# Understanding Intergenerational Transmission of Fertility over Three Generations – Socialization of Fertility Preferences or Transmission of Socioeconomic Traits?

Martin Kolk[1]

**Abstract**

A number of studies have documented consistent patterns of intergenerational transmission of fertility. The reason why children replicate the family size of their parents has however seldom been extensively covered. The goal of this study is to examine if socialized values on family size explain observed fertility associations or if they rather are a result of continuities in socioeconomic traits. Swedish registry data on childbearing histories, demographic events and socioeconomic can be used to disentangle the various possible explanations of observed fertility continuities. Data is collected for the Swedish 1970-1982 cohorts who are linked with parents and grandparents. Event history models are used in which young men's and women's childbearing histories are studied with covariates on own and parental and grandparental characteristics. Results show that some of the associations can be explained by continuities in education and socioeconomic status but that the primary explanation appear to be explained by transmission of values and preferences on family size.

[1] martin.kolk@sociology.su.se

## Introduction

Children are more likely to replicate the family size of their parents than of other members of their parents' generation. This relationship is of moderate strength but has been found constantly in developed societies and seems to be growing in strength over time (Murphy 1999). While the existence of intergenerational fertility is beyond question the causes of these fertility associations are poorly understood. Several explanations have been suggested to explain this association, including childhood socialization (e. g. Anderton, Tsuya, Bean, and Mineau 1987; Johnson and Stokes 1976; Preston 1976), transmission of socioeconomic traits (e. g. Barber 2001; Duncan, Freedman, Coble, and Slesinger 1965) or genetic heritability (e. g. Kohler, Rodgers, and Christensen 1999; Pearson, Lee, and Bramley-Moore 1899; Rodgers, Kohler, Kyvik, and Christensen 2001).

Most of the literature has focused on two main pathways that explain observed intergenerational fertility correlations. The first pathway is transmission of preferences and values on what is an ideal life course, family size and fertility timing. This is typically explained as a socialization process taking place during childhood in which children are thought and shaped by the behavior of their parents. A possible competing explanation is that intergenerational fertility associations primarily are a consequence of socioeconomic associations between generations. Educational levels and occupational class are correlated between generations. If these socioeconomic traits by themselves are associated with fertility any observed association in fertility could be entirely due to socioeconomic continuities.

The aim of this study is to better understand the degree to which fertility is mediated by socioeconomic factors relative socialized preferences and tastes for children. The quality of the data in the study makes it possible to answer this question in greater detail then previous research. The study is based on the complete Swedish population, has information of the majority of the childbearing careers of three generations and has information on both educational level and socioeconomic characteristics in three generations.

This study will look at intergenerational fertility in three generations. The fertility of an index generation (1970-1982 cohorts), their parents and their grandparents is examined. The study use Swedish administrative registry data on the complete Swedish population. Information on fertility histories, educational histories and occupational class is included in all three generations. Event history analysis on the transition to $1^{st}$, $2^{nd}$ and $3^{rd}$ birth of the index population. Intergenerational transmission of fertility is measured by covariates on parents

and grandparents fertility histories. Socioeconomic characteristics, survival and geographical distance are also included as covariates to distinguish between the different pathways explaining the fertility transmission. By distinguishing the effect of parents from grandparents one can distinguish the influence of a broader family background from the effect the immediate family of upbringing.

**Background**

Intergenerational associations in completed family size exists in modern societies. The correlation between generations have been characterized as relatively strong by some scholars (e. g. Murphy 1999; Murphy and Wang 2001) and weak by others (Duncan, Freedman, Coble, and Slesinger 1965; Johnson and Stokes 1976). Pearson correlations between family size of parents and their children is around 0.1 and 0.15 in most western populations (Murphy 1999). Research has also shown that timing of fertility is associated across generations (Barber 2001; Steenhof and Liefbroer 2008), with a specific focus on teenage fertility (e. g. Kahn and Anderson 1992). There also exist an intragenerational influence of fertility between siblings (Lyngstad and Prskawetz 2010).

Strong intergenerational continuities in socioeconomic position have been found in studies looking at stratification of human societies. Occupational class, education and income of parents and their children are correlated in virtually all societies, even if the extent of these correlations can vary considerably across time and space. Sweden has a comparatively high intergenerational social mobility (Breen 2004) but even so continuities in class, income and occupational rank are all much stronger than associations in fertility between generations.

While the existence of intergenerational fertility is well documented, the causes and mechanisms of why this exists is largely unexplored. One possible explanation of observed fertility associations is intergenerational socioeconomic patterns. Education and occupational class and income all affect fertility in important ways and if the socioeconomic characteristics persists between generations this could explain why fertility is correlated as well. Researcher studying intergenerational fertility has commonly acknowledged that socioeconomic transmission might be a key explanation of observed associations (Anderton, Tsuya, Bean, and Mineau 1987; Duncan, Freedman, Coble, and Slesinger 1965; Johnson and Stokes 1976; Preston 1976). The evidence in studies looking using a regression approach to control for characteristics of both generations is mixed. Zimmer & Fulton (1980) found that socioeconomic controls explained most association while (Ben-Porath 1975; Duncan,

Freedman, Coble, and Slesinger 1965; Murphy and Knudsen 2002; Murphy and Wang 2001) found that most of the effect remained. These studies have however been limited to relatively simple measurements of socioeconomic status, often looking only at education, potentially omitting important aspects of socioeconomic characteristics. It is important to understand that educational/occupational decisions and fertility decisions often are interrelated. People can and do choose length and timing of education based on fertility intentions. Therefore what appear as socioeconomic continuities might be influenced by fertility preferences.

