & Mineau, G. P. (1987). Intergenerational transmission of relative fertility and life course patterns. *Demography*, *24*(4), 467–480. https://doi.org/10.2307/2061386

Andeweg, R. B., & Berg, S. B. V. D. (2003). Linking Birth Order to Political Leadership: The Impact of Parents or Sibling Interaction? *Political Psychology*, *24*(3), 605–623. https://doi.org/10.1111/0162-895X.00343

Angelov, N., Johansson, P., & Lindahl, E. (2016). Parenthood and the Gender Gap in Pay. *Journal of Labor Economics*, *34*(3), 545–579. https://doi.org/10.1086/684851

Bar, M., Hazan, M., Leukhina, O., Weiss, D., & Zoabi, H. (2018). Why did rich families increase their fertility? Inequality and marketization of child care. *Journal of Economic Growth*, *23*(4), 427–463. https://doi.org/10.1007/s10887-018-9160-8

Barclay, K. J. (2015). A within-family analysis of birth order and intelligence using population conscription data on Swedish men. *Intelligence*, *49*, 134–143. https://doi.org/10.1016/j.intell.2014.12.007

Barclay, K., & Kolk, M. (2020). The Influence of Health in Early Adulthood on Male Fertility. *Population and Development Review*, *46*(4), 757–785. https://doi.org/10.1111/padr.12357

Benmira, S., & Agboola, M. (2021). Evolution of leadership theory. *BMJ Leader*, *5*, 3–5. https://doi.org/10.1136/leader-2020-000296

Bihagen, E., Nermo, M., & Stern, C. (2013). Class Origin and Elite Position of Men in Business Firms in Sweden, 1993-2007: The Importance of Education, Cognitive Ability, and Personality. *European Sociological Review*, *29*(5), 939–954. https://doi.org/10.1093/esr/jcs070

Bleidorn, W., Hopwood, C. J., & Lucas, R. E. (2018). Life Events and Personality Trait Change: Life Events and Trait Change. *Journal of Personality*, *86*(1), 83–96. https://doi.org/10.1111/jopy.12286

Boone, L. W., & Peborde, M. S. (2008). Developing Leadership Skills in College and Early Career Positions. *Review of Business*, *28*(3), 3–13.

Brons, M. D. (Anne), Liefbroer, A. C., & Ganzeboom, H. B. G. (2021). Parental socioeconomic status and the timing of first marriage: What is the role of unmarried cohabitation? Results from a cross-national comparison. *Demographic Research*, *45*, 469–516. https://doi.org/10.4054/DemRes.2021.45.15

Brunello, G., & De Paola, M. (2013). Leadership at school: Does the gender of siblings matter? *Economics Letters*, *120*(1), 61–64. https://doi.org/10.1016/j.econlet.2013.03.030

Buss, D. M. (1994). The Strategies of Human Mating. *American Scientist*, *82*(3), 238–249.

Buyukkececi, Z., & Leopold, T. (2021). Sibling influence on family formation: A study of social interaction effects on fertility, marriage, and divorce. *Advances in Life Course Research*, *47*, 100359. https://doi.org/10.1016/j.alcr.2020.100359

Bygren, M., Gähler, M., & Magnusson, C. (2021). The Constant Gap: Parenthood Premiums in Sweden 1968–2010. *Social Forces*, *100*(1), 137–168. https://doi.org/10.1093/sf/soaa097

Chudnovskaya, M. (2019). Trends in Childlessness Among Highly Educated Men in Sweden. *European Journal of Population*, *35*(5), 939–958. https://doi.org/10.1007/s10680-018-9511-3

Cools, S., & Hart, R. K. (2015). The Effect of Childhood Family Size on Fertility in Adulthood: New Evidence From IV Estimation. *Demography*, *54*(1), 23–44. https://doi.org/10.1007/s13524-016-0537-z

Cools, S., & Kaldager Hart, R. (2017). The Effect of Childhood Family Size on Fertility in Adulthood: New Evidence From IV Estimation. *Demography*, *54*(1), 23–44. https://doi.org/10.1007/s13524-016-0537-z

Cummins, D. (2006). Dominance, Status, and Social Hierarchies. In D. M. Buss (Ed.), *The Handbook of Evolutionary Psychology* (pp. 676–697). John Wiley & Sons, Inc. https://doi.org/10.1002/9780470939376.ch23

