MAX PLANCK INSTITUTE
FOR DEMOGRAPHIC RESEARCH

Konrad-Zuse-Strasse 1 · D-18057 Rostock · Germany · Tel +49 (0) 3 81 20 81 - 0 · Fax +49 (0) 3 81 20 81 - 202 · www.demogr.mpg.de

MPIDR Working Paper WP 2020-029 I August 2020
https://doi.org/10.4054/MPIDR-WP-2020-029
Revised February 2022

Couples' Educational Pairings, Selection into Parenthood, and Second Birth ProgressionsThe Power of Two: Second Birth Rate Differences between Couples with Homogamous and Heterogamous Educational Pairings

Natalie Nitsche I nitsche@demogr.mpg.de
Alessandra Trimarchi
Marika Jalovaara

This working paper has been approved for release by: Peter Eibich (eibich@demogr.mpg.de), Deputy Head of the Laboratory of Labor Demography.

The Power of Two: Second Birth Rate Differences between Couples with Homogamous and Heterogamous Educational Pairings

Natalie Nitsche,[1,*] Alessandra Trimarchi,[2] Marika Jalovaara[3]

[1] Max Planck Institute for Demographic Research, Rostock, Germany
[2] University of Vienna, Austria
[3] University of Turku, Finland

[*] Corresponding author: Natalie Nitsche, Max Planck Institute for Demographic Research, Konrad-Zuse Straße 1, 18055 Rostock, Germany. Email: nitsche@demogr.mpg.de

Keywords: Fertility, education, couples, second birth, resources, family formation

Acknowledgments: The authors thank Statistics Finland for permission (TK53-663-11) to use the data. Support for this research was provided to Natalie Nitsche from the European Union's Seventh Framework Programme (FP7/2007-2013) through a Marie Curie Action under grant agreement no. 627543 and the Austrian Science Foundation (FWF) within the Lise Meitner Programme under Grant Agreement M 2188-G16. Marika Jalovaara gratefully acknowledges funding from the Academy of Finland (decisions 321264 and 320162).

Abstract

Partners' educational pairings have emerged as decisive in childbearing behavior. In many high-income countries, homogamous tertiary-educated couples display higher second birth rates than heterogamous couples with one tertiary-educated partner. This pattern fits the resource pooling theory, but its specific drivers remain poorly understood. Using data from Finnish registers and recurrent event-history modeling, we examine the role of unobserved heterogeneity and educational upgrading for educational pairing differences in couples' second birth rates. We further differentiate between lower and higher tertiary education to examine whether homogamous couples with the highest joint educational capital, heterogamous couples with low joint educational capital, or couples with the largest educational disparities drive this pattern. We find that the pattern hinges mainly on heterogamous *low pooled resource* couples with a *lower tertiary*-educated partner. Second birth rates are *highest* for all types of couples, in which at least one partner has *higher tertiary* education. Our findings underscore the couple's relevance as a powerful yet often overlooked analytical unit for family formation processes and confirm and extend resource pooling theory. Furthermore, the differentiation between lower and higher tertiary education emerges as crucial to understanding the couple-fertility-education nexus.

INTRODUCTION

Despite the growing diversity in family formation pathways, most children are still born to co-residential couples (Lichter, Sassler, and Turner 2014; Perelli-Harris et al. 2012), which underscores the central role of couples and partners' interactive processes for childbearing (Axinn et al. 2017; Thomson and Hoem 1998; Trimarchi and Van Bavel 2018). Nevertheless, due to a lack of suitable data and the high methodological complexity required for integrating information on partnering trajectories and partners' characteristics (Matysiak and Nitsche 2016), lifetime fertility is often studied from an individual level perspective (Nisén et al. 2018; Nitsche and Brückner 2021).

This research gap on the role of partners in childbearing behavior is increasingly addressed by couple-level studies, both theoretically and empirically (Bauer and Kneip 2013; Oppenheimer 1997). Couple-level studies are limited in that they only concern the population of partnered individuals at any moment, disregard selection processes into partnerships, and neglect the "unpartnered" lifetime when depicting fertility trajectories. Nonetheless, they

allow for complex descriptions of how partners jointly progress with childbearing, contingent on their individual, relative, or joint resources, or other interactive processes such as negotiating diverging childbearing preferences (Thomson, McDonald, and Bumpass 1990).

Economic theories of the family and frameworks on gendered family role behaviors predict variation in childbearing behavior by partners' relative or absolute socioeconomic resources (Becker 2009; Oppenheimer 1994). Empirical couple-level studies have demonstrated greater complexity in the education-fertility nexus than individual-level studies, revealing systematic educational variation in birth progressions contingent on the education of an individual's partner. The detected patterns have, in part, supported Oppenheimer's resource-pooling theory for high-income countries. Specifically, second birth rates appear to be significantly higher among homogamous tertiary (henceforth 'highly') educated couples than among heterogamous couples consisting of one tertiary educated and one secondary or primary (henceforth lower) -educated partner in some high-income countries (Dribe and Stanfors 2010; Nitsche et al. 2018; Nitsche 2014; Trimarchi and Van Bavel 2019).

However, while the specific mechanisms underlying this difference in the second birth rate by educational pairings remain unclear, illuminating them is important because systematic differences in couples' birth progressions contingent on the partners' education likely have implications for individuals' fertility trajectories, children's upbringing, family life, and a society's fertility rates. In addition, they may ultimately reflect social inequalities in family formation experiences and chances. A small number of studies have attempted to test specific pathways that may link educational pairings to second birth transitions. They tested the mediating effect of gendered work divisions, income potential, and unemployment risks (Nitsche 2017; Trimarchi and Van Bavel 2019); however, the findings are varied, country dependent, and do not fully explain educational pairing differentials.

Additionally, unobserved heterogeneity among couples, for instance, due to previously used rather broad measurements of educational parings, due to educational upgrading processes or selectivity into parenthood or other unobserved selectivity, may further complicate the interpretations of previous findings (Trimarchi and Van Bavel 2019). Most existing studies on couples' educational pairings and second births so far are based on survey data, which are limited in the information they provide on partners' educational histories and previous partners beyond the current union. Consequently, with the exception of Trimarchi's and Van Bavel's study (2019), they disregard previous unions and selectivity into parenthood, contingent on educational pairings. Moreover, the observation periods of the panels used in some previous studies were rather short. For instance, the study by Nitsche et al (2018) uses the EU-SILC data, which has an average panel duration of 4 years, the study by Osiewalska (2017) is based on two waves of GGS, and covers a panel duration of about 5 years, contingent on the country. Educational upgrading processes of one or both partners, which may overlap with family formation processes, might thus contribute unnoticed to the link between educational pairings and fertility. Most importantly, limited sample sizes have resulted in rather crude measurements of educational level in these studies, which have mostly relied on a three-category education scheme (low, medium, high/tertiary)(e.g. Osiewaltzka 2017, Dribe and Stanfors 2010, Nitsche 2017), or have even combined the medium and low education categories into one broad group among all couples (Corijn et al. 1996), or when defining the heterogamous couples (Nitsche et al. (2018)).

Overall, measurement imprecision may hide further educational pairing heterogeneity in second birth rates and contribute to the opaqueness of previous findings in terms of theoretical interpretations. Making this heterogeneity visible by employing finer-grained educational pairings might reveal further nuances in the educational pairing-fertility nexus. For instance, to determine whether the resource pooling argument prevails in explaining

higher second birth rates of the homogamous highly educated, a distinction between partners with a higher-tertiary level or a lower-tertiary level of education is necessary. Higher and lower tertiary education implies higher versus lower average income, occupational status, employment participation, and other resources (Statistics Finland 2020), and family formation patterns of these two groups are emerging as distinct (Nitsche and Brückner 2021; Schnor and Jalovaara 2020).

Our study addresses these research gaps and offers two aims. First, we aim to broaden the understanding of the drivers that produce differences in second birth rates between homogamous highly educated couples and heterogamous couples consisting of one highly educated and one lower-educated partner. Using data from Finnish registers, which feature full partnership and childbearing histories and a large sample size, we examine the role of three sources of previously unobserved heterogeneity among couples of different educational pairings for their second birth transitions. First, we differentiate between higher and lower tertiary education to investigate differences in birth rates among finer-grained educational pairings. We can thus test whether homogamous couples with the highest joint educational capital ("highest pooled resource couples"), heterogamous couples with low joint educational capital ("low pooled resources couples"), or couples with the largest educational disparities ("large distance couples") drive this pattern.

Second, we further test whether educational upgrading processes or, third, unobserved couple-level heterogeneity across birth episodes can explain previously documented differences in second birth rates. Is the resource pooling hypothesis confirmed when we differentiate between couple combinations with lower and higher tertiary education, or do other patterns of second birth progressions by educational pairing emerge? Does educational upgrading mediate some of the differences in second birth rates between the educational pairings via postponement of the second birth until the lower-educated partner has caught up

with tertiary education? Are other sources of unobserved heterogeneity at the couple level driving these differences? To answer these research questions, we use recurrent event history modeling of first and second birth transitions with a frailty term to control for unobserved couple-level heterogeneity and model educational upgrading processes.

Our study's second aim is to provide a descriptive overview of second-birth transitions among couples by partners' educational pairings in Finland. Such a study is still lacking in the Finnish context. Finland is a particularly interesting case study because it has a family-oriented welfare system with generous childcare provision and parental leave schemes, and high levels of societal gender equality, which might mitigate some of the pooling-related educational pairing effects. Finnish registers are also one of the few data sets worldwide that provide full co-residential partnership histories of married couples and unmarried cohabiters across several decades, together with fertility and educational histories. This makes Finland a rare case study that allows for joint modeling of first and second birth transitions contingent on partners' educational pairings. Hence, our study contributes to the couple-fertility-education literature both conceptually and substantively.

In summary, our results confirm that couples' joint educational capital is positively linked to their second birth rates in Finland. Next, the differentiation between higher and lower tertiary education emerges as crucial to further our understanding of the couple-fertility-education nexus. A fault line for heterogamous couples' second birth behaviors emerges between couples featuring higher versus lower tertiary education. All types of homogamous and heterogamous couples, in which at least one partner has higher tertiary education experience the highest second-birth transition rates across all couples. Educational upgrading does not drive educational pairing differences in second-birth rates. Finally, adding a common term across birth episodes to address unobserved heterogeneity renders many

pairing differentials among the higher educated groups that are not statistically significant; however, pairing differentials remain large and significant among the lower-educated groups.