The most common explanation for intergenerational associations in fertility has instead focused on the role of preferences, ideals and values. An important mechanism during and soon after the fertility transition was most likely transmission of knowledge and acceptance of fertility control (Anderton, Tsuya, Bean, and Mineau 1987) but in contemporary societies it appears more likely that tastes, ideals and preferences for children and/or family are more important. Most early research looking at family size and socioeconomic factors over two generations explained observed associations by socialization of values (e. g. Johnson and Stokes 1976; Preston 1976). Ideals and preferences on childbearing in the parent generation are important determinants of their children's fertility. In previous studies comparing ideal family size and actual parental family size, the former is stronger associated with the younger generation's eventual fertility (Axinn, Clarkberg, and Thornton 1994; Thornton 1980). Examples of norms and ideals regarding family size that could be associated through generations is both direct pathways like satisfaction/dissatisfaction with children, ideal family size or finding a strong/weak source of meaning in building a family. Norms and ideals could also be important with respect of marriage/first birth timing or general importance of living in a stable union. Finally it seems very plausible that different regions, ethnicities or religions are connected with varying ideas of an ideal/achievable family size which could explain fertility associations.

Much early research on intergenerational fertility was looking at genetic heritability (Fisher 1930; Pearson, Lee, and Bramley-Moore 1899). Early results supporting a genetic heritability were later questioned (e. g. Williams and Williams 1974) and the genetic heritability of fecundity was put into doubt. Recently there has been a reemergence of studies looking at genetic heritability of fertility using modern twin studies (Kirk, Blomberg, Duffy, Heath, Owens, and Martin 2001; Rodgers, Kohler, Kyvik, and Christensen 2001). Studies have shown a significant heritable component but the association appears to primarily relate to the timing of fertility (Rodgers, Hughes, Kohler, Christensen, Doughty, Rowe, and Miller 2001).

In other words if there is a genetic component it could operates as a cognitive preference for large/small family size or other behavioral response that relate to childbearing. Genetic heritability of socioeconomic factors (e. g. Tambs, Sundet, Magnus, and Berg 1989) and non-fertility related aspects like appearance and health could also be important. In this study genetic determinants of fertility will not be examined. It is plausible that genetic heritability explains some heritability, either by explaining a part of the heritability of fertility norms/preferences or by explaining a part of the heritability of socioeconomic norms. Notwithstanding a possible genetic influence the question to isolate the contribution of socioeconomic associations from preference/norm based explanations remains an important research task. A more mechanistic understanding of how genes affect preferences and socioeconomic characteristics necessitate future advances in the knowledge of the human genome.

This study will look at intergenerational fertility from a multigenerational perspective examining the fertility of three different generations. Multigenerational research is a growing trend in demography with an increasing awareness that multigenerational continuities plays a larger role than previously assumed (Mare 2011). Kolk (2011) as well as Murphy and Wang (2001) have found that even after controlling for family size in the middle generation there remain an association in fertility behavior between grandparents and their grandchildren. Multigenerational associations can also be helpful to try to disentangle the various mechanisms. Independent socioeconomic associations between three generations appear to be modest (Erola and Moisio 2007; Warren and Hauser 1997). Socioeconomic traits of grandparents and their grandparents are associated but this is almost entirely mediated by the middle generation. For socioeconomic traits it appears that it is possible to treat multigenerational lineages as a series of parent-child transmissions (i.e a Markov process). Kolk (2011) found independent effects of both the completed fertility of parents' siblings (i. e. aunts & uncles) and grandparents on the fertility of adults in contemporary Sweden. It is possible that these associations work both through direct socialization between grandparents and grandchildren, but also that it is a preference/taste for kinship and extended family networks that is acquired when the youngest generation grows up. Including three generations opens up new possibilities to better understand how fertility, socioeconomic traits and family preferences are transmitted across generations as well as providing new knowledge on multigenerational associations in social science.

Sweden is a good country to examine intergenerational transmission of fertility for several reasons. Foremost of these is the excellent administrative register data that has a longer longitudinal depth than any other country, the key requirements for studies on intergenerational demography. The registers were digitized in the sixties and detailed micro level information is available from 1960 with child-parent links starting in 1932. Another advantage is that cohort fertility rate has been almost flat for all cohorts born in the 20th century unlike most of Europe and the US. Sweden is also in many aspects a homogenous country which means that it is easier to study preferences for children and family size partly avoiding strong regional, ethnic or religious patterns.

**Research design**

Both parental socioeconomic characteristics and parental preferences of children are possibly transmitted from parents to children. The relative contribution of each and the interaction between the two pathways is however poorly understood. In this study parental and grandparental socioeconomic characteristics will be included in the models together with characteristics of the index person to explicitly estimate the role of family social background and how it affects intergenerational transmission of fertility.

