Educational Differences in Completed Fertility – a Study of Finnish Twins

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Background and Aims of the Study

Overall differentials in completed fertility can be assessed both in terms of having any children and number of children. In low-fertility countries, a negative association between educational level and both having any children and number of children is often found in women, although lately differences in Scandinavian countries have been found to be relatively modest. For men there is less evidence on this issue and it is also less consistent than for women (e.g. Andersson et al. 2009, Goodman & Koupil 2009, Hagestad & Call 2007, Hoem et al. 2006a & 2006b, Keizer et al. 2007, Kiernan 1989, Kravdal & Rindfuss 2008, Parr 2005 & 2009, Skirbekk 2008, Toulemon & Lapierre-Adamcyk 2000, Weeden et al. 2006). However, recent studies from Scandinavia point to different patterns for men from those of women (Kravdal & Rindfuss 2008, Goodman & Koupil 2009).

The level of education of Finnish men and women born around the mid-20th century is related to their completed fertility differently. Among Finnish men born in the 1940's and 1950's, those with low education were less likely to have any children than the higher educated men. Higher education is also associated with a higher number of children in general in these birth cohorts (Nikander 1995). Among Finnish women born in the 1940's, higher level of education was associated with being less likely to have any children, but this association weakened among women born in the 1950's. Presumably depending on the classification of educational level used in the studies, women with both low (Andersson et al. 2009) and high (Ruokolainen & Notkola 2007) education have been noticed to have been least likely to have any children in women born in the 1950's. Similarly, educational differences in the number of children of Finnish women weakened in the cohorts born in the 1940's and 1950's (Nikander 1992, Andersson et al. 2009). However, for women born in the 1960's, there seems to be again a steeper educational gradient in number of children, with highly educated women probably ending up with a relatively small number of children on average (Ruokolainen & Notkola 2007).

In explaining educational fertility differentials in the low-fertility context, a lot of attention has been paid to the ways in which gaining education can causally influence one's fertility behavior and thus contribute to the socio-economic differentials found (see e.g. Kravdal & Rindfuss 2008). It seems plausible, however, that features of family background could contribute to these associations at least to some extent. There are some

previous notions on possible selection mechanisms and on complexity of the association between educational level and fertility, especially with respect to the transition to parenthood (e.g. Houseknecht 1979, Morgan & Rindfuss 1999, Hakim 2000, Kravdal 2001, Hoem et al. 2006a & 2006b). In Finland, for example socio-demographic features of the parental home such as the number of siblings, social class and level of urbanization of living area in childhood have been associated both with level of education and fertility (Nikander 1992 & 1995, Havén 1998, Riala et al. 2003[1]). Yet including all possible confounders related to one's family background can be challenging in an ordinary individual study.

This study aimed to quantify educational differences in completed fertility for men and women in Finland and to examine in a twin setting whether family background could contribute to these differences. As twins share their social family environment (in addition to a varying amount of shared genes), twin data offer a possibility to study optimally the contribution of family background for the associations observed.

Data and Methods

The data were derived from the older cohort of the Finnish Twin Cohort Study. The baseline questionnaire was mailed in 1975 to all same-sex Finnish twin pairs born before 1958 and both co-twins alive in 1974. The response rate to this questionnaire was 89%. A follow-up questionnaire was sent in 1981 to all twin pairs to whom the baseline questionnaire had been sent regardless of whether they had participated in the 1975 survey. The response rate in the first follow-up survey was 84%. We included the cohorts born 1950–57 into the study sample. We restricted the study to only those twins, who were not living with their co-twin in 1981 (n=7842), based primarily on the empirical observation that compared to the Finnish population (SVT Väestö 2007, 87–88) a relatively large proportion of these twins were childless. Further, the small amount of respondents whom a triplet or quadruplet was registered (n=8) were excluded from the analysis as well as those who had not given information on their education in the 1975 survey nor in the 1981 survey (n=14). The final study population consisted of 7820 subjects of whom 3592 were men and 4228 women. Results based on the final study population were compared to those calculated for all subjects with non-missing information on educational level. Very similar results were obtained from both analyses.

Information on live births is available since the year 1950 in the Finnish population register and was linked to the baseline data using a unique personal identification number given to all Finnish citizens a few days after the birth. Register-based information on practically completed fertility of these twins was available until June 2009 at which time the participants were 51–59 years of age. As our information on fertility is register-based, underestimation of children born to men is possible. However, this should be unlikely to seriously

[1] For the associations between the number of siblings / childhood social class and fertility evidence only for women.

affect the results, as the proportion of children without a known father in Finland during the last decades of the 20th century was small (1.3% of children aged 0–17 years in 1997) (Kartiovaara & Säkkinen 2007).