BACKGROUND AND HYPOTHESES

Couples, childbearing, and educational pairings

In high-income societies, most co-residential couples are homogamous in terms of their educational resources (Grow and Van Bavel 2015). Changing gender ratios in tertiary education has led to changes in assortative mating in heterogamous couples. Hypogamous couples with a highly educated female partner and a lower-educated male partner have become more common, while hypergamous male breadwinner couples, once prevalent, are now on the decline (De Hauw, Grow, and Van Bavel 2017; Esteve et al. 2016). These educational assortative mating changes have spurred interest in examining their implications for childbearing behavior because the implied changes in the economic roles of men and women in families are expected to affect childbearing choices (Van Bavel 2012). Empirical studies confirm that a partner's education appears to make a significant difference in the relationship between an individual's education and childbearing behaviors, at least in some settings (Corijn, Liefbroer, and de Jong Gierveld 1996; Dribe and Stanfors 2010; Nitsche et al. 2018; Trimarchi and Van Bavel 2019). Given that educational pairings are likely among the factors contributing to gender differences in educational fertility gradients, investigating differential birth rates by educational pairing has relevance in demography.

Existing couple-level studies focusing on the partners' education have derived their hypotheses regarding how educational pairings predict couples' birth progressions based on arguments from the New Home Economics (Becker 2009) or Oppenheimer's ideas about resource pooling (Oppenheimer 1997). While some studies have focused on couples' transitions to parenthood and their probability of remaining childless (Bauer and Jacob 2010;

Corijn et al. 1996; Jalovaara and Miettinen 2013; Osiewalska 2017; Wirth 2007), others have examined the transitions to second and third births (Dribe and Stanfors 2010; Nitsche et al. 2018; Nitsche 2017; Trimarchi and Van Bavel 2019). The conceptualization of partners' joint resources in these studies also varies. Most studies have examined educational level pairings only, while others combined information on education with information on the field of study (Trimarchi and Van Bavel 2019), occupational status (Osiewalska 2017), and income (Dribe and Stanfors 2010).

How education is measured and how enrolment in education is controlled in these studies has also varied. The findings of this small number of studies are mixed for first births but are more consistent for second- or higher-order birth progressions. Especially in Western European countries and Sweden, couples with two highly educated partners were found to have higher second (and third) birth progression rates than couples with one highly educated partner and one lower-educated partner (Dribe and Stanfors 2010; Nitsche et al. 2018; Nitsche 2017; Trimarchi and Van Bavel 2019). While these studies have suggested that resource pooling, reduced perceived unemployment risks, and greater gender equality in the division of paid and unpaid work are among the potential mechanisms for the elevated second birth rates among highly educated couples, they did not test these mechanisms directly. Moreover, as most of these studies used event-history methods, it remains unclear whether these are timing or quantum effects. One study used stepwise models to investigate the mediating effect of the division of unpaid work in a German sample. The results demonstrated that these differentials in second birth rates between homogamous highly educated and other couples remained robust and did not appear to be driven by gendered housework divisions (Nitsche 2017).

To date, there has been no single-country study of Finland involving educational pairings and second birth transitions. One study that used Finnish register data investigated

the transition to parenthood by examining the effects of each partner's income and education, as well as the interaction effects between the partners' resources. While no interactive effects of the partners' education on the first birth hazard were found (Jalovaara and Miettinen 2013), differential first-birth hazards based on the partners' education and income levels were present. The higher the income of each partner, the higher the transition rate to the first birth. Even though the effect of the partners' resources did not interact significantly in this study, the results suggest that couples with higher levels of joint resources have higher birth rates than couples with lower levels of joint resources.

Educational pairings and the classification of education

Given the rapid expansion of education, a large percentage of the current population of many high-income nations have attended tertiary education (Barro and Lee 2013; Schofer and Meyer 2005). For instance, in Finland, around 45% of 35–44-year-olds in 2018 had received some type of tertiary education (Statistics Finland 2017), up from around 36% in 2000 (Statistics Finland 2021. Thus, the category of individuals classified as "highly" educated (based on the standard educational classifications of low, medium/secondary, and high/tertiary) has increased and diversified over time. We argue that given this diversity and the tertiary-educated group's large size, a more nuanced distinction should be made between lower and higher tertiary education. For example, it is likely that the earning potential and employment participation levels vary significantly between these two groups, which may have implications for couples' childbearing decisions (Statistics Finland 2020). In heterogamous couples in which one partner has a secondary education, and the other partner has a lower tertiary education, the differences between the partners in terms of income, earnings potential, social background, capital, and values may be much smaller than they are in a couple in which one partner has a higher tertiary education, and the other has secondary

education. Nonetheless, previous studies have mostly grouped all hypogamous or hypergamous couples, including one tertiary-educated partner and one lower-educated partner. Thus, these studies may have overlooked potential diversity not only within the group of tertiary-educated individuals but within those heterogamous couples in which one partner was highly educated, while the other had secondary or basic education (e.g., Nitsche et al. 2018).

Couples consisting of one partner with tertiary education and one partner with low education are rare and cannot be examined as a separate group in analyses based on survey data because of their small sample sizes. However, it is possible that the lower second (or third) birth progression rates of heterogamous couples are driven by these large-distance couples (e.g., one partner has high tertiary education and the other has secondary or basic education). Heterogamy along cultural or socioeconomic dimensions such as religion, nationality, social value orientation, and social background, which can accompany educational heterogamy, has been theorized and empirically shown to decrease union stability (Kalmijn, De Graaf, and Janssen 2005; Schwartz 2010) and the progression to marriage (Trimarchi and Van Bavel 2018). In Finland, cohabiting large--distance couples are more likely to separate (Mäenpää and Jalovaara 2014). Therefore, the higher separation rates of these couples, combined with phases of lower relationship satisfaction and investments preceding the separation, may contribute to the lower birth progression rates of heterogamous couples.

Alternatively, second birth progression rates may be lower in heterogamous couples that include one partner with lower tertiary education because of their lower overall economic resources (low joint resource couples), based on the assumption that having sufficient joint socioeconomic resources is crucial for stimulating second births (Oppenheimer 1997). This argument also implies that the high second birth rates of homogamous highly educated

couples are particularly driven by homogamous higher tertiary (highest pooled resource) pairing—i.e., by the partners having high earning potential, gender-egalitarian attitudes, high social capital, and perhaps high levels of union stability—while the second birth rates of higher-lower tertiary pairings are likely to be in between those of the other two groups. Thus, differences in birth rates between couples with two partners with higher tertiary education (highest pooled resource couples) and couple combinations with higher and lower tertiary education may be present but masked in the standard classification. Looking more closely at a sufficiently large sample will enable us to understand such finer-grained dynamics.

In summary, we posit the following first hypothesis, derived from theoretical arguments regarding the implications of 1a) homogamy versus heterogamy and 1b) pooled socioeconomic resources:

Hypothesis 1a: *Among heterogamous couples that include one tertiary educated partner, second birth rates are lower mainly in pairings in which there is a "large distance" between the partners' educational levels (e.g. upper tertiary and basic education) (H1a large distance low birth rate).*

Hypothesis 1b: *Among heterogamous couples that include one highly educated partner, second birth rates are lower mainly in pairings in which one partner has lower tertiary education (and one has secondary or basic education). Simultaneously, "highest pooled resource couples" will have the highest second birth rates, and higher/lower tertiary combination couples will have second birth rates that lie between those of the other two groups (H1b Pooling).*

As a caveat to hypotheses 1a , hypergamous couples, in particular those with a tertiary educated man and a basic educated woman, may represent male breadwinner couples, in which he specializes in labor market work, and she in family and care work. The New Home Economics theory of the family hypothesizes that role specialization maximizes a couples' utility function, minimizes opportunity costs, and predicts that male breadwinner couples, in a context where family and care work is still predominantly carried out by women, will have higher birth rates than other types of couples (Becker 2009). Hhypergamous 'large-distance' couples, consisting of a tertiary educated man and a woman with basic education likely do have an unevenly distributed earnings potential, which may make it more likely for them to adhere to a male breadwinner family model. These hypergamous 'large-distance' couples may thus have higher second birth rates than hypergamous couples with partners who are closer in educational level, and than hypogamous or homogamous couples. . Couples in Finland share house- and childcare work less gender equally than their neighbors in Sweden and Norway (Moreno-Colom 2017), and fathers are more likely to take up parental leave in Finland when the mother is employed in upper while-collar occupations (Lammi-Taskula 2008). Heterogamous 'large-distance' couples in Finland may thus be one subgroup likely to adhere to a male breadwinner family model. These couples are, however, rare (Dribe and Stanfors 2010). Even in case their second birth rate was higher than that of hypergamous couples with a tertiary educated man and a secondary educated woman, this might not change the average estimate of hypergamous couples in a sample where these couples mainly consist of a tertiary educated man and a secondary educated woman. We therefore posit a third hypothesis.

Hypothesis 1c: *Among hypergamous couples that include a tertiary educated man, second birth rates in pairings in which there is a "large distance" between the partners' educational levels (upper tertiary/basic) are higher than in hypergamous couples with less educational distance (tertiary/secondary). (H1c large distance male breadwinner).*

Educational pairings and upgrading

Childbearing is a dynamic life process. Couples generally plan the timing of births, although conception and pregnancy outcomes are not always within the scope of the partners' agency (Hohmann-Marriott 2009; Thomson and Hoem 1998). Some couples will postpone the transition to parenthood or to another birth for various reasons, such as economic or employment considerations (Gustafsson 2001; Mills et al. 2011). While having a child during education enrollment is not common, it is occurring at increasing rates, at least in the US (Kuperberg 2009). The average age at the completion of tertiary education varies across countries and is declining across Europe due to the Bologna reform (OECD 2014). However, in some countries, such as Finland, the average age at college graduation was high in the past and remains high today (OECD 2016). Currently, the average age at which Finns earn their first university degree is 25–27, and around 30 for post-graduate degrees (OECD 2016).

The later in the life course an individual completes their education, the more their childbearing and educational processes may overlap. The period when an individual is enrolled in tertiary education, and particularly toward the end of this period when most coursework is completed, is generally characterized by a high degree of time flexibility and may be perceived as a good time to make the transition to parenthood (Mason, Wolfinger, and Goulden 2013). This is especially likely if the other partner has already completed their education and is employed with a stable income. Thus, it may seem feasible for some couples

to transition to parenthood while one partner is still enrolled in education. Such a first birth would be classified as a birth to a heterogamous couple as, for instance, the partner still enrolled in tertiary education, before having earned their first tertiary degree, is officially classified as "medium" educated. Such a couple may postpone their second birth to a time when the enrolled partner has completed their studies and possibly entered the labor market, for instance, because parental leave benefits are tied to previously received earnings.

To our knowledge, there is currently no representative evidence on if this childbearing trajectory is relatively common. Kravdal (2007) estimated that, in Norway, 23% of mothers registered as highly educated at age 39 had made the transition to motherhood while they were still at the secondary education level. Hence, this birth-trajectory pattern may be more common than acknowledged and explain some portion of the elevated second birth risk observed for homogamous highly educated couples. Thus, following the couple over time and modeling the upgrading process explicitly may reduce the birth rate differences between homogamous highly educated couples and heterogamous couples.

Previous studies have controlled for the educational enrollment of either partner but have not modeled education upgrading within the same couple. We suggest that such a childbirth education upgrading sequence may be more applicable to couples in which the woman is enrolled (hypergamous couples), as she can combine her pregnancy and maternity periods with her studies. Additionally, male partners are typically older than female partners; thus, educational upgrading of the female partner after the first birth may be more common than upgrading of the male partner, simply for age-related reasons.