The main goal of the study is to examine the different contribution of either a), multigenerational transmission of fertility values or b), multigenerational continuities in socioeconomic achievements to explain intergenerational transmission of fertility. The following hypotheses will be used to distinguish the two alternatives:

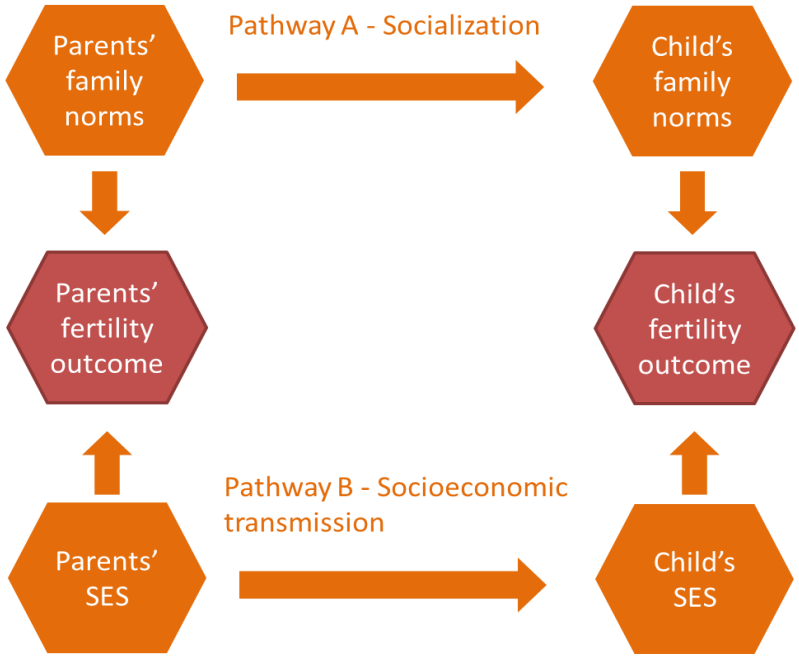
- If on the other hand intergenerational transmission of fertility is due to similar values and preferences on family life and childbearing decisions (a); the effect of parental and grandparental family size should remain broadly similar when controlling for socioeconomic traits.

- If intergenerational transmission of fertility primarily can be explained by intergenerational patterns in socioeconomic traits (b); association between parental and grandparental family size and the index generations fertility behavior should grow weaker when controls for education and occupational class of index generation, parents and grandparents are included.

Possible independent effects of grandparental characteristics can be used to examine if intergenerational associations are limited to the nuclear family or if there is an effect of the

extended family background. If intergenerational transmission of fertility and socioeconomic traits are limited to the transmission from the nuclear family there should be no independent effect of grandparental characteristics after controlling for parental characteristics. In addition covariates on geographic proximity (and survival) of kin should absorb some of the association between fertility of index persons and older kin if socialization in early adulthood matters. If on the other hand the effect of both parents and grandparents are limited to the period of upbringing geographical characteristics in adulthood should matter less.

Figure 1: Research Question




**Data and Methods**

Swedish administrative registers are used to collect information on the complete 1970 to 1982 cohorts (N≈920 000). The index cohort consists of all Swedish born children with two known parents who also both need to be born in Sweden. The population is followed until the end of 2007. These cohorts will be referred to as the index population and are linked to their biological parents and grandparents. Childbearing histories, demographic events and information on socioeconomic traits are linked to the index population and their parents and grandparents. By means of the Swedish multigenerational register extensive kinship networks can be constructed and virtually the entire cohorts of the study can be connected to their grandparents. A description on how these networks are constructed and some minor selection

issues are discussed in (Kolk 2011). Standard errors are presented together with relative risks to facilitate hypothesis testing.

Event history analysis (piecewise exponential hazard models) are applied on transition to 1st, 2nd and 3rd birth for the index generation. Measures using survival analysis focusing both on tempo and quantum of fertility are appropriate as previous analysis on multigenerational transmission of fertility in Sweden show that the effect is strong both for fertility quantum and tempo (Kolk 2011). Separate models are run for men and women. Subjects of the index population are followed starting either at age 16 or previous birth. Subjects remain in the population until censorship (at death, outmigration, twin birth, or the end of 2007) or until their (next) birth. Covariates on age and period are included in the models in addition to covariates controlling for socioeconomic characteristics of the index generation, parents and grandparents. A covariate on birth year of each grandmother is finally included. The degree of multicollinearity between covariates has been examined and only birth year of maternal and paternal grandmother is significantly correlated.

To measure intergenerational transmission of fertility the number of children of parents (number of siblings) and grandparents (number of uncles/aunts) are included as covariates. The covariates are based on ever-born children in 2007. For the parental generation a covariate on the number of children of the index persons mother is used. An additional covariates measure if the father had the same or fewer/more children. Only the fertility of grandmothers is used in the grandparental generation. This is acceptable due to high union stability in Sweden before the sixties. Additional explanatory covariates used in the study are: education level, socioeconomic status (SES) measured by occupational class, survival status, and geographical distance. Individual covariates on the characteristics of the index population are also included. These include educational level, mean income the last 3 years (not including years before age 20), educational enrollment, and if the person received social welfare.

Occupational is measured by means of the Erikson, Goldthorpe and Portocarero (EGP) class scheme converted from Statistics Sweden's Socioekonomisk Indelning (SEI). Data is collected from the Swedish 1960 census for the grandparental generation and the 1970 census for the parental generation. If information on occupation of a household member is not available the data on the head of household is used. Educational level is measured as any primary (up to 9 years), secondary (up to 12 years) or tertiary (12 or more years) education.

