# Understanding intergenerational transmission of fertility –A multigenerational approach to disentangle mechanisms of transmission

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Children are more likely to replicate the family size of their parents than other members of their parents' generation. This relationship is of moderate strength (0.1-.15 measured as a Pearson correlation) but has been found constantly in developed societies and seems to be growing in strength over time (Murphy 1999). Several explanations have been suggested to explain this association including childhood socialization (e. g. Johnson and Stokes 1976; Preston 1976), transmission of socioeconomic traits (e. g. Barber 2001; Duncan et al. 1965) or genetic heritability (e. g. Kosova, Abney and Ober 2010; Rodgers et al. 2001). Swedish administrative registers of the complete population together with a multigenerational data design provides a powerful way to distinguish between these mechanisms. By using event history models on young men and women in Sweden it is possible to analyze how intergenerational associations in family size is modified by measures of socioeconomic status and social interaction for children, parents and grandparents. The patterns of association between these measures can be used to can explain mechanisms underlying the association between the family size of a child and his parents and grandparents.

Covariates used in the study are; socioeconomic status (SES), family disruption in childhood, educational level and geographical distance (during childhood and adulthood) together with covariates on parental and grandparental family size. All of the variables are available for all parents and all grandparents. By looking at the role of socioeconomic indicators and measures on social interaction as mediators of intergenerational continuities in fertility it is possible to distinguish between explanations based on childhood experiences and socioeconomic patterns that are reproduced over generations.

Multigenerational effects have commonly been neglected in demography (Mare 2011). Studies of intergenerational transmission have been focused on the child-parent association while the role of grandparents and other extended kin have been ignored. In a recent study Kolk (2011) found consistent transmission of fertility from grandparents and aunts/uncles even when controlling for characteristics of the parents' generation. Sociology and demography in the post war years examined the degree to which childhood socialization of values on ideal family size, timing of births, views on marriage and family and childhood satisfaction could explain observed associations (Anderton et al. 1987; Johnson and Stokes 1976; Preston 1976). Recently there has been a growing interest on both a genetic influence on fecundity and on preferences for children (Kosova et al. 2010; Rodgers et al. 2001). At this point there is no consensus on the contributions of different explanations on the observed associations.

**Study design & Data**

Swedish administrative registers are used to collect information on the complete 1970 to 1982 cohorts born in Sweden. These cohorts will be referred to as the index population and are linked to their biological parents and grandparents by means of the Swedish multigenerational register. Demographic

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information on childbearing as well as information on socioeconomic traits is linked to both the index population and their parents and grandparents. Event history analysis is used on transition to 1st, 2nd and 3rd birth. Distinguishing between different parities is important to separate the effect of different mechanisms. Transition to 1st birth is largely determined by timing (tempo) of parenthood and union formation, transition to 2nd is nearly universal in Sweden and mainly a question of tempo of childbearing, transition to 3rd birth represents the realization of above average family size in contemporary Sweden.

Covariates on the index populations socioeconomic traits as well as covariates on completed family size and socioeconomic characteristics of parents and grandparents is also included to better understand the mechanisms of transmission. Socioeconomic controls include educational histories and EGP measures of occupational class. Information on if the kin as alive and its geographical proximity to the index person, both in childhood and during adult ages of the kin, as well as family disruption in childhood for index population and parents is also included.

**Research questions**

Through the effect on kin covariates it is possible to infer information on the mechanisms of intergenerational transmission of fertility. Four general groups of explanations are acknowledged in this study. The first explanation is if childhood socialization on norms on childbearing and ideal family size could explain similarities between generations, this will be called **direct social transmission**. The second explanation is the possibility that socioeconomic traits like education are transmitted across generations and that those traits could encourage or constrain fertility, this explanation will be referred to as **indirect social transmission**. The third explanation is if there is a genetic heritability of fertility for men and women, this could both operate as genetic traits determining fecundity and traits affecting a preference for children/family formation, this will be called **direct genetic transmission**. The last explanation is a genetic heritability on other societal traits associated with fertility, for example health status, education or physical appearance; this will be referred to as **indirect genetic transmission**. The following hypotheses are made to distinguish between the various explanations:

If the results is due to **direct social transmission** one would expect strong kin effects on transmission to 1st (timing of becoming a parent) and 3rd child (progress beyond the 2-child norm), the strength of fertility transmission would be affected by geographical distance and family disruption of index person and kin but less by education and SES. In addition women, female kin and maternal kin should be more important due to a female dominated kin universe in Sweden. Geographical distance in childhood/adulthood and survival of older kin can be used to distinguish the relative strength of childhood socialization and influences of norms/behavior of kin in adult ages.

If the results are characterized **indirect social transmission** one would expect strong effects on transmission to 1st child (mediated by education) and less effect for later births, transmission of fertility largely disappears after controlling for education and SES of index persons and older kin. If the intergenerational transmission of fertility shrinks substantially after controlling for education and class it is likely that this is the primary mechanism underlying observed fertility associations. Geographical distance in adulthood and union disruption in childhood should not be important if indirect structural factors are dominant.