H2: *A hypergamous couple may be more prone to having their first child, while the woman (or the man) is still enrolled in education, but they may turn into a homogamous, highly educated couple before having their second child.*

Therefore, second birth rate differences between homogamous highly educated couples and hypergamous couples will shrink when we allow for educational upgrading (H2 Upgrading).

Educational upgrading will also occur among lower-educated couples. Nonetheless, we expect to find that the education upgrading mechanism applies primarily to differences in birth rates between highly educated homogamous and hypogamous couples, as they are more likely than lower-educated couples to be enrolled in education in their prime childbearing years.

Further unobserved heterogeneity

The relationship between education and higher-order births is difficult to assess due to parenthood selection (Kravdal 2001; Kravdal 2007; Kreyenfeld 2002). Unobserved heterogeneity across birth orders may lead to a more selected group among highly educated mothers who have higher second or third birth rates than among lower-educated mothers. Thus, the educational gradient in higher-order births may not represent a "clean" effect of education on fertility. This mechanism can also be extended to couples (Trimarchi and Van Bavel 2019). Thus, to observe a "cleaner" effect of couples' educational pairing on higher-order births, accounting for unobserved heterogeneity at the couple level is necessary. Among the unobserved factors that could affect fertility are partners' fecundity and partners' psychological and physical traits. If differentials in birth rates between educational pairings are largely driven by such unobserved heterogeneity, these differences should become smaller when unobserved couple-level heterogeneity across first and second births is accounted for.

H3: *If educational pairing differences are attenuated by jointly modeling the transition to parenthood and the second birth when accounting for unobserved*

heterogeneity, such differences are likely driven by unobserved common factors at the couple level (H3 Selection).

DATA AND METHODS

Data and sample selection

We used Finnish register data that include complete education, co-residential unions, and childbearing trajectories. Finnish registers are exceptional; since the late 1980s, they have contained information on the place of residence down to the specific dwelling, which makes it possible to identify coresidential couples even when they are childless and unmarried (for details on the inference of unions, see Jalovaara and Kulu 2018). To protect individual anonymity, Statistics Finland opted to deliver a sub-sample of the full registers only. Therefore, starting with a random 11% sample instead of the full population of the cohort of women born in 1969, we observed records of all co-residential unions formed between the ages of 18 and 39. The women in our sample were born between 1969 and 1990, and they formed their unions between 1985 and 2009 (N = 40,021). Women who did not enter a union during the observed time (N = 2,412) were excluded from the sample. Further, 6,827 women were dropped because they had their first child after September 2009, which is our censoring time. Our overall sample comprised 30,782 women who formed 46,270 unions. Unions were censored in September 2009, at women's emigration, and 15 years since the beginning of a co-residential union.

In the first step, to estimate second birth transitions by educational pairing without accounting for unobserved heterogeneity across birth episodes, we only retained unions in which the first child had been born; hence, we left out 16,185 unions that did not lead to a first birth during the observed time. From the remaining 30,085 unions, 312 unions were excluded from the analysis because of an inconsistent time to event (N =141 equal to zero, N

= 171, negative time). We were left with 29,773 unions at risk of a second birth and 28,139 women. Thus, for the basic second birth rate estimation, we considered all coresidential unions of mothers at parity one, regardless of their marital status, and included all unions that ended before marriage or the birth of a second child occurred. This allowed us to account for the fact that some women have formed several unions that might or might not involve childbearing.

Main explanatory variables

Educational pairings were measured as time-varying variables. Using the updated 2011 version of the International Standard Classification of Education (ISCED), we first divided the partners' education into three main groups: low (ISCED-2011 levels 0–2: basic education or less), medium (ISCED-2011 3–4: higher secondary and vocational training), and high (ISCED-2011 5–8: low and high tertiary education). We combined partners' education to obtain a broader educational pairing variable measured in nine categories, similar to previous studies.

Next, we created a more refined variable for educational pairing. The highly educated group was further subdivided into lower tertiary educated (ISCED-2011 levels 5–6, including individuals with a bachelor's degree with a track that is typically vocationally oriented) and higher tertiary-educated individuals (ISCED-2011 levels 7–8, including individuals who obtained a higher tertiary or doctoral degree). The refined educational pairing variable resulting from forming all the possible combinations of the partners' finer-grained educational levels consists of 4×4=16 categories.

The other main explanatory variable is an indicator of educational upgrading, that is, whether either of the partners had obtained a higher level of education relative to their observed education at the time of starting the coresidential union. The variable presents four

categories; for each couple, we defined whether both partners upgraded their level of education (1), only the man upgraded (2), only the woman upgraded (3), or neither of the partners upgraded (4).

Control variables

We controlled for 1) the woman's year of birth, entered as yearly dummy variables; 2) the union cohort, which indicates the year when the union was formed and was measured in three categories: formed before 1995, between 1995 and 2000, after 2000; 3) marital status; and 4) the partner's age difference as a three-category variable, coded as a) homogamous: age difference of fewer than two years; b) hypergamous: the man is at least two years older than the women; and c) hypogamous: the woman is at least two years older than the man. Table 1 contains a detailed description of the explanatory variables for all couples at risk of a second birth.

[Insert Table 1 here]

Analytical strategy

To test our hypotheses, our analytical strategy consisted of two steps. First, we modeled the transition to a second birth through a standard piecewise exponential model on a sample of unions at risk of a second birth. Here, we estimated the three models. The first model (specification 1) includes a nine-category educational pairing variable. The second model (specification 2) includes a refined 16-category educational pairing variable. The third model (specification 3) includes the upgrading variable using a detailed educational pairing measure with 16 categories. Given that we observed several unions per woman, we also specified models that clustered standard errors at the woman level to account for the non-independence of observational units (in our case, couples); however, our conclusions are substantially the same. The piecewise exponential model can be expressed as follows:

$$\log(\lambda_{ij}) = \alpha_j + x'_i\beta \quad (1)$$

where $\log\lambda_{ij}$ is the log of the hazard of couple *i* in interval *j*; α_j is the log of the baseline hazard, which is assumed to be constant within each interval considered; and $x'_i\beta$ is the relative risk for a couple with that specific covariate profile (including both time-constant and time-varying covariates), compared to the baseline, at any given time. In our models, the time process of the transition to the second birth was measured as the duration from the previous birth until conception (birth minus eight months). Our baseline duration was measured in eight intervals (0–2 years since the last birth, 2–3, 3–4, 4–5, 5–6, 6–7, 7–10, and 10+).

In the second step, we applied a model for recurrent events in which birth episodes are nested within a couple. This allowed us to control time-constant unobserved factors correlated across birth episodes for each couple formed by the women in our sample. To do so, we used a sample of all women and their unions who were at risk of a first birth at the beginning of our observational period, in addition to the sample at risk of a second birth utilized previously (N women= 48055; N couples = 70331). This piecewise exponential model with an unobserved random effect can be written as follows:

$$\log\lambda_{ij} = \alpha_j + x'_i\beta + \nu_i \quad (2)$$

where ν_i is the unobservable random effect across couples' first and second birth episodes, which is assumed to be normally distributed with mean zero and variance σ^2 to be estimated. The distribution of ν_i was approximated by 12 integration points in our models; the results are robust if we used eight or 16 integration points. To obtain an event-specific covariate effect, we interacted each independent variable with the type of event, that is, whether it is a first or a second birth. We estimated the recurrent event model using both the detailed 16-category educational pairing variable (specification 4) and the basic nine-category educational pairing variable (results available upon request). The findings for model specifications 1–4 are

illustrated in Table 2, and the coefficients and confidence intervals for these models are plotted in Figures 1–4.

We estimated several additional models to check for the robustness of our educational pairing parameters, as illustrated in the Appendix in Tables A and B, and Figure A. First, we estimated a series of stepwise models for all specifications to assess whether educational pairing differentials in second birth rates were increased or diminished—in other words, mediated by the control variables we use. An inflation of coefficients may, for example, result from artificially "equalizing" couples on dimensions that may affect educational pairing formation, or that may be affected by educational pairings, such as the year of union formation, the age difference between the partners, or the couple's marital status.

Second, we added controls for the age at first birth while measuring the age at first birth in two different ways: as the woman's actual age at her first birth and the woman's age at the first birth that occurred within the present partnership. There is a debate in the literature about whether the age at first (or previous) birth should be controlled for in event-history models predicting the time to the second (or next) birth; and, if so, how it should be specified, particularly when attempting to obtain estimates for factors that themselves affect first birth timing, such as education (Hoem 1996; Kravdal 2007; Kreyenfeld 2002). Time squeezes among women who, on average, have their first child later in life, such as highly educated women, can lead to faster second birth progressions, thus producing higher second birth transition rates in time-to-event models. Time squeeze effects, if present, are pure timing effects and are often further exacerbated by adding a control for age at first birth (Kreyenfeld 2002).

For our main models, we decided to forgo controlling for age at first birth because it can be expected that such a control would exacerbate the differences in education effects on second birth timing. The literature has demonstrated that when controlling for the partners'

education, modeling interaction effects between the partners' education, and adding a common term for unobserved heterogeneity across birth episodes might be more meaningful when assessing second birth risks by education than when controlling for age at first birth (Kravdal 2007; Kreyenfeld 2002; Nitsche et al. 2018). Nonetheless, we estimated additional models while controlling for age at first birth, which indeed demonstrated exacerbated education-pairing differentials. The findings for these and the stepwise models are illustrated in Tables A and B in the Appendix. As they detected the same patterns as our main models, our results are robust to these checks. While the coefficient sizes changed slightly, particularly after controlling for age at first birth, the relative distances between the educational pairings remained the same throughout.

RESULTS

Descriptive Statistics

Table 1 illustrates the descriptive statistics for the distribution of couple years and events by couples' educational pairings for both education conceptualizations (nine pairings and 16 pairings). Approximately 53% of the couple time is contributed by homogamous couples, in which the partners have the same education level. Homogamous couples with secondary education were the most common pairing (30.0%); they served as the reference category in all models. We retained low and high tertiary education combinations as homogamous (within the group of highly educated) couples in the finer-grained panel of Table 1. Hypogamous couples make up about 31% of couple time, while hypergamous couples make up only about 15% of couple time. The finer-grained pairings reveal that in most tertiary-educated homogamous couples, both partners have lower tertiary education (9.3%), a smaller percentage of these couples are "highest pooled resource couples" in which both partners have higher tertiary education (3.4%). Combinations of lower and higher tertiary education

are present in less than 5% of couples (2.4% for each combination). Couples that we have termed large distance are rare. Only 0.04% of couple time is contributed by couples with a higher tertiary-educated man and a basic-educated woman, and only 0.32% by couples with a higher tertiary-educated woman and a basic-educated man. Combinations with lower tertiary and basic education are somewhat more common, at 0.8% among hypergamous couples and 3.3% among hypogamous couples.