Data on education for grandparents and parents is also collected from the 1960 and 1970 censuses. Survival status and geographical status of parents and grandparents is measured using yearly registers on dwelling in a municipality and updated every year. Geographical distance is computed by comparing the distance between populations weighted geographical midpoint of municipalities of residence. Survival is measured by presence in the national registers and is more narrowly defined as presence in Sweden. It does therefore not distinguish between out-migration and death but because international migration is very rare at high ages this is a very close approximation of survival.

Characteristics of the index population are collected from yearly registers on educational level and income data. Four different measures are used, educational level income from the last three years, enrollment as a student and being a recipient of social welfare. Highest achieved educational level is measured yearly using national educational registers. Income is computed from national tax registers on income from labor, excluding ages younger than 20. Enrollment is measured as being a receiver of the universal allowances for university students in Sweden and is collected from the income registers. Data on being a recipient of social welfare is constructed in a similar way. Birth order of the index person is also included as a covariate by means of the multigenerational register as it has been speculated that it is an important predictor of intergenerational continuity in fertility (e. g. Johnson and Stokes 1976).

**Results**

The strength of intergenerational transmission of fertility is measured by the degree to which covariates on kin family size are associated with the hazard of birth for the index population. To answer the research question on the pathways explaining these fertility associations a succession of stepwise models are presented. By looking at the change in intergenerational fertility associations after the new covariates are introduced in the models one can examine the extent to which the explanatory controls affect the strength of intergenerational transmission of fertility. First results will be presented for transition to $1^{st}$ birth for women (table 1) and men (table 2). Each table includes four different models with different numbers of socioeconomic controls. After that a similar analysis will be done for transition to second and third birth for women (table 3) and men (table 4). Each of the later tables will include two models.

First results of transition to $1^{st}$ birth will be shown and discussed. Results on the transition to $2^{nd}$ and $3^{rd}$ birth will be shown afterwards. Relative risks for covariates on parental and

grandparental family size are shown. The first row of table 1 and table 2 shows the effect of parental and grandparental family size in a model which includes no socioeconomic controls for individual and kin. Following rows show the effect of parental and grandparental fertility with each additional model adding more controls in a succession of stepwise models. Model 2 additionally includes socioeconomic characteristics of the index person, model 3 also adds geographical proximity and survival of parents and grandparents and model 4 additionally includes SES and education of parents and grandparents.

Table 1: Event history model on transition to 1st birth for women born in Sweden between 1970-1982. Presentation on how kin-family size covariates affect birth hazard. Coefficients are relative risks for covariates of fertility of parents and grandparents.

| Nr. of children of kin | HR | SE | HR | SE | HR | SE | HR | SE |
|---|---|---|---|---|---|---|---|---|
| | Model 1* | | Model 2** | | Model 3*** | | Model 4**** | |
| Mother | no controls | | + ego's SES | | + distance | | + kin SES/education | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.14 | (0.012) | 1.15 | (0.010) | 1.14 | (0.01) | 1.16 | (0.012) |
| 3 | 1.24 | (0.012) | 1.26 | (0.011) | 1.26 | (0.011) | 1.28 | (0.012) |
| 4 to 5 | 1.44 | (0.015) | 1.44 | (0.014) | 1.43 | (0.014) | 1.45 | (0.015) |
| 6+ | 1.74 | (0.028) | 1.66 | (0.028) | 1.66 | (0.028) | 1.66 | (0.029) |
| Maternal grandmother | | | | | | | | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.01 | (0.007) | 1.02 | (0.007) | 1.02 | (0.007) | 1.02 | (0.007) |
| 3 | 1.04 | (0.008) | 1.04 | (0.008) | 1.04 | (0.008) | 1.03 | (0.007) |
| 4 to 5 | 1.12 | (0.008) | 1.09 | (0.008) | 1.10 | (0.008) | 1.06 | (0.008) |
| 6 to 7 | 1.21 | (0.011) | 1.14 | (0.011) | 1.14 | (0.011) | 1.08 | (0.011) |
| 8+ | 1.28 | (0.017) | 1.21 | (0.017) | 1.22 | (0.017) | 1.14 | (0.016) |
| Paternal grandmother | | | | | | | | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 0.98 | (0.007) | 1.00 | (0.007) | 1.00 | (0.007) | 1.00 | (0.007) |
| 3 | 1.01 | (0.007) | 1.03 | (0.007) | 1.03 | (0.007) | 1.02 | (0.007) |
| 4 to 5 | 1.09 | (0.008) | 1.08 | (0.008) | 1.08 | (0.008) | 1.06 | (0.008) |
| 6 to 7 | 1.17 | (0.011) | 1.12 | (0.011) | 1.12 | (0.011) | 1.07 | (0.011) |
| 8+ | 1.22 | (0.016) | 1.16 | (0.016) | 1.16 | (0.016) | 1.09 | (0.015) |

All models control for age and period

*includes controls for: Birth year of grandmothers

**includes controls for: Birth year of grandmothers and ego´s education, income, enrolment and welfare

*** include controls for: Birth year of grandmothers and ego´s education, income, enrolment and welfare, geographical distance and survival of kin