The completed fertility of a subject was measured with a three-class categorized variable: no children, 1–2 children and at least three children. The measure of the level of education was based on survey information from the years 1975 and 1981. In these surveys, the respondents were asked "What kind of schools and courses have you attended?" and nine response alternatives were given. For those subjects who had not answered the questionnaire in 1981 (or had answered their level of education to be "other") the information from questionnaire in 1975 was used. Those respondents still studying when reporting their level of education were assumed to have reached the next possible educational category given in the questionnaire. The highest level of education was then classified into four groups: only primary school, primary school and at least one year of vocational education, junior high school and senior high school.

Multinomial logistic regression analysis was used to study the association between level of education and completed fertility treating twins as individuals. In the estimation of standard errors, it was taken into account that observations of twins within twin pairs may be correlated by using a survey cluster option. In the twin pair comparison, conditional logistic regression analysis was conducted to study educational differences within those pairs who were discordant for educational level and completed fertility. Men and women were analyzed separately. The results from multinomial and conditional logistic regression analyses are presented as odds ratios (OR). For all estimates from regression analyses 95% confidence intervals (CI) were calculated. Analyses were conducted by using the Stata statistical package, version 10.

Results

In men 23% and in women 18% were childless. A half of men and over a half of women (56%) had one or two children. In men 27% and in women 25% had at least three children.

In the multinomial logistic regression models having 1–2 children and having at least three children were compared to being childless. The lowest educated – the only primary school educated – were held as the reference group.

In the age-adjusted multinomial model for men, those belonging to the reference group were less likely to have 1–2 children than the more educated men (OR 1.00 vs. 1.32–1.75[2]), with primary school educated men with at least one year of vocational education being most likely to do so (OR 1.75 95% CI 1.42–2.16). Men

[2] Statistically significant ($p<0.05$) differences only between all other educational groups and the reference group.

in the reference group were also least likely to have at least three children (OR 1.00 vs. 1.38–1.61[2]), while junior high school educated men were most likely to do so (OR 1.61 95% CI 1.19–2.18).

In the age-adjusted multinomial model for women, the two high school educated groups were less likely to have 1–2 children than the two primary school educated groups (OR 0.58–0.63 vs. 1.00–1.07[3]), with the senior high school educated being least likely to do so (OR 0.58 95% CI 0.46–0.73). Similarly, the high school educated women were less likely to have at least three children than the primary school educated ones (OR 0.51–0.58 vs. 0.91–1.00[4]), with as well senior high school educated women being least likely to do so (OR 0.51 95% CI 0.39–0.67).

Twin comparisons for completed fertility the level of education were conducted for male and female discordant twin pairs by using conditional logistic regression analysis. Having 1–2 children and having at least three children were compared to being childless in two separate models fitted for both sexes. As in the multinomial regression modeling, also in these analyses the only primary school educated ones were held as the reference group.

Although confidence intervals in the twin comparison were rather wide, in men the educational gradient in completed fertility seemed similar, though partly attenuated, compared to that of the twin individual analysis. The men with a primary school and at least one year of vocational education, and those with junior high school education differed statistically significantly from the reference group in being more likely to have 1–2 children (OR 1.59 95% CI 1.01–2.50 and OR 2.40 95% CI 1.26–4.57, respectively). In having at least three children, the primary school educated men with at least one year of vocational education, and the senior high school educated men seemed to differ from the reference group, although the differences were not statistically significant (OR 1.23 95% CI 0.62–2.43 and OR 1.20 95% CI 0.34–4.26, respectively).

In the female twin comparison in turn there seemed to exist hardly any association between level of education and completed fertility.

[3] Statistically significant ($p<0.05$) differences only between the primary school educated and high school educated groups of women.

[4] Statistically significant ($p<0.05$) differences only between high school educated groups of women and the reference group.

Conclusions

In this study the twin individual part of the analysis showed a rather similar pattern between level of education and completed fertility as has been reported previously in Finland and in some studies from other low-fertility countries. Here in men a relatively high and in women a relatively low education was positively associated with completed fertility. Although the confidence intervals in the twin comparison part of the analysis were wide, in men there was evidence of an educational gradient similar to that of the twin individual analysis. For women in turn we found hardly any association in the twin comparison. These results are suggesting that family background factors might play a role in the female association between level of education and completed fertility. For men in turn the association seems more likely to result from a causal relationship between the two variables. However, in order to draw more definitive conclusions on this issue, more evidence is preferred.

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