Baseline Model

The model results are presented in Figures 1–4 and Table 2. The figures plot the relative risk ratios of a second birth for educational pairings. Figure 1 presents the baseline model with nine educational pairings. In general, we detect a significant positive cumulative effect of educational resources in couples on second-birth hazards. As expected, homogamous, highly educated couples displayed the highest second birth rates compared to all other couples, their relative risk is at 1.30, compared to the reference group of homogamous secondary educated couples. All types of hypergamous couples with one tertiary and one lower-educated partner or two lower educated partners displayed significantly lower second birth rates than the homogamous tertiary-educated couples. The difference between homogamous tertiary educated couples and hypergamous couples with a highly educated man and secondary educated woman is the smallest (relative risk of 1.30 versus 1.21), yet still statistically significant at the 5% level ($p=0.0203$). All remaining contrasts between homogamous tertiary educated and other couples are statistically significant at $p<.001$. : Differences in second birth rates between hypergamous and hypogamous pairings of the same respective educational attainment level are not statistical significant throughout ($p>.05$). Hence, cumulative education effects are gender-neutral in this Finnish sample. Also noteworthy are the large cumulative education effects among the lower-educated couples. The relative

second birth risk of low-low educated couples is at 0.6 (p<.001), and of the low-secondary combinations is at 0.8 (p<.001), compared with the reference group (secondary-secondary). These results confirm previous findings on the relationship between partners' education and second births from other countries apply also for the Finnish context (Dribe and Stanfors 2010; Nitsche et al. 2018).

[Insert Figure 1 here]

Finer Grained Educational Pairings

Next, we explored the potential drivers of these differential second-birth rates. Figure 2 illustrates the estimates based on the finer-grained educational pairings, testing H1a,H1b and H1c. The estimates indicate only small differences in relative second birth risks among the four finer-grained "homogamous" tertiary-educated couple types (relative risk [r.r.] of 1.26–1.38). Couples with two high tertiary-educated partners have the highest second-birth risk in this set of couples, however, the difference in the point estimate to the other homogamous highly educated couple types was only statistically significant compared with the pairing consisting of wo low tertiary-educated partners (p=.009). All other contrasts in this set of four tertiary educated couples were statistically insignificant (p>.05). This finding leads us to reject the second part of H1b (highest pooled resource pooling), which suggests that these four homogamous tertiary educated types would differ in their second birth rates due to differences in their pooled socioeconomic resources, although with the caveat that two upper-tertiary educated partners stand out with a significantly higher birth rate when compared to low tertiary educated couples. Moreover, and as expected, significant and, in some cases, large differences are detected among the finer-grained hypogamous and hypergamous couples in which one partner is tertiary educated, and the other is less educated.

[Insert Figure 2 here]

[Insert Table 2 here]

Among the four types of hypogamous couples (women with more education, here tertiary education), those with the most joint educational capital, namely, couples in which the woman has upper tertiary education and the man is secondary-educated (r.r. of 1.33), do not differ from homogamous highly educated couples (contrasting tests with all four types of homogamous tertiary educated couples yield p-values > .05). In contrast, the couples with the lowest cumulative capital (hypogamous couples with a low tertiary-educated woman and a basic-educated man) had second birth risks that were the lowest among the four types (r.r. 0.98) and were significantly lower than those of both the homogamous highly educated couples and the other hypogamous couples ($p=.035$ for contrast with hypogamous couples consisting of an upper tertiary educated woman and a basic educated man, $p<.001$ for all other seven contrasts with homogamous or hypogamous couples involving a tertiary educated woman). The second birth risk of the other two hypogamous pairings lies between those of the other two groups (r.r. = 1.26, 1.14). Confidence intervals for the rare group of couples with an upper tertiary educated woman and a basic educated man overlap with all homogamous and the other hypogamous couples with a tertiary educated woman. However, the second lowest cumulative resource couples consisting of a low tertiary educated woman and a secondary educated man display a significantly second lowest birth rate (r.r. 1.14) compared with all other hypogamous and homogamous couples involving a tertiary educated woman ($p<0.001$ for all contrasts), apart from hypogamous couples with a lower tertiary educated woman and a basic educated man, who displayed the lowest rate among the hypogamous set. It is thus evident that the differences in the second birth risks between the

hypogamous and the homogamous highly educated couples mainly hinge on the two pairings that include a woman with low tertiary education, which supports the first part of H1b on low resource pooling.

We see a similar yet slightly distinct differentiation between the four hypergamous pairings involving a tertiary-educated man. Here, the two hypergamous pairings with an upper-tertiary educated man have the highest second birth rates of all couples (r.r. of 1.39 for the upper tertiary-secondary pairing, r.r. of 1.72 for the upper tertiary-basic pairing). All contrasts in the birth rate between these two couple-types and the four homogamous tertiary educated types are statistically indistinguishable ($p>.05$). The birth rate of the pairing with a low tertiary-educated man and a basic educated woman is the lowest of all hypergamous couples featuring a tertiary educated partner (r.r. 0.94, $p=.021$ for the contrast with the upper tertiary man-basic educated woman pairing, $p<.01$ for all other hypergamous and homogamous pairings with one or two tertiary educated partners). The pairing with a lower-educated tertiary man and a secondary educated woman has a relative second birth risk of 1.17, which is significantly higher than that of the lower-tertiary educated man-basic educated woman pairing ($p=0.020$) and significantly lower than that of all homogamous educated tertiary educated couples ($p<.05$) apart from the low-low tertiary educated pairing. Yet, it is statistically indistinguishable from the rate of the two hypergamous pairings with an upper-tertiary educated man ($p>.05$). .

In sum, we find support for H1b on low resource pooling, both for hypogamous and hypergamous couples. The lower second birth rate of heterogamous couples with one tertiary partner is clearly driven by couples with one low-tertiary educated and one secondary or basic educated partner. Thus, a clear distinction has emerged between those heterogamous couples with an upper-tertiary educated versus a lower-tertiary educated partner, regardless of the gender of the low-tertiary educated partner: lower second birth rates of heterogamous

couples compared with homogamous couples with at least one tertiary educated partner hinge upon heterogamous couples with a low tertiary educated partner.

Next, we do not find support for H1a, according to which large distance couples—featuring one partner with upper tertiary education and one with basic education—have significantly lower second birth risks than the homogamous highly educated couples. Still, hypergamous large-distance couples, with an upper-tertiary educated man and a basic educated woman, have the highest second birth risk of all couples in terms of point estimate, which offers support for H1c (large distance male breadwinner). The sample size for this pairing is, however, small. This leads to non-significant contrasts with the second birth rate of homogamous highly educated couplesand implies that this high point estimate does not change the overall birthrate estimate of the hypergamous tertiary-basic educated pairing in model 1 much.

Educational Upgrading

Figure 3 presents the results from the model that includes the covariates for educational upgrading, testing H2. The overall patterns from Model 2 remained unaltered, although some slight changes in relative birth risks were found. For instance, the second birth risks of couples with a high tertiary-educated man and a low tertiary-educated woman increase slightly, while those of couples with two low tertiary-educated partners decrease slightly. This contrast is now statistically significant (p=.014). This suggests that some couples use a strategy of waiting to have their second child until the man has upgraded his education from low to high tertiary. Indeed, the couples in which the man upgrades his education or in which no upgrading occurs have significantly higher second birth rates than the couples in which only the woman (r.r. 0.78) or both partners (r.r. 0.81) upgrade their education, as illustrated in Table 2. This finding is contrary to our expectation that a woman's educational upgrading

would be associated with higher second birth rates. It also further underlines the finding of the presence of highest second birth rates in couples with an upper-tertiary educated man. Couples with an upper-tertiary educated man and a lower-tertiary educated woman may reflect a "male earner-female caretaker" set-up within the highest levels of socioeconomic resources, for example, a male doctor and a female nurse.

[Insert Figure 3 here]

Hence, there is no indication of a widespread pattern of couples deciding to wait for a second child until after the woman finalized her tertiary education. Indeed, if anything, the results suggest that the period after the man has upgraded his education is the preferred time to have a second birth. Nonetheless, the resulting changes in the educational pairing coefficients are small and overall comparable to the patterns we found in Model 2. This finding was confirmed in a model that added education upgrading measures to the basic nine-category educational pairing specification and suggests that the birth risk differences illustrated in Figure 1 remain (Appendix Figure A). Thus, we reject H2.

Unobserved Heterogeneity

Finally, Figure 4 illustrates the results from the recurrent event models, which include a frailty term and the education upgrading control for the finer-grained educational pairing specification. Figure 4 reveals that the differences in second birth rates are only slightly affected by the inclusion of unobserved heterogeneity, compared with the previous model featuring 16 educational pairings and educational upgrading. First, the four tertiary-educated homogamous couple types still display similarly high birth rates with overlapping confidence intervals. As in the previous model, the pairing of a man with upper tertiary education and a

woman with low tertiary education displays the highest point estimate (r.r. 1.38) among this set, the contrast with the low-low tertiary educated pairing remains statistically significant at 5% level. Interestingly, the second birth rate point estimate for the large distance couple of an upper-tertiary educated man and a basic educated women is reduced to 1.47, from 1.68 in model 3, and no longer statistically distinguishable from that of any other pairing, due to even wider confidence intervals. Lower point estimates are found among the four types of hypogamous couples (ranging from 0.95 to 1.20).. As before, contrasts between hypogamous couples with an upper tertiary educated women are statistically indistinguishable from the pairings in the homogamous tertiary educated set ($p>.05$), while all contrasts between hypogamous pairings with a low tertiary educated woman and the tertiary homogamous educated pairing set remain statistically significant ($p<.01$).

[Insert Figure 4 here]

Similarly, as in Model 3, the contrasts between the two hypergamous couples involving an upper tertiary-educated man and a secondary or basic-educated woman remain significantly different from those of the highly educated homogamous set ($p<.01$), while those for hypergamous couples with a low tertiary educated man and a basic or secondary educated woman do not ($p<.01$, apart from the contrast between the pairing of a low tertiary educated man-secondary educated woman with the pairing of an upper tertiary educated woman-low tertiary educated man, $p >.05$). Thus, we find little support for H3. In other words, unobserved time-constant characteristics across pairings do not appear to explain the birth differentials between highly educated homogamous pairings and hypogamous pairings with a highly educated woman and a secondary or basic-educated man.

Finally, it is noteworthy that the differentials between the higher educated pairings and the lower-and low/medium-educated pairings are not affected by addressing unobserved

heterogeneity. Here, the partners' education's interactive effects appear to play a crucial role in second birth transitions and remain unchanged compared to the baseline model. Couples in which both partners have basic education have a 40% lower rate of second birth (r.r. 0.60) than couples in which both partners have secondary education; the two types of heterogamous couples in which one partner has basic education and the other has secondary education have a relative second birth risk of 0.75. Thus, partners' cumulative human capital resources play an even larger role in the second birth transitions among the lower-educated segment of Finland's population.