****includes controls for: Birth year of grandmothers and ego´s education, income, enrolment , welfare and parental & grandparental SES/education

Table 2: Event history model on transition to 1st birth for men born in Sweden between 1970-1982. Presentation on how kin-family size covariates affect birth hazard. Coefficients are relative risks for covariates of fertility of parents and grandparents.

| Nr. of children of kin | Model 1* | | Model 2** | | Model 3*** | | Model 4**** | |
|---|---|---|---|---|---|---|---|---|
| Mother | no controls | | + ego's SES | | + distance | | + kin SES/education | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.15 | (0.013) | 1.14 | (0.013) | 1.12 | (0.011) | 1.15 | (0.013) |
| 3 | 1.25 | (0.013) | 1.24 | (0.013) | 1.22 | (0.012) | 1.25 | (0.013) |
| 4 to 5 | 1.37 | (0.016) | 1.34 | (0.015) | 1.33 | (0.015) | 1.35 | (0.015) |
| 6+ | 1.56 | (0.030) | 1.50 | (0.027) | 1.49 | (0.029) | 1.51 | (0.028) |
| Maternal grandmother | | | | | | | | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.01 | (0.008) | 1.03 | (0.008) | 1.02 | (0.008) | 1.01 | (0.008) |
| 3 | 1.03 | (0.008) | 1.05 | (0.008) | 1.04 | (0.008) | 1.03 | (0.008) |
| 4 to 5 | 1.09 | (0.009) | 1.09 | (0.009) | 1.08 | (0.009) | 1.06 | (0.008) |
| 6 to 7 | 1.17 | (0.013) | 1.14 | (0.012) | 1.14 | (0.013) | 1.10 | (0.012) |
| 8+ | 1.18 | (0.018) | 1.12 | (0.017) | 1.14 | (0.018) | 1.09 | (0.017) |
| Paternal grandmother | | | | | | | | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.00 | (0.007) | 1.02 | (0.007) | 1.01 | (0.008) | 1.01 | (0.007) |
| 3 | 1.01 | (0.008) | 1.04 | (0.008) | 1.02 | (0.008) | 1.01 | (0.008) |
| 4 to 5 | 1.07 | (0.008) | 1.08 | (0.008) | 1.06 | (0.008) | 1.04 | (0.008) |
| 6 to 7 | 1.13 | (0.012) | 1.12 | (0.012) | 1.11 | (0.012) | 1.07 | (0.012) |
| 8+ | 1.12 | (0.017) | 1.08 | (0.017) | 1.08 | (0.017) | 1.04 | (0.016) |

All models control for age and period

*includes controls for: Birth year of grandmothers

**includes controls for: Birth year of grandmothers and ego´s education, income, enrolment and welfare

*** include controls for: Birth year of grandmothers and ego´s education, income, enrolment and welfare, geographical distance and survival of kin

****includes controls for: Birth year of grandmothers and ego´s education, income, enrolment , welfare and parental & grandparental SES/education

Results show moderate independent effect on family size of parents and grandparents on transition to first birth for the index cohorts. The models should be interpreted as primarily timing of 1st birth. Parental family size increases the hazard of giving birth by around 10% for each child of the parent (sibling of the index person) with somewhat lower relative risks for men. At very high parental family size the effects are somewhat stronger (model 1). For grandparents there is almost no independent effect at low family sizes, but for grandparents with a high completed family size there is an independent increase in hazard of around 15-25% compared to grandparents with one or two children. The estimates are stronger for women than for men. The estimates for parents can be characterized as moderate in strength

while the estimates for grandparents can be characterized as weak except for unusually large extended families.

Estimates on intergenerational fertility are partly dependent on socioeconomic characteristics of index person, parents and grandparents (model 2-4). Estimates on the strength of intergenerational transmission of fertility for parents are largely independent of socioeconomic factors as parental socioeconomic covariates appears to not affect the fertility associations between the index generation and their parents. However, around half of the association with grandparent's family size disappears when socioeconomic covariates are added (model 4). Geographical distance to parents and grandparents has no effect on the intergenerational transmission of fertility (model 3). Effects of both parental and grandparental socioeconomic characteristics on 1st birth are reasonably strong (not shown), though they don't impact intergenerational transmission of fertility. Survival and geographical distance has no effect at all on risk of 1st birth (not shown). Patterns on the relative contribution of socialization and socioeconomic continuities for men are similar to those for women, even if overall levels of intergenerational transmission of fertility are lower. Overall patterns for men and women are very similar. The pathways that explain intergenerational transmission of fertility appear to be similar for women and men. Occupational class and education both have an independent effect on the intergenerational transmission of fertility that is similar in level (not shown). Combining occupational class and education in the same model produce similar results as each of them in separate models. Covariates on birth-order show very weak association with the strength of intergenerational transmission of fertility (not shown). Stratifying separate models by birth order also show similar patterns across models.

Models on later parities largely confirm patterns for transition to 1st birth even if there are some important differences (table 3 & 4). Only results from the base model without socioeconomic controls (model 1-1 & 2-1) and models with all socioeconomic controls (model 2-1, & 2-2) will be presented separately for women (table 3) and men (table 4) for transition to 2nd and 3rd birth. The patterns found in the step-wise presentation for models 1-4 on transition to 1st birth remain similar in models on later parities. Survival status and geographical distance of kin remains unrelated to fertility covariates.

