Grandparental Investment, Parents' Fertility and Child Development in the UK

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Introduction

Grandparents may increase their inclusive fitness by investing in their children and grandchildren. In pre-modern and traditional populations the reproductive success of grandparents could be improved in two ways. First, by assisting their adult children grandparents may have increased quantity (i.e. number of grandchildren). Second, grandparental support may have increased the grandchild quality (i.e. health, well-being or development). However, because of the sex-specific reproductive interests the investment of maternal and paternal grandparents may have different outcomes. Studies from pre-modern and traditional populations have found trade-offs between grandchild quality and quantity. Research suggests that the presence of maternal grandparents (maternal grandmothers in particular) may increase child survival, but not fertility, while the presence of paternal grandparents may increase fertility, but not child survival. However, there is lack of studies of the effect of different grandparent types on both quantity (i.e. parents' fertility) and quality (i.e. child development) in modern societies.

Hypotheses

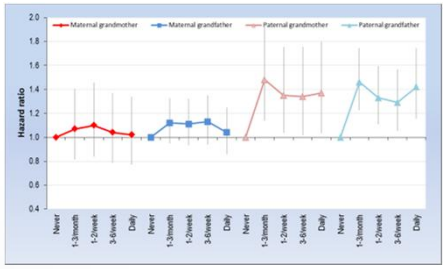
H1) Maternal grandparents (maternal grandmothers in particular) improve grandchild development, but not parents' fertility;

H2) Paternal grandparents increase parents' fertility, but not grandchild development.

Material and methods

We use longitudinal Millennium Cohort Study from the UK. The outcome of grandparental investment (measured by grandparental contact frequency) is studied by child development and parental reproductive success.
First (study 1), we study with discrete-time survival analysis an association between grandparental contact frequency and parental reproductive success during a follow-up period of 4.5 years. As a method we use complementary log-log regression analysis.
Second (study 2) , using logistic regression analysis we study an association between grandparental contact frequency and child development measured by the Foundation Stage Profile assessment. In the state schools of England, teachers complete the Foundation Stage Profile assessment concerning "early learning goals" at the end of the children's first school year.

Figure 1. Predicting probability of having a second child by grandparental investment



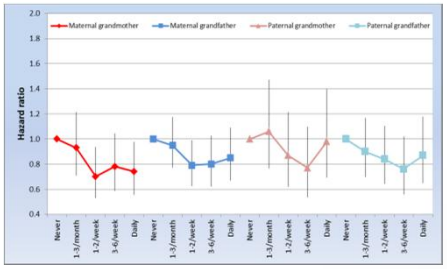
Notes. Results of 4 complementary log-log regression models. Values are hazard ratios (and 95% confidence intervals) of discrete-time survival analysis. The independent variable is grandparental contact frequency: 0 = Never (ref), 1 = 1-3 times a month or less often, 2 = Once or twice a week, 3 = 3-6 times a week, 4 = Every day. Controlled variables in every model are number of children in household, mother's age, educational attainment, and ethnicity, parents' combined labour force participation, the financial situation of the family, are other grandparents alive, time, and time².
Model 1 (maternal grandmother): n = 4,511; Model 2 (maternal grandfather): n = 4,195; Model 3 (paternal grandmother): n = 4,372; Model 4 (paternal grandfather): n = 3,951.

Results

Study 1
First, we found that paternal grandparents' investment correlates with parents' probability of having a second child. In contrast, maternal grandparents' (maternal grandmothers in particular) investment correlates with parents' decreased probability to experience a family addition in the cases when parents have already at least two children (Figures 1 and 2).

Study 2
Second, we found that the investment from maternal grandmothers correlates with children's increased likelihood to achieve a good level on the Foundation Stage Profile assessment, but daily investment from paternal grandfathers correlates with decreased probability to achieve good result in the Foundation Stage Profile test (Figure 3).

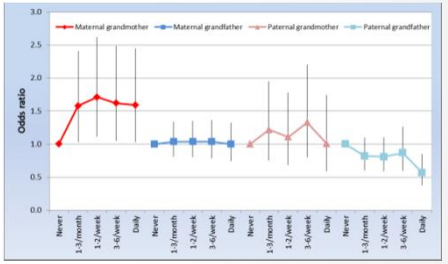
Figure 2. Predicting probability of having a third or subsequent child by grandparental investment



Notes. Results of 4 complementary log-log regression models. Values are hazard ratios (and 95% confidence intervals) of discrete-time survival analysis. The independent variable is grandparental contact frequency: 0 = Never (ref), 1 = 1-3 times a month or less often, 2 = Once or twice a week, 3 = 3-6 times a week, 4 = Every day. Controlled variables in every model are number of children in household, mother's age, educational attainment, and ethnicity, parents' combined labour force participation, the financial situation of the family, are other grandparents alive, time, and time².
Model 1 (maternal grandmother): n = 4,924; Model 2 (maternal grandfather): n = 4,349; Model 3 (paternal grandmother): n = 4,665; Model 4 (paternal grandfather): n = 4,030.

Highlights:
- Maternal grandmothers tend to improve child development
- Paternal grandparents tend to increase parents' probability of having a second child.

Figure 3. Predicting the good level on the child development scores by grandparental investment



Notes. Results of 4 logistic regression models. Values are odds ratios (and 95% confidence intervals). The independent variable is grandparental contact frequency: 0 = Never (ref), 1 = 1-3 times a month or less often, 2 = Once or twice a week, 3 = 3-6 times a week, 4 = Every day. Controlled variables in every model are child's sex, age, ethnicity, number of siblings, mother' age, mother's educational attainment, the financial situation of the family, and the existence of the spouse of a grandparent. In addition, in maternal grandmother's and grandfather's models the presence or absence of the child's father, and in maternal grandmother's and grandfather's models the age of the father is controlled for.
Model 1 (maternal grandmother): n = 5,740; Model 2 (maternal grandfather): n = 5,027; Model 3 (paternal grandmother): n = 3,910; Model 4 (paternal grandfather): n = 3,357.

Conclusions

Results are in line with the evolutionary prediction based on the sex-specific reproductive interests. Maternal grandmothers' investment seems to improve grandchild quality measured by child development. In contrast, paternal grandparents' investment may increase quantity measured by parents' fertility.

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