CONCLUSIONS AND DISCUSSION

The relationship between childbearing behavior and education is complex; it is likely bi-directional, varies across time and place and is mediated in part via union formation and stability dynamics (Kravdal and Rindfuss 2008; Rindfuss, Morgan, and Offutt 1996; Trimarchi and Van Bavel 2017). Childbearing can occur over a long period across the life course; this is also the case for educational attainment and advancement processes. The relationship between education and second birth rates—including directionality, strength, and underlying mechanisms, the differences therein between men and women, and the variation across time and place—has been the subject of considerable scientific debates, including debates about the measurements and modeling strategies used to assess this relationship (Bremhorst, Kreyenfeld, and Lambert 2019; Kravdal 2007; Kreyenfeld 2002; Nisén et al. 2018; Wood and Neels 2014; Zang 2019).

Further complicating the fertility-education picture is that childbearing is inherently a two-person endeavor, implying that individual education-fertility trajectories interact with the partner's presence and characteristics. Thus, the effort to jointly assess the partners' education-fertility nexus from a couple perspective has emerged as a crucial addition to

individual-level studies in fertility research. Previous studies found that in some developed countries, couples in which both partners are tertiary-educated transition to a second birth at higher rates than couples in which only one partner is highly educated (Dribe and Stanfors 2006; Kreyenfeld 2002; Nitsche et al. 2018; Nitsche 2014; Trimarchi and Van Bavel 2019).

In this study, we set out to further investigate the drivers that underlie this association, testing whether education classification schemes, education upgrading, and unobserved heterogeneity allow deeper insights into what is underlying these previous findings. Using Finnish register data, we add to the literature on couples' joint education and fertility by providing further evidence of the relevance of educational pairings, education classifications, educational upgrading, and unobserved couple-level heterogeneity across birth episodes. Four main findings have emerged.

First, the relationship between education and second birth transitions in Finland is, as in many other countries, contingent on the partners' educational pairings. The general pattern we observe is that the second birth rate increases relatively steadily as the couple's joint human capital increases. These findings underscore that the partners' joint education level matters significantly for their joint childbearing trajectories, even in Finland, a country that provides generous parental leave, childcare, schooling, and other social services (Pfau-Effinger 2005). The couple further emerges as a central unit that produces social outcomes, even in a welfare state that provides one of the highest social support and assistance levels for families. Going forward, further spotlight on the couple-level appears to hold much promise for family formation research.

Second, creating finer-grained educational pairings by differentiating between lower and higher tertiary education has emerged as central to furthering the understanding of the couple-fertility-education nexus. This conceptualization of finer-grained educational pairings reveals that heterogamous couples consisting of a low tertiary educated and a secondary or

basic-educated partner drive the broader tertiary-tertiary and tertiary-lower educational pairings second birth rate difference. This applies, in particular, to hypogamous couples consisting of a tertiary-educated woman and a lower-educated man. We, therefore, confirm part of our hypothesis H1b pooling; namely, that the low resources pooling of heterogamous couples with a low tertiary-educated partner seems to drive the differentials between highly educated homogamous and heterogamous couples. Thus, we confirm that joint resources of the two partners play an important role in the time to the second birth transition, as was first suggested by Oppenheimer (1997) and has been empirically demonstrated in previous research (Dribe and Stanfors 2006; Kreyenfeld 2002; Nitsche et al. 2018).

However, we extend the resource pooling theory by ascertaining that the pooling-of-resources-effect may not operate linearly and equally across all education levels and interact with gender. Among those couples at the highest end of the education distribution, consisting of two tertiary-educated partners, additional resources acquired via one partner's higher tertiary education appear non-consequential for second birth transitions. However, for those with basic or secondary education, each increase in the partner's education significantly increases the second birth rate. Hence, couples' low levels of joint resources despite partnering seem to play a larger role in hindering their second births than an abundance of joint resources acquired via partnering may boost second births of the already well-off (in particular when one of the two partner attained upper tertiary education). This interpretation is underscored by the large and robust disparities in second birth rates among the lower-educated educational pairings we detect.

Future research should test more systematically for the relevance of pooling in affecting family formation trajectories, whether this effect is linear or plateaus at a certain level of joint resources, and how exactly it interacts with the sex of the partners. For instance, we detected gendered patterns in second birth rates among heterogamous couples with one

upper-tertiary educated and one secondary or basic educated partner. Hypogamous couples with a higher tertiary-educated woman have lower second birth rates than hypergamous couples with a higher-tertiary educated man. This applies in particular to 'large-distance' pairings with an upper-tertiary-educated and a basic educated partner. This findings support hypothesis 1c, which states that hypergamous large distance couples may have high second birth rates, which are hidden when finer grained educational pairings are summed up into coarser categorizations. It may further indicate that female breadwinner couples with a highest educated woman face more contingencies in the family formation process in Finland than male breadwinner couples with a highest educated man. However, our study is limited in that is does not measure how the partners' educational resources translate into income, employment patterns, or occupational status, which means that we cannot speak to the underlying pathways of how these gendered resource distributions are related to the couples' second childbearing.

Therefore, more research is necessary to assess which of the resources available to couples through their joint education have the greatest effects on their birth progressions. These could include economic resources (e.g., income, employment security, and parental wealth), social resources (e.g., support from social networks, including relatives), and health and psychological resources (e.g., stress and conflict management strategies, health care seeking, or sexual behaviors). Additionally, learning more about the circumstances that are more or less conducive to couples continued childbearing, while also investigating demographic change in couples' educational pairing distributions over time, may improve our understanding of the recent fertility declines that have been taking place across all ages and parities in Finland (Hellstrand, Nisén, and Myrskylä 2020).

Distinguishing between individuals with high and low tertiary education has also revealed that those couples with a high tertiary-educated man and a lower-educated woman—

regardless of whether the woman has low tertiary, secondary, or basic education—have the highest second birth rates in terms of point estimates. It appears that in Finland, these types of "Beckerian couples," in which the man is highly tertiary educated, tend to have the highest second birth transition rates. More generally, though, one partner having higher, but not lower, tertiary education is consistently linked to the highest second birth rates, regardless of the sex of the higher tertiary-educated partner and the education of the other partner. Future research is needed to look into this more deeply. Why is higher tertiary education linked to the highest likelihood or the fastest time of progressing to a second birth, regardless of the partner's education? Does attaining high tertiary education early in life preselect individuals (who also form a union) into higher fertility trajectories? Are those individuals selected on typically unmeasured fertility research characteristics, such as goal orientation, life energy availability, high achievement mentality, social skills, above-average resilience levels, and stress management capabilities (Kravdal 2007)?

Additionally, could these baseline differences in skills, if present, be further refined by educational processes in college? While we control for stable characteristics among couples across birth episodes, our analyses do not address selection into union formation or educational pairings. As union formation is associated with educational attainment, it affects the transition to parenthood, particularly among men (Trimarchi and Van Bavel 2017; Nisén et al. 2018). Nevertheless, as education levels continue to rise, future research on the education-fertility nexus should seek to differentiate between lower and higher tertiary education in both individual- and couple-level studies.

Third, our results lead us to reject Hypotheses 1a and 2. They state that large educational distance couples or educational upgrading drive differences in second births by educational pairing. Given the low incidence of large-distance couples in Finland, future studies focusing on Finnish fertility levels may probably disregard them. However, going

forward, it seems imperative to account for different levels of tertiary education to understand the fertility behaviors of couples.

Fourth, while unobserved stable characteristics among couples, which relate to first and second birth transitions, account for some small adjustments in second birth rate differences among the higher educated homogamous and heterogamous pairings, they do not lead to significant changes in the main findings. This result rejects Hypothesis 3. The role of unobserved heterogeneity at the couple level across birth episodes, as well as of unmeasured characteristics among individuals affecting the selection into unions and educational pairings, does not explain educational pairing differences in second birth rates. Nonetheless, it should be addressed in greater detail in future research, potentially by using data from full registers to allow for more detailed assessments. Whether modeling frailty terms to control for unobserved heterogeneity is the most appropriate technique when modeling fertility histories has been debated (Rodriguez 1994; Trussell et al. 1992); our study, however, is limited in its assessment of the role of unobserved heterogeneity by relying on the frailty-approach only. Therefore, we advocate taking our results from the recurring event models as evidence that should be tested and confirmed by future research using alternative techniques, such as sibling-fixed effects or the direct modeling of the omitted factors suspected to be behind the unobserved heterogeneity.

Finally, it is well known that in event-history models, timing and quantum are entangled. Hence, another limitation of our study lies in its inability to assess whether our findings represent pure timing effects or may represent quantum differentials in couples' second birth rates. This question remains to be addressed in future research. To overcome the timing-quantum problem, other scholars have attempted to use modeling alternatives, such as cure survival models (Bremhorst, Kreyenfeld, and Lambert 2016; Bremhorst et al. 2019), or to retrospectively measure the fertility-education relationship and its timing and quantum

implications at the end of the fertile life span (Kravdal 2007). Using such techniques when studying couples will bring additional challenges related to union formation and separation timing and multiple unions formed over the life course. However, they would enable a deeper understanding of the consequences of educational pairings for lifetime fertility outcomes.

In sum, a variety of mechanisms that produce the second birth rate differences observed among couples' educational pairings are likely at play simultaneously. Future research should investigate the selection of education tracks, the meaning of obtaining high tertiary education for family formation, the specific couple-level dynamics that make the pooling of education resources relevant for couples' second birth progressions, and whether these dynamics are the same among couples in the higher and the lower educated segments of the population.

REFERENCES

Axinn, William G., Dirgha J. Ghimire, and Emily Smith-Greenaway. 2017. Emotional Variation and Fertility Behavior. *Demography* 54(2):437–58.

Barro, R. J., and J. W. Lee. 2013. A New Data Set of Educational Attainment in the World, 1950–2010. *Journal of Development Economics* 104:184–98.

Bauer, G., and T. Kneip. 2013. Fertility from a Couple Perspective: A Test of Competing Decision Rules on Proceptive Behaviour. *European Sociological Review* 29(3):535–48.

Becker, G. S. 2009. *A Treatise on the Family*. Harvard University Press.

Berghammer, C. (2014). The return of the male breadwinner model? Educational effects on parents' work arrangements in Austria, 1980–2009. *Work, employment and society*, *28*(4), 611-632.

Bremhorst, V., M. Kreyenfeld, and P. Lambert. 2016. Fertility Progression in Germany: An Analysis Using Flexible Nonparametric Cure Survival Models. *Demographic Research* 35:505–34.

Bremhorst, V., M. Kreyenfeld, and P. Lambert. 2019. Nonparametric Double Additive Cure Survival Models: An Application to the Estimation of the Non-Linear Effect of Age at First Parenthood on Fertility Progression. *Statistical Modelling* 19(3):248–75.

Corijn, M., A. C. Liefbroer, and J. de Jong Gierveld. 1996. It Takes Two to Tango, Doesn't It? The Influence of Couple Characteristics on the Timing of the Birth of the First Child. *Journal of Marriage and the Family* 58(1):117–26.