Models on transition to 2nd birth follows a quite different pattern with much weaker intergenerational continuities. The association between parental family size and hazard of birth is about half as strong as for transitions to 1st and 3rd birth. There is only a very modest

independent effect of grandparents. The weaker effects are most likely due to the different demographic context on transition to 2nd birth in Sweden. There exists a strong 2-child norm and families with only one child are rare. Most families therefore rapidly have a second child regardless of other characteristics. This standardization of transition to a 2nd child have been further reinforced by a new parental leave policy in which it is advantageous to have birth intervals shorter than 30 months (Andersson, Hoem, and Duvander 2006). Patterns are similar for women and men with the former having slightly stronger associations. Puzzlingly, adding socioeconomic and geographic controls has a reversed effect compared to transition to 1st birth, increasing intergenerational fertility associations. The difference is small and mainly related to a very large parental/grandparental family size. The interpretation from hazards on 2nd birth is that intergenerational transmission of fertility is unaffected by socioeconomic pathways.

Patterns for transition to 3rd birth are more similar to patterns for transition to 1st birth. The association between parental fertility and hazard of 3rd birth is slightly stronger than for becoming a parent. Grandparental fertility and hazard of 3rd birth shows a smaller association than for transition to 1st birth. Having a 3rd birth after a 2nd child represents the realization of an above average family size in contemporary Sweden. This might explain why associations are relatively strong, in particular for large parental and grandparental family sizes.

Socioeconomic and geographic controls have a weak effect for fertility transmission between parents and the index generation similar to hazard of 1st birth. Associations between grandparents and index generation are weaker than for 1st birth and also show the same inverse pattern observed for transition to 2nd birth. Associations between index generation and grandparents for 3rd birth are weaker not controlling for socioeconomic covariates but of similar size as associations with 1st birth after adding them. As for previous parities it appears that most of the intergenerational fertility continuities are unrelated to socioeconomic associations between generations. Patterns by sex are similar to those found in models on previous transitions. Overall results on transitions to 3rd birth can easily be reconciled with the importance of transmission of values/ideals/preferences about a small/large family between generations. Kin family size is strongly associated with having a 3rd birth and this association is weakly related to socioeconomic/geographical factors. Both these factors support interpretations on the importance of intergenerational transmission of fertility preferences.

Table 3: Event history model on transition to 2nd and 3rd birth for women born in Sweden between 1970-1982. Presentation on how kin-family size covariates affect birth hazard. Coefficients are relative risks for covariates of fertility of parents and grandparents.

| Nr. of children of kin | Parity 1-> 2 | | | | Parity 2->3 | | | |
|---|---|---|---|---|---|---|---|---|
| | Model 1-1* | | Model 1-2** | | Model 2-1* | | Model 2-2** | |
| Mother | no controls | | everything | | no controls | | everything | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.13 | (0.015) | 1.11 | (0.015) | 1.03 | (0.03) | 1.03 | (0.03) |
| 3 | 1.21 | (0.015) | 1.20 | (0.015) | 1.24 | (0.034) | 1.24 | (0.034) |
| 4 to 5 | 1.26 | (0.016) | 1.28 | (0.017) | 1.49 | (0.041) | 1.46 | (0.041) |
| 6+ | 1.35 | (0.028) | 1.43 | (0.03) | 1.84 | (0.069) | 1.78 | (0.068) |
| Maternal grandmother | | | | | | | | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.02 | (0.009) | 1.01 | (0.009) | 1.03 | (0.02) | 1.04 | (0.02) |
| 3 | 1.03 | (0.009) | 1.03 | (0.009) | 1.03 | (0.021) | 1.05 | (0.021) |
| 4 to 5 | 1.01 | (0.009) | 1.03 | (0.01) | 1.06 | (0.021) | 1.08 | (0.022) |
| 6 to 7 | 1.01 | (0.012) | 1.04 | (0.013) | 1.04 | (0.026) | 1.07 | (0.027) |
| 8+ | 0.98 | (0.017) | 1.02 | (0.017) | 1.10 | (0.036) | 1.14 | (0.038) |
| Paternal grandmother | | | | | | | | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.04 | (0.009) | 1.04 | (0.009) | 1.02 | (0.019) | 1.02 | (0.019) |
| 3 | 1.04 | (0.009) | 1.04 | (0.009) | 1.04 | (0.02) | 1.05 | (0.02) |
| 4 to 5 | 1.04 | (0.009) | 1.05 | (0.009) | 1.07 | (0.02) | 1.08 | (0.021) |
| 6 to 7 | 1.04 | (0.013) | 1.07 | (0.013) | 1.04 | (0.026) | 1.06 | (0.026) |
| 8+ | 1.03 | (0.018) | 1.05 | (0.018) | 1.07 | (0.036) | 1.10 | (0.037) |

All models control for age and period

*includes controls for: Birth year of grandmothers

**includes controls for: Birth year of grandmothers and ego´s education, income, enrolment , welfare and parental & grandparental SES/education

Table 4: Event history model on transition to 2nd and 3rd birth for men born in Sweden between 1970-1982. Presentation on how kin-family size covariates affect birth hazard. Coefficients are relative risks for covariates of fertility of parents and grandparents.