Dahlberg, J., & Kolk, M. (2018). Explaining Swedish sibling similarity in fertility: Parental fertility behavior vs. social background. *Demographic Research*, *39*, 883–896. https://doi.org/10.4054/DemRes.2018.39.32

De Neve, J.-E., Mikhaylov, S., Dawes, C. T., Christakis, N. A., & Fowler, J. H. (2013). Born to lead? A twin design and genetic association study of leadership role occupancy. *The Leadership Quarterly*, *24*(1), 45–60. https://doi.org/10.1016/j.leaqua.2012.08.001

Denissen, J. J. A., Bleidorn, W., Hennecke, M., Luhmann, M., Orth, U., Specht, J., & Zimmermann, J. (2018). Uncovering the Power of Personality to Shape Income. *Psychological Science*, *29*(1), 3–13.

Duvander, A.-Z., & Kridahl, L. (2020). Decisions on marriage? Couples' decisions on union transition in Sweden. *Genus*, *76*(1), 1–21. https://doi.org/10.1186/s41118-020-00092-5

Erola, J., Harkonen, J., & Dronkers, J. (2012). More Careful or Less Marriageable? Parental Divorce, Spouse Selection and Entry into Marriage. *Social Forces*, *90*(4), 1323–1345. https://doi.org/10.1093/sf/sos073

Eurostat. (2018). *Marriage now more common in Sweden*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Marriages_and_births_in_Sweden&oldid=396647#More_children_per_woman_during_the_2000s

Floris, M., Wiblen, S. L., & Anichenko, E. (2020). Senior Project Leadership Skills and Career Stallers: Analysis of Perception Differences and Implications for Careers. *Project Management Journal*, *51*(2), 214–234. https://doi.org/10.1177/8756972820907491

Garn, A. C., Matthews, M. S., & Jolly, J. L. (2012). Parents' role in the academic motivation of students with gifts and talents. *Psychology in the Schools*, *49*(7), 656–667. https://doi.org/10.1002/pits.21626

Greenleaf, R. K. (2002). *Servant Leadership. A Journey Into the Nature of Legitimate Power and Greatness*. Paulist Press.

Grönqvist, E., & Lindqvist, E. (2015). *Kan man lära sig ledarskap? Befälsutbildning under värnplikten och utfall på arbetsmarknaden* (4). Institutet för arbetsmaknads- och utbildningspolitisk utvärdering.

Gunn, R. W. (2000). Can leadership be taught? *Strategic Finance*, *82*(6), 14–16.

Hart, R. K., & Cools, S. (2019). Identifying interaction effects using random fertility shocks. *Demographic Research*, *40*, 261–278. https://doi.org/10.4054/DemRes.2019.40.10

Hartman, S. J., & Harris, O. J. (1992). The Role of Parental Influence in Leadership. *The Journal of Social Psychology*, *132*(2), 153–167. https://doi.org/10.1080/00224545.1992.9922968

Hopcroft, R. L. (2006). Sex, status, and reproductive success in the contemporary United States. *Evolution and Human Behavior*, *27*(2), 104–120. https://doi.org/10.1016/j.evolhumbehav.2005.07.004

Hopcroft, R. L. (2015). Sex differences in the relationship between status and number of offspring in the contemporary U.S. *Evolution and Human Behavior*, *36*(2), 146–151. https://doi.org/10.1016/j.evolhumbehav.2014.10.003

Hopp, C., & Pruschak, G. (2023). Is there such a thing as leadership skill? – A replication and extension of the relationship between high school leadership positions and later-life earnings. *The Leadership Quarterly*, *34*(4), 101475. https://doi.org/10.1016/j.leaqua.2020.101475

Hopwood, C. J., & Bleidorn, W. (2018). Stability and change in personality and personality disorders. *Current Opinion in Psychology*, *21*, 6–10. https://doi.org/10.1016/j.copsyc.2017.08.034

Horishna, N., Slozanska, H., Soroka, O., & Romanovska, L. (2019). Exploring the Leadership Skills of Pre-Service Social Work Students: Implications for Social Work Education. *Problems of Education in the 21st Century*, *77*(5), 598–615. https://doi.org/10.33225/pec/19.77.598

Hunt, T., & Fedynich, L. C. (2018). Leadership: Past, Present, and Future: An Evolution of an Idea. *Journal of Arts and Humanities*, *08*(02), 20–26.