De Hauw, Yolien, André Grow, and Jan Van Bavel. 2017. The Reversed Gender Gap in Education and Assortative Mating in Europe. *European Journal of Population = Revue Europeenne de Demographie* 33(4):445–74.

Dribe, M., and M. Stanfors. 2010. Family Life in Power Couples: Continued Childbearing and Union Stability among the Educational Elite in Sweden, 1991–2005. *Demographic Research* 23:847–78.

Esteve, Albert, Christine R. Schwartz, Jan Van Bavel, I. ñaki Permanyer, Martin Klesment, and Joan Garcia. 2016. The End of Hypergamy: Global Trends and Implications. *Population and Development Review* 42(4):615–25.

Grow, André, and Jan Van Bavel. 2015. Assortative Mating and the Reversal of Gender Inequality in Education in Europe: An Agent-Based Model. *PLOS ONE* 10(6):e0127806.

Gustafsson, S. 2001. Optimal Age at Motherhood. Theoretical and Empirical Considerations on Postponement of Maternity in Europe. *Journal of Population Economics* 14(2):225–47.

Hellstrand, Julia, Jessica Nisén, and Mikko Myrskylä. 2020. All-Time Low Period Fertility in Finland: Demographic Drivers, Tempo Effects, and Cohort Implications. *Population Studies* 74(3):315–29.

Hoem, J. M. (1996). The harmfulness or harmlessness of using an anticipatory regressor: how dangerous is it to use education achieved as of 1990 in the analysis of divorce risks in earlier years?. *Finnish Yearbook of Population Research*, 34-43.

Hohmann-Marriott, Bryndl. 2009. The Couple Context of Pregnancy and Its Effects on Prenatal Care and Birth Outcomes. *Maternal and Child Health Journal* 13(6):745–54.

Jalovaara, M. 2012. Socio-Economic Resources and First-Union Formation in Finland, Cohorts Born 1969–81. *Population Studies* 66(1):69–85.

Jalovaara, M., and A. E. Fasang. 2017. From Never Partnered to Serial Cohabitors: Union Trajectories to Childlessness. *Demographic Research* 36:1703–20.

Jalovaara, M., and H. Kulu. 2018. Separation Risk over Union Duration: An Immediate Itch? *European Sociological Review* 34(5):486–500.

Jalovaara, M., and A. Miettinen. 2013. Does His Paycheck Also Matter? The Socioeconomic Resources of Co-Residential Partners and Entry into Parenthood in Finland. *Demographic Research* 28(April):881–916.

Kalmijn, Matthijs, Paul M. De Graaf, and Jacques P. Janssen. 2005. Intermarriage and the Risk of Divorce in the Netherlands: The Effects of Differences in Religion and in Nationality, 1974–94. *Population Studies* 59(1):71–85.

Kravdal, Ø. 2001. The High Fertility of College Educated Women in Norway: An Artifact of the Separate Modelling of Each Parity Transition. *Demographic Research* 5:187–216.

Kravdal, Ø. 2007. Effects of Current Education on Second- And Third-Birth Rates among Norwegian Women and Men Born in 1964: Substantive Interpretations and Methodological Issues. *Demographic Research* 17:211–46.

Kravdal, Ø., and R. R. Rindfuss. 2008. Changing Relationships between Education and Fertility: A Study of Women and Men Born 1940 to 1964. *American Sociological Review* 73(5):854–73.

Kreyenfeld, M. 2002. Time-Squeeze, Partner Effect or Self-Selection? An Investigation into the Positive Effect of Women's Education on Second Birth Risks in West Germany. *Demographic Research* 7:15–48.

Kuperberg, A. 2009. Motherhood and Graduate Education: 1970–2000. *Population Research and Policy Review* 28(4):473–504.

Lichter, Daniel T., Sharon Sassler, and Richard N. Turner. 2014. Cohabitation, Post-Conception Unions, and the Rise in Nonmarital Fertility. *Social Science Research* 47:134–47.

Mäenpää, E., and M. Jalovaara. 2014. Homogamy in Socioeconomic Background and Education, and the Dissolution of Cohabiting Unions. *Demographic Research* 30:1769–92.

Martín-García, T., and P. Baizán. 2006. The Impact of the Type of Education and of Educational Enrolment on First Births. *European Sociological Review* 22(3):259–75.

Mason, M. A., N. H. Wolfinger, and M. Goulden. 2013. *Do Babies Matter? Gender and Family in the Ivory Tower*. New Brunswick, NJ: Rutgers University Press.

Matysiak, A., and N. Nitsche. 2016. Emerging Trends: Family Formation and Gender. *Emerging Trends in the Social and Behavioral Sciences: An Interdisciplinary, Searchable and Linkable Resource*, 1–15.

Mills, Melinda, Ronald R. Rindfuss, Peter McDonald, Egbert Te Velde, and ESHRE Reproduction and Society Task Force. 2011. Why Do People Postpone Parenthood? Reasons and Social Policy Incentives. *Human Reproduction Update* 17(6):848–60.

Moreno-Colom, S. (2017). The gendered division of housework time: Analysis of time use by type and daily frequency of household tasks. *Time & Society*, *26*(1), 3-27.

Nisén, Jessica, Pekka Martikainen, Jaakko Kaprio, and Karri Silventoinen. 2013. Educational Differences in Completed Fertility: A Behavioral Genetic Study of Finnish Male and Female Twins. *Demography* 50(4):1399–420.

Nisén, Jessica, Pekka Martikainen, Mikko Myrskylä, and Karri Silventoinen. 2018. Education, Other Socioeconomic Characteristics across the Life Course, and Fertility among Finnish Men. *European Journal of Population = Revue Europeenne de Demographie* 34(3):337–66.

Nitsche, N. 2014. "Fertility, Education, and Couple Dynamics: Three Essays on Childbearing Behavior in the United States and Germany." Ph.D. dissertation, Yale University.

Nitsche, N. 2017. Partners' Educational Pairings, Work Divisions, and Fertility: Evidence from Germany (19/2017). Vienna Institute of Demography working papers.

Nitsche, N., & Brückner, H. (2021). Late, But Not Too Late? Postponement of First Birth Among Highly Educated US Women. *European Journal of Population*, *37*(2), 371-403.

Nitsche, N., A. Matysiak, J. Van Bavel, and D. Vignoli. 2018. Partners' Educational Pairings and Fertility across Europe. *Demography* 55(4):1195–232.

OECD. 2014. Education Indicators in Focus. (https://www.oecd.org/education/skills-beyond-school/EDIF_23%20eng%20(2014)EN.pdf). Paris: OECD Publishing.

OECD. 2016. Table X1.1a - Typical Graduation Ages, By Level of Education (2014). Annexes. Paris: OECD Publishing. (https://doi.org/10.1787/eag-2016-table257-en).

Oppenheimer, V. K. 1994. Women's Rising Employment and the Future of the Family in Industrial Societies. *Population and Development Review* 20(2):293–342.

Oppenheimer, V. K. 1997. Women's Employment and the Gain to Marriage: The Specialization and Trading Model. *Annual Review of Sociology* 23(1):431–53.

Osiewalska, B. 2017. Childlessness and Fertility by Couples' Educational (In) Equality in Austria, Bulgaria, and France. *Demographic Research* 37:325–62.

Perelli-Harris, Brienna, Michaela Kreyenfeld, Wendy Sigle-Rushton, Renske Keizer, Trude Lappegård, Aiva Jasilioniene, Caroline Berghammer, and Paola Di Giulio. 2012. Changes in Union Status during the Transition to Parenthood in Eleven European Countries, 1970s to Early 2000s. *Population Studies* 66(2):167–82.

Pfau-Effinger, B. 2005. Welfare State Policies and the Development of Care Arrangements. *European Societies* 7(2):321–47.

Rindfuss, R. R., S. P. Morgan, and K. Offutt. 1996. Education and the Changing Age Pattern of American Fertility: 1963–1989. *Demography* 33(3):277–90.

Schnor, C., and M. Jalovaara. 2020. The Increase in Non-Marital Childbearing and Its Link to Educational Expansion. *Acta Sociologica* 63(4):400–21.

Schofer, E., and J. W. Meyer. 2005. The Worldwide Expansion of Higher Education in the Twentieth Century. *American Sociological Review* 70(6):898–920.

Schwartz, Christine R. 2010. Pathways to Educational Homogamy in Marital and Cohabiting Unions. *Demography* 47(3):735–53.

Statistics Finland. 2021. Population by Level of Education. (https://www.stat.fi/tup/suoluk/suoluk_koulutus_en.html).

Statistics Finland. 2017. Educational Structure of Population [e-publication]. Helsinki: Statistics Finland. (http://www.stat.fi/til/vkour/2017/vkour_2017_2018-11-02_tie_001_en.html).

Statistics Finland. 2020. Population by Area, Main Type of Activity, Level of Education, Sex, Age and Year, 1987–2018. StatFin Online Service. (https://www.stat.fi/tup/statfin/index_en.html).

Thomson, E. 2014. Family Complexity in Europe. *The Annals of the American Academy of Political and Social Science* 654(1):245–58.

Thomson, E., and J. M. Hoem. 1998. Couple Childbearing Plans and Births in Sweden. *Demography* 35(3):315–22.

Thomson, E., E. McDonald, and L. L. Bumpass. 1990. Fertility Desires and Fertility: Hers, His, and Theirs. *Demography* 27(4):579–88.

Trimarchi, Alessandra, and Jan Van Bavel. 2017. Education and the Transition to Fatherhood: The Role of Selection into Union. *Demography* 54(1):119–44.

Trimarchi, Alessandra, and Jan Van Bavel. 2018. Pathways to Marital and Non-Marital First Birth: The Role of His and Her Education. *Vienna Yearbook of Population Research* 1:143–79.

Trimarchi, Alessandra, and Jan Van Bavel. 2019. Partners' Educational Characteristics and Fertility: Disentangling the Effects of Earning Potential and Unemployment Risk on Second Births. *European Journal of Population = Revue Europeenne de Demographie*, 36(3), 439–464. (https://doi.org/10.1007/s10680-019-09537-w).

Van Bavel, Jan. 2012. The Reversal of Gender Inequality in Education, Union Formation, and Fertility in Europe. *Vienna Yearbook of Population Research* 10:127–54.

Wirth, H. (2007). Kinderlosigkeit von hoch qualifizierten Frauen und Männern im Paarkontext—Eine Folge von Bildungshomogamie?. In *Ein Leben ohne Kinder* (pp. 167-199). VS Verlag für Sozialwissenschaften.

Wood, J., K. Neels, and T. Kil. 2014. The Educational Gradient of Childlessness and Cohort Parity Progression in 14 Low Fertility Countries. *Demographic Research* 31:1365–416.

Zang, E. (2019). Women's educational attainment and fertility among Generation X in the United States. *Population studies*, *73*(3), 335-351.