| Nr. of children of kin | Parity 1-> 2 | | | | Parity 2->3 | | | |
|---|---|---|---|---|---|---|---|---|
| | Model 1-1* | | Model 1-2** | | Model 2-1* | | Model 2-2** | |
| Mother | no controls | | everything | | no controls | | everything | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.12 | (0.017) | 1.11 | (0.017) | 0.99 | (0.035) | 0.99 | (0.036) |
| 3 | 1.17 | (0.016) | 1.17 | (0.016) | 1.16 | (0.039) | 1.17 | (0.039) |
| 4 to 5 | 1.18 | (0.017) | 1.21 | (0.018) | 1.40 | (0.048) | 1.38 | (0.048) |
| 6+ | 1.24 | (0.03) | 1.34 | (0.032) | 1.72 | (0.082) | 1.69 | (0.082) |
| Maternal grandmother | | | | | | | | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.02 | (0.01) | 1.02 | (0.01) | 1.01 | (0.025) | 1.01 | (0.025) |
| 3 | 1.03 | (0.011) | 1.03 | (0.011) | 1.02 | (0.025) | 1.03 | (0.026) |
| 4 to 5 | 1.02 | (0.011) | 1.04 | (0.011) | 1.06 | (0.026) | 1.08 | (0.027) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6 to 7 | 0.99 | (0.014) | 1.03 | (0.015) | 1.06 | (0.034) | 1.09 | (0.035) |
| 8+ | 1.04 | (0.021) | 1.09 | (0.022) | 1.03 | (0.044) | 1.06 | (0.046) |
| Paternal grandmother | | | | | | | | |
| 1 (ref) | 1 | | 1 | | 1 | | 1 | |
| 2 | 1.02 | (0.01) | 1.02 | (0.01) | 0.99 | (0.023) | 0.99 | (0.023) |
| 3 | 1.02 | (0.01) | 1.02 | (0.01) | 1.02 | (0.025) | 1.02 | (0.025) |
| 4 to 5 | 1.01 | (0.011) | 1.02 | (0.011) | 1.06 | (0.025) | 1.07 | (0.026) |
| 6 to 7 | 1.02 | (0.015) | 1.04 | (0.015) | 1.09 | (0.034) | 1.11 | (0.035) |
| 8+ | 1.00 | (0.02) | 1.03 | (0.021) | 1.09 | (0.048) | 1.12 | (0.049) |

All models control for age and period

*includes controls for: Birth year of grandmothers

**includes controls for: Birth year of grandmothers and ego´s education, income, enrolment , welfare and parental & grandparental SES/education

## Conclusions

This study confirms previous findings on intergenerational transmission of fertility that extend beyond the immediate family of upbringing (Kolk 2011). Results support the importance of transmission of norms on childbearing and family life as the primary explanatory factor of observed multigenerational associations in fertility. For intergenerational transmission of fertility between the index generation and the parents socioeconomic associations only impact fertility associations to a small degree. Controlling for socioeconomic characteristics of the index generation is also largely independent of intergenerational transmission of fertility. The pattern varies by parity and is different for fertility associations with parents and grandparents. Associations between parents and the index generation socioeconomic factors appear unrelated fertility continuities. For grandparents, around half of the transmission disappears when looking at hazard of 1$^{st}$ birth controlling for socioeconomic characteristics grandparents. For later transitions an inverse pattern between socioeconomic status and fertility transmission can be observed. Both survival status and geographical proximity of parents and grandparents appear to have weak effects on the index cohorts' fertility. This suggests that socioeconomic and norm transmission between generations primarily takes place during upbringing. Social interaction after leaving the parental home plays less of a role.

The results can be summarized as that intergenerational transmission of fertility is primarily mediated through socialization of values regarding fertility intentions and desires for childbearing and family life. Socioeconomic transmission plays a minor role. Grandparents have a small independent effect on the index generations fertility behavior but this independent effect is limited to grandparents with very high fertility. The existence of a

significant multigenerational transmission of fertility can possibly be due to socialization into a general preference for family life and kinship acquired during frequent meetings with extended family members (Kolk 2011). Socialization appears to primarily take place during childhood and adolescence as both survival of kin and geographical distance in early adulthood is largely insignificant. The weak effects of residence in adulthood are true for both parents and grandparents.

It appears that previous research on intergenerational transmission of fertility has been correct in focusing of socialization of fertility preferences (Johnson and Stokes 1976; Preston 1976). Socioeconomic continuities appear to be of less importance. Multigenerational continuities are overall weak even if there is an independent effect of grandparental family size and socioeconomic characteristics (not shown) on the fertility of the index population even after controlling for characteristics of the index population. This is contrary to previous findings on multigenerational associations in socioeconomic characteristics that have found no effect of grandparental characteristics after controlling for parents characteristics (Becker and Tomes 1986; Erola and Moisio 2007; Warren and Hauser 1997). Findings of multigenerational associations with independent grandparental effects of both family size and socioeconomic position support the recent call for more research on multigenerational effects in stratification and demography research (Mare 2011).

**Acknowledgements**

I am grateful for suggestions and comments by Gunnar Andersson and Juho Härkönen. The study is supported by the Swedish Research Council, Vetenskapsrådet, via the Swedish Initiative for research on Microdata in the Social and Medical Sciences, SIMSAM. I have also received support from STINT, The Swedish Foundation for International Cooperation in Research and Higher and Education, and the Sweden-America foundation.