Jalovaara, M., & Fasang, A. E. (2020). Family Life Courses, Gender, and Mid-Life Earnings. *European Sociological Review*, *36*(2), 159–178. https://doi.org/10.1093/esr/jcz057

Jalovaara, M., Neyer, G., Andersson, G., Dahlberg, J., Dommermuth, L., Fallesen, P., & Lappegård, T. (2019). Education, Gender, and Cohort Fertility in the Nordic Countries. *European Journal of Population*, *35*(3), 563–586. https://doi.org/10.1007/s10680-018-9492-2

Johnson, N. E., & Stokes, C. S. (1976). Family size in successive generations: The effects of birth order, intergenerational change in lifestyle, and familial satisfaction. *Demography*, *13*(2), 175–187. https://doi.org/10.2307/2060799

Jokela, M., & Keltikangas-Järvinen, L. (2009). Adolescent Leadership and Adulthood Fertility: Revisiting the "Central Theoretical Problem of Human Sociobiology." *Journal of Personality*, *77*(1), 213–230. https://doi.org/10.1111/j.1467-6494.2008.00543.x

Kalmijn, M. (2011). The Influence of Men's Income and Employment on Marriage and Cohabitation: Testing Oppenheimer's Theory in Europe. *European Journal of Population / Revue Européenne de Démographie*, *27*(3), 269–293. https://doi.org/10.1007/s10680-011-9238-x

Kanazawa, S. (2003). Can Evolutionary Psychology Explain Reproductive Behavior in the Contemporary United States? *The Sociological Quarterly*, *44*(2), 291–302. https://doi.org/10.1111/j.1533-8525.2003.tb00559.x

Kohler, H.-P., Rodgers, J. L., & Christensen, K. (1999). Is Fertility Behavior in Our Genes? Findings from a Danish Twin Study. *Population and Development Review*, *25*(2), 253–288. https://doi.org/10.1111/j.1728-4457.1999.00253.x

Kolk, M. (2015). The causal effect of an additional sibling on completed fertility: An estimation of intergenerational fertility correlations by looking at siblings of twins. *Demographic Research*, *32*, 1409–1420. https://doi.org/10.4054/DemRes.2015.32.51

Kolk, M. (2019). The relationship between lifecourse accumulated income and childbearing of Swedish men and women born 1940-1970. *Stockholm Research Reports in Demography*, *19*, 1–31.

Kolk, M., & Barclay, K. (2021). Do income and marriage mediate the relationship between cognitive ability and fertility? Data from Swedish taxation and conscriptions registers for men born 1951–1967. *Intelligence*, *84*, 1–11. https://doi.org/10.1016/j.intell.2020.101514

Kragt, D., & Day, D. V. (2020). Predicting Leadership Competency Development and Promotion Among High-Potential Executives: The Role of Leader Identity. *Frontiers in Psychology*, *11*, 1–16. https://doi.org/10.3389/fpsyg.2020.01816

Kuhn, P., & Weinberger, C. (2005). Leadership Skills and Wages. *Journal of Labor Economics*, *23*(3), 395–436. https://doi.org/10.1086/430282

Kuo, J. C.-L., & Raley, R. K. (2016). Is It All About Money? Work Characteristics and Women's and Men's Marriage Formation in Early Adulthood. *Journal of Family Issues*, *37*(8), 1046–1073. https://doi.org/10.1177/0192513X14530973

Kuziemko, I. (2006). Is Having Babies Contagious? Estimating Fertility Peer Effects Between Siblings. *Unpublished Manuscript, New Jersey*, 1–36.

Lindqvist, E., & Vestman, R. (2010). *Web Appendix (B-F): The Labor Market Returns to Cognitive and Noncognitive Ability: Evidence from the Swedish Enlistment*.

Ludvigsson, J. F., Berglind, D., Sundquist, K., Sundström, J., Tynelius, P., & Neovius, M. (2022). The Swedish military conscription register: Opportunities for its use in medical research. *European Journal of Epidemiology*. https://doi.org/10.1007/s10654-022-00887-0

Lund, O. C. H., Tamnes, C. K., Moestue, C., Buss, D. M., & Vollrath, M. (2007). Tactics of hierarchy

negotiation. *Journal of Research in Personality*, *41*(1), 25–44.

https://doi.org/10.1016/j.jrp.2006.01.002

Lyngstad, T. H., & Prskawetz, A. (2010). Do siblings' fertility decisions influence each other?