Tables and Figures

Table 1. Sample description, total number of second births by couple time for each independent variable

Educational pairing 1	N Couple-Months	% Couple Months	N events
Both basic	83,334	5.96	554
Both secondary	418,993	29.95	4,589
Both tertiary	244,837	17.50	4,288
She basic-he secondary	*109,431*	*7.82*	*893*
She basic-he tertiary	*12,040*	*0.86*	*122*
She secondary-he tertiary	*89,832*	*6.42*	*1,287*
She secondary-he basic	168,837	12.07	1,339
She tertiary-he basic	50,789	3.63	569
She tertiary-he secondary	220,967	15.79	3,148
Educational pairing 2			
Both basic	83,334	5.96	554
Both secondary	418,993	29.95	4,589
Both low tertiary	130,715	9.34	2,186
Both high tertiary	46,815	3.35	872
She low tertiary-he high tertiary	33,172	2.37	616
She high tertiary-he low tertiary	34,135	2.44	614
She basic-he secondary	*109,431*	*7.82*	*893*
She basic-he low tertiary	*11,548*	*0.83*	*110*
She basic-he high tertiary	*492*	*0.04*	*12*
She secondary-he low tertiary	*79,405*	*5.68*	*1,119*

She secondary-he high tertiary	*10,427*	*0.75*	*168*
She secondary-he basic	168,837	12.07	1,339
She low tertiary-he basic	46,266	3.31	501
She low tertiary-he secondary	197,496	14.12	2,749
She high tertiary-he basic	4,523	0.32	68
She high tertiary-he secondary	23,471	1.68	399
Upgrading	,		
Both not	953,822	68.18	11,391
Only man	119,746	8.56	1,736
Only woman	259,930	18.58	2,755
Both up	65,562	4.69	907
Type of union			
Unmarried cohabitation	229,667	16.42	2,936
Marriage	1169,393	83.58	13,853
Age difference between partners			
Age homogamy	539,485	38.56	7,188
Age hypergamy	*762,037*	*54.47*	*8,727*
Age hypogamy	97,538	6.97	874
Unions' cohorts			
Before 1995	499,511	35.70	5,594
1995–2000	464,044	33.17	6,350
After 2000	435,505	31.13	4,845
Total	1,399,060		16,789

Notes: For easier readability, hypergamous couples (the man has more education) are marked in cursive, and hypogamous couples (the woman has more education) are marked in gray.

Table 2. Model results: Couples' educational pairings and second birth transitions

Variable	Model 1: Basic 9 Pairings		Model 2: 16 Pairings		Model 3: 16 Pairings + Up		Model 4: Heterogeneity	
Duration since First Birth (ref: 1)								
2–3	1.15	***	1.16	***	1.16	***	1.10	***
3–4	0.64	***	0.64	***	0.64	***	0.58	***
4–5	0.38	***	0.38	***	0.38	***	0.34	
5–6	0.22	***	0.22	***	0.22	***	0.20	***
6–7	0.14	***	0.14	***	0.14	***	0.13	***
7–10	0.06	***	0.06	***	0.06	***	0.05	***
10+	0.01	***	0.01	***	0.01	***	0.01	***
Union cohort (ref: <1995)								
1995–2000	0.88	*	0.87	**	0.85	***	0.83	***
> 2000	0.64	***	0.63	***	0.60	***	0.57	***
Partners' age difference (ref: Same)								
Male older	0.95	***	0.95	***	0.95	***	0.94	***
Female older	0.90	***	0.91	***	0.91	***	0.87	***
Type of union (ref: Cohabitation)								
Marriage	1.07	***	1.07	***	1.05	**	0.99	
Educational pairing 1 (ref: Both Sec)								
Both basic	0.69	***						
Both tertiary	1.30	***						
She basic-he secondary	0.84	***						
She basic-he tertiary	0.98							

She secondary-he tertiary	1.21	***				
She secondary-he basic	0.79	***				
She tertiary-he basic	1.00					
She tertiary-he secondary	1.16	***				
Educational pairing 2 (ref: Both Sec.)						
Both basic	0.69	***	0.64	***	0.60	***
Both low tertiary	1.26	***	1.23	***	1.26	***
Both high tertiary	1.38	***	1.31	***	1.31	***
She basic-he secondary	0.84	***	0.78	***	0.75	***
She basic-he low tertiary	0.94		0.89		0.92	
She basic-he high tertiary	1.72	*	1.68	*	1.47	
She secondary-he basic	0.79	***	0.81	***	0.79	***
She secondary-he low tertiary	1.19	***	1.18	***	1.16	***
She secondary-he high tertiary	1.39	***	1.34	***	1.37	***
She low tertiary-he basic	0.98		0.96		0.96	

She low tertiary-he secondary	1.14	***	1.12	***	1.13	***	
She low tertiary-he high tertiary	1.35	***	1.37	***	1.38	***	
She high tertiary-he basic	1.26		1.19		1.20		
She high tertiary-he secondary	1.33	***	1.25	***	1.20	***	
She high tertiary-he low tertiary	1.33	***	1.25	***	1.27	***	
Educational Upgrading (ref: None)							
Only man			1.00		1.03		
Only woman			0.78	***	0.75	***	
Both Up			0.81	***	0.80	***	
Constant	0.02	***	0.02	***	0.02	***	0.02	***
Log-likelihood	-35551.842		-35539.347		-35461.635		-226267.67	
N	29773		29773		29773		70331	

All models include woman's year of birth fixed effects, coefficients not illustrated.

*** p <= 0.001, ** p <= 0.01, * p <= 0.05, ◊ p <= 0.1

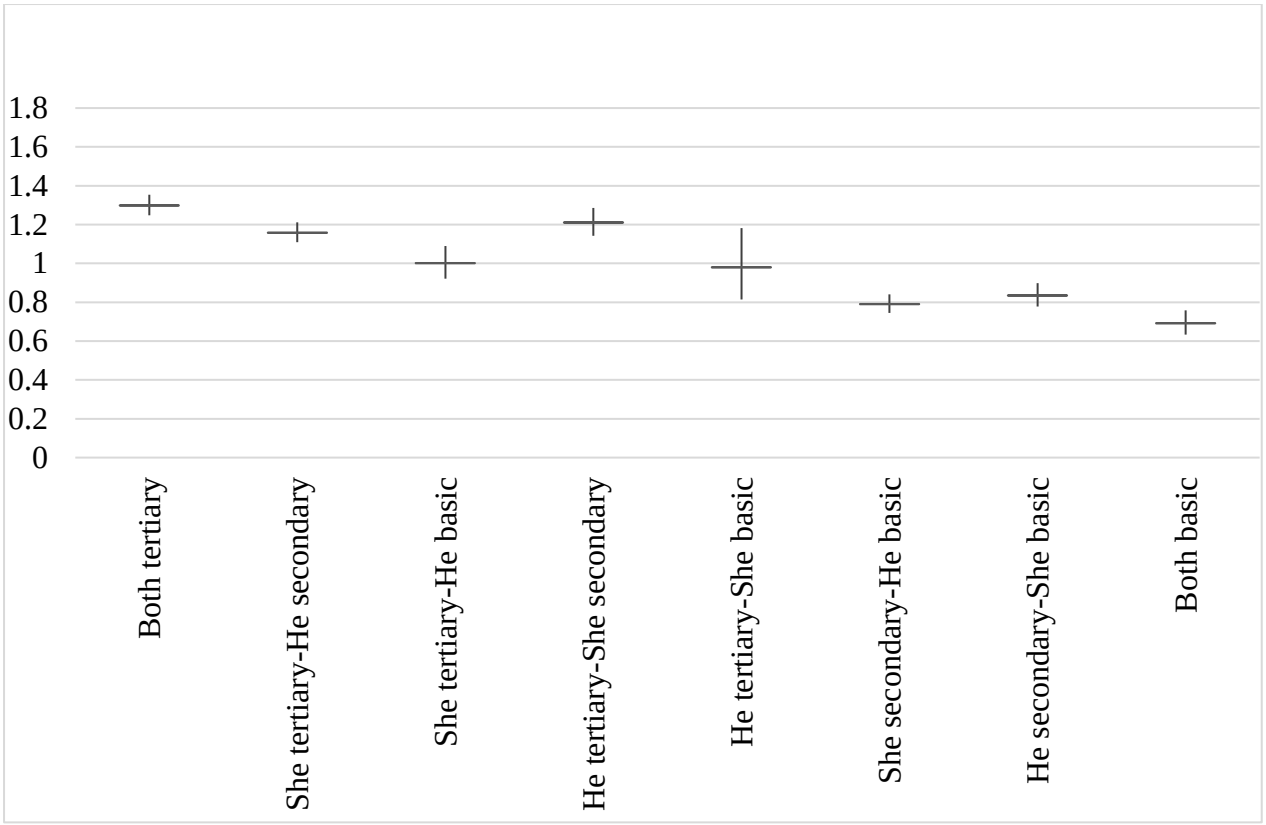

Figure 1. Couples' relative risk of second birth: nine educational pairings (Model 1, baseline)

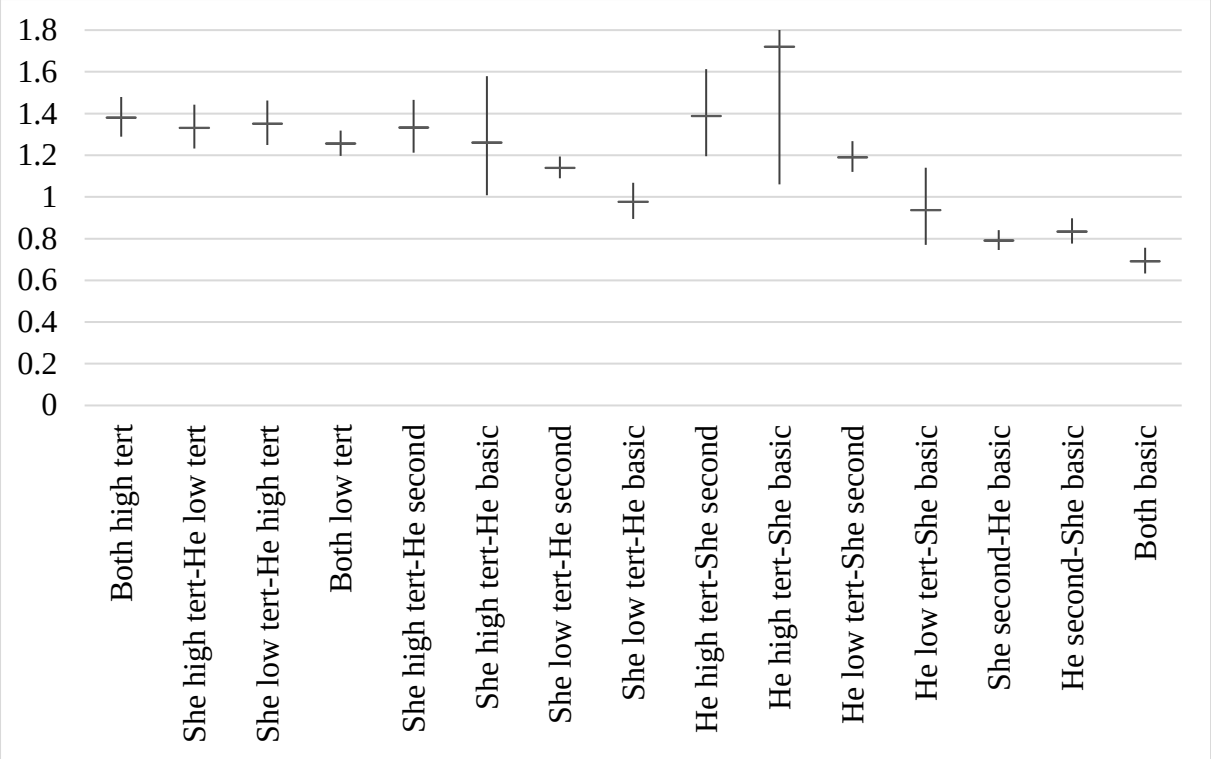

Figure 2. Couples' relative risk of second birth: 16 educational pairings (Model 2)