If the effect is due to **direct genetic transmission** of fecundity the effect should be very weak for transition to 1st child but much stronger for transition to a 2nd child and also important for transition to a 3rd child. Socioeconomic and experiences during childhood should have less of an effect. If the effect is linked to fecundity it seems likely that it would be stronger for women and female kin. If the effect is due to genetic influence on preferences for children we would instead see high intergenerational transmission of fertility on transition to 1st and 3rd child similar to patterns for direct social transmission. Socioeconomic traits should be less important but also union disruption and geographical proximity should have weak influence on the strength of transmission.

**Indirect genetic transmission** is hard to separate from the other three explanations and is very hard to infer without a model using information on the degree of shared genetic and environmental components. If indirect effects are related union formation the strength of transmission would most likely be strong for transmission to a 1st child. SES and education could be important as they are might mediate genetic heritability but geographical proximity and effects of characteristics of older kin in adulthood should be weak.

**Results**

Results of early analyses using a 5% sample of the available population are presented for transition to 1st child. Tables 1 show how the index population's timing of parenthood is associated with the number of children of parents and grandparents and subsequently how this association changes with additional variables on parental and grandparental socioeconomic status. Results are presented in the form of an increase in relative risks for 1st birth of the index population for each additional child of the mother, father (correlated 0.68 with family size of the mother), maternal grandfather and the paternal grandfather.

Table 1: Effect of parental and grandparental family size on transition to 1st birth

| | Relative risks | | |
|---|---|---|---|
| | Wo. | Men | Controlls for: |
| Model 1 | | | Own education & SES |
| Mother | 1.09 | 1.06 | Father's & mother's family size |
| Father | 1.03 | 1.02 | |
| Model 2 | | | Own education & SES |
| Mother | 1.07 | 1.05 | Father's & mother's family size |
| Father | 1.03 | 1.02 | Father's & mother's edu. + SES |
| Model 3 | | | Father's & mother's family size |
| Mother | 1.08 | 1.06 | Grandfathers' family size |
| Father | 1.03 | 1.01 | |
| Mat. Gr. Fa. | 1.05 | 1.03 | |
| Pat. Gr. Fa. | 1.03 | 1.03 | |
| Model 4 | | | Own education & SES |
| Mother | 1.07 | 1.05 | Father's & mother's family size |
| Father | 1.03 | 1.01 | Grandfathers' family size |
| Mat. Gr. Fa. | 1.04 | 1.02 | |
| Pat. Gr. Fa. | 1.03 | 1.02 | |

| | Relative risks | | Controlls for: |
|---|---|---|---|
| | Wo. | Men | |
| Model 5 | | | Own education & SES |
| Mother | 1.07 | 1.05 | Father's & mother's family size |
| Father | 1.04 | 1.01 | Father's & mother's education |
| Mat. Gr. Fa. | 1.03 | 1.02 | Grandfathers' family size |
| Pat. Gr. Fa. | 1.02 | 1.02 | Grandfathers'education |
| Model 6 | | | Own education & SES |
| Mother | 1.06 | 1.05 | Father's & mother's family size |
| Father | 1.04 | 1.01 | Father's & mother's SES |
| Mat. Gr. Fa. | 1.03 | 1.02 | Grandfathers' family size |
| Pat. Gr. Fa. | 1.02 | 1.01 | Grandfathers' SES |
| Model 7 | | | Own education & SES |
| Mother | 1.07 | 1.05 | Father's & mother's family size |
| Father | 1.04 | 1.01 | Father's & mother's edu. + SES |
| Mat. Gr. Fa. | 1.03 | 1.02 | Grandfathers' family size |
| Pat. Gr. Fa. | 1.02 | 1.02 | Grandfathers'education + SES |

Consistent but moderate associations are found between the fertility behavior of the index population and the family size of parents and grandparents. Overall women show stronger associations with parental family size than men. Controlling for both EGP-class and educational level of parents decreases the intergenerational association for men and women. Estimates of grandparental family size remain largely unchanged when controlling both for socioeconomic characteristics of the parental and grandparental generation. Occupational class as measured by EGP appears to be a stronger intergenerational mediator of family size than education.

Future expansion of the models: Analyses will be carried out on transition to 1st, 2nd, 3rd and 4th child.. Instead of linear terms of completed family size of parents and grandparents categorical variables will be used. Grandmothers as well as grandfathers' education and SES will be used. Variables on childhood union disruption and geographical distance will be added. In future analysis the population will not be based on a 5% sample.

**Conclusions**

This study supports previous findings on intergenerational transmission of fertility that extend beyond the immediate family (cf. Kolk 2011). The results support the importance of transmission of transmission of norms on childbearing and family life as the prime explanatory factor of observed multigenerational associations in fertility. Some influence from parents and extended kin seems to be mediated by factors that can be accounted for by socioeconomic variables like education and income in the index population and educational level and SES among parents and grandparents. The primary mechanism supported by preliminary data on transition to 1st birth is **direct social transmission** and to a lesser degree **indirect social transmission**. There is weak support for the argument that a genetic heritability of fecundity plays an important role. It is however possible that a preference of childbearing is genetically heritable and that it together with socialization from parents and grandparents explain high/low preference for children across generations. With further analysis as mentioned in the result section it will be easier to differentiate between possible mechanisms of intergenerational transmission of fertility.

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