Demography, *47*(4), 923–934. https://doi.org/10.1007/BF03213733

Malakyan, P. G. (2014). Followership in Leadership Studies: A Case of Leader-Follower Trade

Approach. *Journal of Leadership Studies*, *7*(4), 6–22. https://doi.org/10.1002/jls.21306

Maurer, T. J., Hartnell, C. A., & Lippstreu, M. (2017). A model of leadership motivations, error

management culture, leadership capacity, and career success. *Journal of Occupational and*

Organizational Psychology, *90*(4), 481–507. https://doi.org/10.1111/joop.12181

Miller, S., Lansford, J. E., Costanzo, P., Malone, P. S., Golonka, M., & Killeya-Jones, L. A. (2009). Early

Adolescent Romantic Partner Status, Peer Standing, and Problem Behaviors. *The Journal of*

Early Adolescence, *29*(6), 839–861. https://doi.org/10.1177/0272431609332665

Mills, M. C., Barban, N., & Tropf, F. C. (2018). The Sociogenomics of Polygenic Scores of Reproductive

Behavior and Their Relationship to Other Fertility Traits. *RSF: The Russell Sage Foundation*

Journal of the Social Sciences, *4*(4), 122–136. https://doi.org/10.7758/RSF.2018.4.4.07

Mills, M. C., & Tropf, F. C. (2015). The Biodemography of Fertility: A Review and Future Research

Frontiers. *KZfSS Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, *67*(S1), 397–424.

https://doi.org/10.1007/s11577-015-0319-4

Ministry of Defense Sweden. (1984). *Conscription in the future* (71; Swedish Government Official

Reports).

https://lagen.nu/sou/1984:71?attachment=index.pdf&repo=soukb&dir=downloaded

Mönstringshandboken. (2021). Plikt-och prövningsverket.

https://pliktverket.se/download/18.3b29fb261791cde3ba045b1/1620048296684/Monstring

shandboken-2021.pdf

Morosow, K., & Kolk, M. (2020). How Does Birth Order and Number of Siblings Affect Fertility? A

Within-Family Comparison Using Swedish Register Data. *European Journal of Population*,

36(2), 197–233. https://doi.org/10.1007/s10680-019-09525-0

Murphy, M. (2013). Cross-National Patterns of Intergenerational Continuities in Childbearing in

Developed Countries. *Biodemography and Social Biology*, *59*(2), 101–126.

https://doi.org/10.1080/19485565.2013.833779

Murphy, M., & Knudsen, L. B. (2002). The intergenerational transmission of fertility in contemporary

Denmark: The effects of number of siblings (full and half), birth order, and whether male or

female. *Population Studies*, *56*(3), 235–248. https://doi.org/10.1080/00324720215937

Nettle, D., & Pollet, T. V. (2008). Natural Selection on Male Wealth in Humans. *The American

Naturalist*, *172*(5), 658–666. https://doi.org/10.1086/591690

Nisén, J., Martikainen, P., Silventoinen, K., & Myrskylä, M. (2014). Age-specific fertility by educational

level in the Finnish male cohort born 1940–1950. *Demographic Research*, *31*, 119–136.

https://doi.org/10.4054/DemRes.2014.31.5

Ohlsson-Wijk, S. (2014). Digit preferences in marriage formation in Sweden: Millennium marriages

and birthday peaks. *Demographic Research*, *30*, 739–752.

https://doi.org/10.4054/DemRes.2014.30.25

Özcan, M., Gür, R., Eranil, A. K., & Ericok, B. (2019). Investigation of the Critical Leadership Scores of

Candidate Teachers by Parental Education Levels. In S. S. Ercetin & N. Potas (Eds.), *Chaos,

Complexity and Leadership 2017. Explorations of Chaos and Complexity Theory* (pp. 557–

567). Spring.

Palmo, N. J. (2015). *Why do Swedes Marry? Examining the Difference between Marriage and

Cohabitation in Sweden*. University of Texas at Austin.

Peters, S. (2023). The prospective power of personality for childbearing: A longitudinal study based

on data from Germany. *Genus*, *79*(1), 6. https://doi.org/10.1186/s41118-023-00184-y

Porter, J., & Baker, E. L. (2005). Partnering Essentials. *Journal of Public Health Management and Practice*, *11*(2), 174–177. https://doi.org/10.1097/00124784-200503000-00013

Rapp, I. (2018). Partnership Formation in Young and Older Age. *Journal of Family Issues*, *39*(13), 3363–3390. https://doi.org/10.1177/0192513X18783469

Regan, P. C., & Berscheid, E. (1997). Gender Differences in Characteristics Desired in a Potential Sexual and Marriage Partner. *Journal of Psychology & Human Sexuality*, *9*(1), 25–37. https://doi.org/10.1300/J056v09n01_02