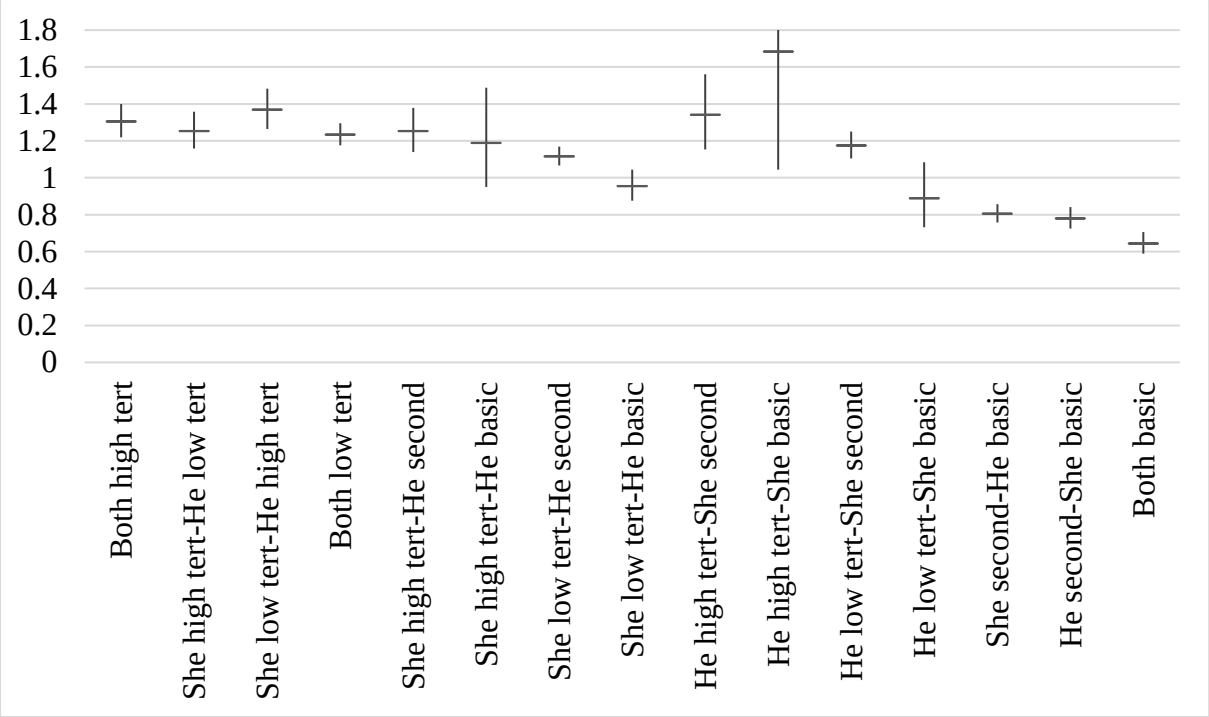

Figure 3. Couples' relative risk of second birth: 16 educational pairings, controlling for educational upgrading (Model 3)

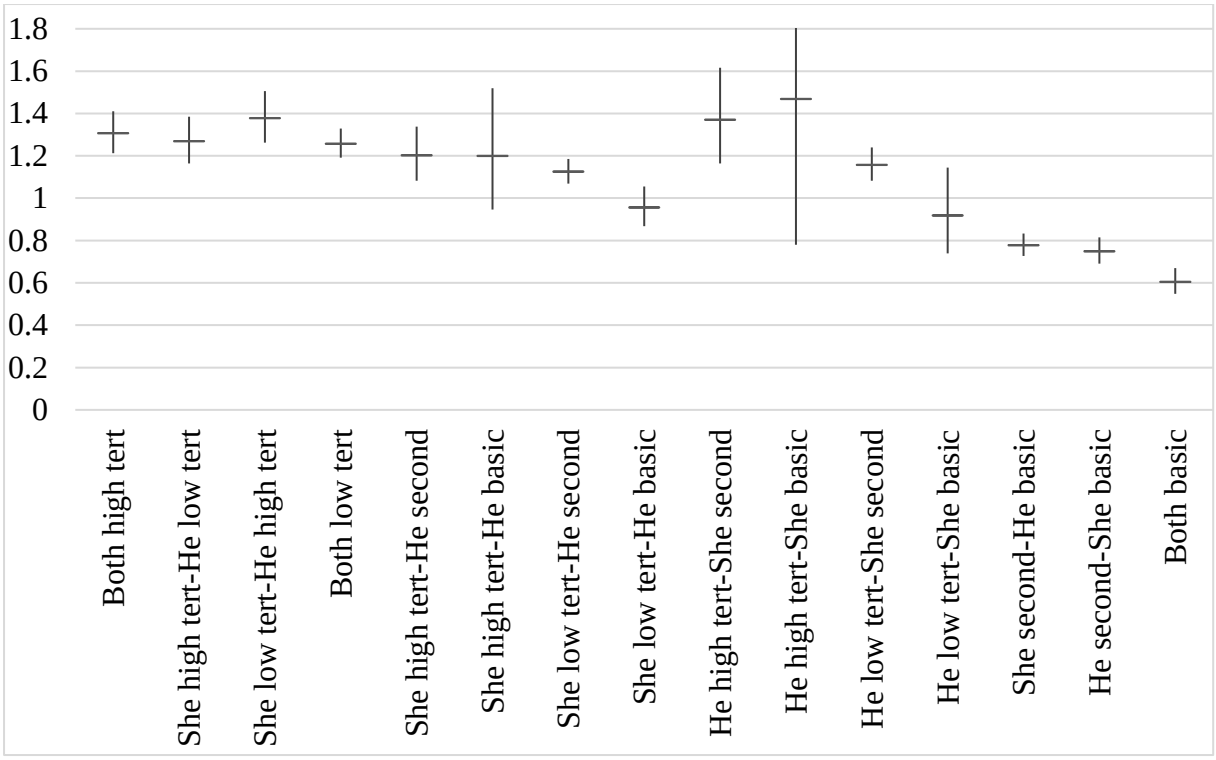

Figure 4. Couples' relative risk of second birth: 16 educational pairings, controlling for educational upgrading, joint model with first births adding a frailty term (Model 4)

Appendix

Table A. Stepwise models, basic educational pairing (no education upgrading control)

	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5
Educational pairing						
Both basic	0.70***	0.69***	0.69***	0.70***	0.68***	0.61***
Both secondary	ref.	ref.	ref.	ref.	ref.	ref.
Both tertiary	1.26***	1.32***	1.31***	1.31***	1.50***	1.48***
She basic-he secondary	0.84***	0.83***	0.84***	0.84***	0.83***	0.75***
She basic-he tertiary	0.96	0.98	0.98	0.99	0.95	0.89
She secondary-he tertiary	1.20***	1.22***	1.22***	1.21***	1.28***	1.27***
She secondary-he basic	0.79***	0.79***	0.80***	0.80***	0.79***	0.79***
She tertiary-he basic	0.95	1.01	1.01	1.00	1.11**	1.07
She tertiary-he secondary	1.13***	1.17***	1.17***	1.16***	1.27***	1.24***
Model controls for:						
Woman's birth cohort	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**
Union cohort	no	**yes**	**yes**	**yes**	**yes**	**yes**
Age difference partners	no	no	**yes**	**yes**	**yes**	**yes**

Marital status	no	no	no	**yes**	**yes**	**yes**
Age first birth (woman)	no	no	no	**yes**	no	no
Age first birth (within couple)	no	no	no	no	**yes**	**yes**
Education upgrading	no	no	no	no	no	**yes**
Constant	0.18	0.19	0.19	0.19	0.17	0.20
Log-likelihood	-35771.61	-35565.95	-35557.99	-35506.63	-34643.08	-34486.84

Table B. Stepwise models, finer-grained educational pairing (no education upgrading control)

	Model 0	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Educational pairing						
Both basic	.70***	0.69***	0.69***	0.70***	0.68***	0.61***
Both secondary	ref.	ref.	ref.	ref.	ref.	ref.
Both low tertiary	1.24***	1.27***	1.27***	1.26***	1.40***	1.38***
Both high tertiary	1.31***	1.42***	1.40***	1.44***	1.78***	1.67***
She basic-he secondary	0.84***	0.83***	0.83***	0.84***	0.82***	0.75***
She basic-he low tertiary	0.92	0.93	0.94	0.94	0.91	0.85
She basic-he high tertiary	1.60◊	1.73*	1.73*	1.75*	1.84*	1.74*

She secondary-he basic	0.79***	0.79***	0.79***	0.79***	0.79***	0.80***
She secondary-he low tertiary	1.18***	1.20***	1.19***	1.19***	1.26***	1.24***
She secondary-he high tertiary	1.34***	1.41***	1.40***	1.40***	1.53***	1.48***
She low tertiary-he basic	0.94	0.98	0.98	0.98	1.07	1.04
She low tertiary-he secondary	1.11***	1.15***	1.15***	1.14***	1.24***	1.22***
She low tertiary-he high tertiary	1.30***	1.38***	1.37***	1.37***	1.59***	1.63***
She high tertiary-he basic	1.11	1.28*	1.28*	1.30*	1.53***	1.42**
She high tertiary-he secondary	1.25***	1.36***	1.36***	1.38***	1.66***	1.55***
She high tertiary-he low tertiary	1.26***	1.35***	1.35***	1.38***	1.65***	1.55***
Model controls for:						
Woman's birth cohort	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**
Union cohort	no	**yes**	**yes**	**yes**	**yes**	**yes**
Age difference partners	no	no	**yes**	**yes**	**yes**	**yes**
Marital status	no	no	no	**yes**	**yes**	**yes**

Age first birth (woman)	no	no	no	**yes**	no	no
Age first birth (within couple)	no	no	no	no	**yes**	**yes**
Education upgrading	no	no	no	no	no	**yes**
Constant	0.18	0.19	0.19	0.19	0.17	0.20
Log-likelihood	-35764.69	-35551.49	-35544.21	-35488.55	-34601.08	-34457.19

*** p <= 0.001, ** p <= 0.01, * p <= 0.05, ◊ p <= 0.1