## References


Andersson, G., J.M. Hoem, and A.Z. Duvander. 2006. "Social differentials in speed-premium effects in childbearing in Sweden." *Demographic Research* 14:51-70.

Anderton, Douglas L., Noriko O. Tsuya, Lee L. Bean, and Geraldine P. Mineau. 1987. "Intergenerational transmission of relative fertility and life course patterns." *Demography* 24:467-480.

Axinn, W. G., M. E. Clarkberg, and A. Thornton. 1994. "Family Influences on Family-Size Preferences." *Demography* 31:65-79.

Barber, J. S. 2001. "The intergenerational transmission of age at first birth among married and unmarried men and women." *Social Science Research* 30:219-247.

Becker, G. S. and N. Tomes. 1986. "Human capital and the rise and fall of families." *Journal of Labor Economics* 4:S1-S39.

Ben-Porath, Y. 1975. "First-generation effects on second-generation fertility." *Demography* 12:397-405.

Breen, Richard. 2004. *Social mobility in Europe*. Oxford: Oxford University Press.

Duncan, Otis Dudley, Ronald Freedman, J. Michael Coble, and Doris P. Slesinger. 1965. "Marital Fertility and Size of Family of Orientation." *Demography* 2:508-515.

Erola, J. and P. Moisio. 2007. "Social mobility over three generations in Finland, 1950-2000." *European Sociological Review* 23:169-183.

Fisher, RA. 1930. *The genetical theory of natural selection*. Oxford, England: Clarendon Press.

Johnson, Nan E. and C. Shannon Stokes. 1976. "Family size in successive generations: The effects of birth order, intergenerational change in lifestyle, and familial satisfaction." *Demography* 13:175-187.

Kahn, J.R. and K.E. Anderson. 1992. "Intergenerational patterns of teenage fertility." *Demography* 29:39-57.

Kirk, K. M., S. P. Blomberg, D. L. Duffy, A. C. Heath, I. P. F. Owens, and N. G. Martin. 2001. "Natural selection and quantitative genetics of life-history traits in western women: A twin study." *Evolution* 55:423-435.

Kohler, Hans-Peter, Joseph L. Rodgers, and Kaare Christensen. 1999. "Is fertility behavior in our genes? Findings from a Danish twin study." *Population and Development Review* 25:253-288.

Kolk, M. 2011. "Intergenerational continuities in family size - Multigenerational transmission of fertility in contemporary Sweden." *Stockholm Research Reports in Demography* 14:1-34.

Lyngstad, T.H. and A. Prskawetz. 2010. "Do siblings' fertility decisions influence each other?" *Demography* 47:923-934.

Mare, R. D. 2011. "A Multigenerational view of Inequality." *Demography* 48:1-23.

Murphy, M. 1999. "Is the relationship between fertility of parents and children really weak?" *Social Biology* 46:122-145.

Murphy, M. and L. B. Knudsen. 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* 56:235-248.

Murphy, M. and D. L. Wang. 2001. "Family-level continuities in childbearing in low-fertility societies." *European Journal of Population* 17:75-96.

Pearson, K., A. Lee, and L. Bramley-Moore. 1899. "Mathematical contributions to the theory of evolution. VI. Genetic (reproductive) selection: Inheritance of dertility in man, and of fecundity in thoroughbred racehorses." *Philosophical Transactions of the Royal Society of London, Series A* 192:257-330.

Preston, Samuel H. 1976. "Family sizes of children and family sizes of women." *Demography* 13:105-114.

Rodgers, J. L., K. Hughes, H. P. Kohler, K. Christensen, D. Doughty, D. C. Rowe, and W. B. Miller. 2001. "Genetic influence helps explain variation in human fertility: Evidence from recent behavioral and molecular genetic studies." *Current Directions in Psychological Science* 10:184-188.

Rodgers, Joseph Lee, Hans-Peter Kohler, Kirsten Ohm Kyvik, and Kaare Christensen. 2001. "Behavior genetic modeling of human fertility: Findings from a contemporary Danish twin study." *Demography* 38:29-42.

Steenhof, L. and A. C. Liefbroer. 2008. "Intergenerational transmission of age at first birth in the Netherlands for birth cohorts born between 1935 and 1984: Evidence from municipal registers." *Population Studies* 62:69-84.

Tambs, K., J.M. Sundet, P. Magnus, and K. Berg. 1989. "Genetic and environmental contributions to the covariance between occupational status, educational attainment, and IQ: A study of twins." *Behavior Genetics* 19:209-222.

Thornton, A. 1980. "The influence of first generation fertility and economic status on second generation fertility." *Population & Environment* 3:51-72.

Warren, J. R. and R. M. Hauser. 1997. "Social stratification across three generations: New evidence from the Wisconsin Longitudinal Study." *American Sociological Review* 62:561-572.

Williams, L.A. and BJ Williams. 1974. "A re-examination of the heritability of fertility in the British peerage." *Biodemography and Social Biology*.

Zimmer, B. G. and J. Fulton. 1980. "Size of family, life chances, and reproductive behavior." *Journal of Marriage and the Family* 42:657-670.