Rohrer, J. M., Egloff, B., & Schmukle, S. C. (2015). Examining the effects of birth order on personality. *Proceedings of the National Academy of Sciences*, *112*(46), 14224–14229. https://doi.org/10.1073/pnas.1506451112

Sassler, S., Roy, S., & Stasny, E. (2014). Men's economic status and marital transitions of fragile families. *Demographic Research*, *30*, 71–110. https://doi.org/10.4054/DemRes.2014.30.3

SCB CPI. (2022). CPI, Fixed Index Numbers (1980=100). https://www.scb.se/en/finding-statistics/statistics-by-subject-area/prices-and-consumption/consumer-price-index/consumer-price-index-cpi/pong/tables-and-graphs/consumer-price-index-cpi/cpi-fixed-index-numbers-1980100/

Schneider, D. (2011). Wealth and the Marital Divide. *American Journal of Sociology*, *117*(2), 627–667. https://doi.org/10.1086/661594

Schneider, D., Harknett, K., & Stimpson, M. (2018). What Explains the Decline in First Marriage in the United States? Evidence from the Panel Study of Income Dynamics, 1969 to 2013. *Journal of Marriage and Family*, *80*(4), 791–811. https://doi.org/10.1111/jomf.12481

Sear, R., Mace, R., & McGregor, I. A. (2003). The effects of kin on female fertility in rural Gambia. *Evolution and Human Behavior*, *24*(1), 25–42. https://doi.org/10.1016/S1090-5138(02)00105-8

Shafer, K., & James, S. L. (2013). Gender and Socioeconomic Status Differences in First and Second Marriage Formation: Comparing First and Second Marriage Formation. *Journal of Marriage and Family*, *75*(3), 544–564. https://doi.org/10.1111/jomf.12024

Silver, C. B., & Spilerman, S. (1990). Psychoanalytic Perspectives on Occupational Choice and Attainment. *Research in Social Stratification and Mobility*, *9*, 181–214.

Skirbekk, V. (2008). Fertility trends by social status. *Demographic Research*, *18*, 145–180. https://doi.org/10.4054/DemRes.2008.18.5

South, S. J. (2001). The Variable Effects of Family Background on the Timing of First Marriage: United States, 1969–1993. *Social Science Research*, *30*(4), 606–626. https://doi.org/10.1006/ssre.2001.0714

Statistics Sweden. (2024). *Average age, first marriage by sex and year*. https://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__BE__BE0101__BE0101L/Gift Medelalder/table/tableViewLayout1/

Stone, C. B., Lengnick-Hall, M., & Muldoon, J. (2018). Do Stereotypes of Veterans Affect Chances of Employment? *The Psychologist-Manager Journal*, *21*(1), 1–33.

Stulp, G., Sear, R., Schaffnit, S. B., Mills, M. C., & Barrett, L. (2016). The Reproductive Ecology of Industrial Societies, Part II: The Association between Wealth and Fertility. *Human Nature*, *27*(4), 445–470. https://doi.org/10.1007/s12110-016-9272-9

Sullivan, D. R.-E. (2009). *Learning to Lead. Effective Leadership Skills for Teachers of Young Children*. Redleaf Press.

Sulloway, F. J. (1996). *Born to rebel: Birth order, family dynamics, and creative lives.* Pantheon Books.

Sweeney, M. M. (2002). Two Decades of Family Change: The Shifting Economic Foundations of Marriage. *American Sociological Review*, *67*(1), 132. https://doi.org/10.2307/3088937

Thomson, E., & Bernhardt, E. (2010). Education, Values, and Cohabitation in Sweden. *Marriage & Family Review*, *46*(1–2), 1–21. https://doi.org/10.1080/01494921003648431

VanderWeele, T. J. (2016). Mediation Analysis: A Practitioner's Guide. *Annual Review of Public Health*, *37*(1), 17–32. https://doi.org/10.1146/annurev-publhealth-032315-021402

Weiss, E. S., Anderson, R. M., & Lasker, R. D. (2002). Making the Most of Collaboration: Exploring the Relationship Between Partnership Synergy and Partnership Functioning. *Health Education & Behavior*, *29*(6), 683–698. https://doi.org/10.1177/109019802237938

Wolfinger, N. H. (2003). Wolfinger 2003.pdf. *Social Forces*, *82*(1), 337–353.