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"Education and fertility in low-fertility settings"

Guest Editors: Éva Beaujouan, Tomáš Sobotka and Jan Van Bavel

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Guest editors:
Éva Beaujouan, Tomáš Sobotka and Jan Van Bavel

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Introduction: education and fertility in low-fertility settings

Tomáš Sobotka, Éva Beaujouan and Jan Van Bavel*

This issue of the *Vienna Yearbook of Population Research* (2017) gives a variety of perspectives on the linkages between education and fertility in low-fertility settings. It follows up on earlier volumes of the *Vienna Yearbook* that have been devoted to education and demography (2010) and to education and the global fertility transition (2012).

In countries with highly educated populations, educational enrolment and attainment continue to be strongly related to fertility timing, family size, union formation, partnership choices, and broader family behaviours. Cleland (2009: 183) has suggested that the education of adults "persistently emerges as the single most powerful predictor of their demographic behaviour". In turn, fertility and partnership-related preferences can simultaneously shape educational and family trajectories (Stange 2011). The studies in this volume confirm the continuing salience of education for patterns of fertility, family, and reproduction. James et al. (2012: 2) have argued that education "is likely to have increased in importance as a status-defining characteristic over the 20th century". At the same time, the influence of education is moulded by the institutional contexts of different societies, including by each country's educational system, family policies, economic development level, labour market characteristics, family patterns, gender norms, and prevailing societal values.

In recent decades, rich countries with low levels of fertility have been changing substantially, and the opportunities, challenges, and responses created by these transformations have been differentiated along educational lines. Access to higher education has been expanding rapidly, especially among women. In some of these countries – including Canada, Japan, South Korea, and the United Kingdom – a majority of young people are earning tertiary degrees (OECD 2017a).

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As young adults often spend their early to mid-twenties enrolled in education and economically inactive, they are postponing their transitions to employment, residential independence, union formation, and parenthood. A number of studies have demonstrated that educational expansion has been the most prominent factor driving the shift towards later family formation (e.g. Neels et al. 2017; Ní Bhrolcháin and Beaujouan 2012; Mills et al. 2011).

Labour markets have changed rapidly as well. They have become more competitive, both nationally, with individual qualification and work flexibility requirements rising; and internationally, with countries and regions engaged in a global competition for jobs and investments. Combined with labour market deregulation, this competition has often resulted in rising levels of economic uncertainty and the deepening of divides in skills, incomes, and economic opportunities across population groups. As a result of these trends, young adults are more likely than their older counterparts to end up in unstable jobs with relatively low pay and low levels of protection (Mills and Blossfeld 2013). As income inequality has been rising in many countries since the 1980s, social status differences have also been widening (Piketty and Zucman 2014; review by Adserà in this volume). The trends towards more competitive labour markets, lower levels of protection and pay for younger workers, and higher levels of income inequality were accelerated during the economic recession in 2008–13. The economic downturn has negatively affected the long-term prospects for employment, wages, and career (OECD 2014), especially among the *Millennials* born in the 1980s and early 1990s. Thus, the social status inequalities have grown rapidly in recent years, leaving younger people – and especially those with low to medium levels of education – worse off than the previous generations (e.g. review by Adserà in this volume). These new educational and generational divides are reflected in divergent patterns of union formation and parenthood among women and men with different levels of education. A *pattern of disadvantage* characterised by early and unstable family transitions has been observed among less educated people (McLanahan and Percheski 2008; Perelli-Harris and Lyons Amos 2016). However, the effects of the economic shocks of the recent recession differed widely across countries, with some countries – especially in Southern Europe – experiencing very high levels of unemployment and long-lasting negative effects on the well-being and the economic position of the younger generations (OECD 2014, 2016).

In parallel, rising gender equality has improved the position of women in the labour market, but also in the private domain, as childcare and household responsibilities are increasingly being shared by men. Women in most rich societies have achieved high levels of labour force participation, and having two incomes has become the norm among couples. However, this general trend has been developing very unevenly across countries, and many forms of gender inequality persist even in the most gender-equal societies, including differences between men and women in rates of part-time work, working hours, and pay (OECD 2017b). Moreover, many working adults continue to struggle to reconcile their career and family aspirations. Gender equality has emerged as one of the key factors influencing the relationship between education and family behaviour. Esping-Andersen and Billari (2015) have argued that in gender-egalitarian societies, there has been a trend among highly educated women towards "more family", or towards higher fertility, more frequent marriage, and higher levels of union stability. In parallel, less educated women have experienced lower levels of union stability and, possibly, lower fertility. Similarly, Goldscheider et al. (2015) have highlighted the role of rising education in reducing gender inequalities and in spreading egalitarian gender attitudes over the course of the "gender revolution". This shift has in turn been contributing to the reversals in educational gradients in family behaviours, especially in rates of divorce and union dissolution. Today, many highly educated women earn more than their male partners. This trend has been accompanied by an increase in homogamy and hypogamy in union formation (i.e. the male partner has a lower or a similar educational level) (Klesment and Van Bavel 2017), which is likely shifting the pillars and the processes of reproductive decision-making (Van Bavel 2012).

Clearly, the influence of education on fertility is shaped by a wide array of forces and trends that differ between countries, welfare state regimes, and broad regions; but also between sub-populations. At the same time, this influence is not unidirectional: decisions about education, partnership, and childbearing are often interrelated, and family and partnership-related preferences also shape educational trajectories (Martín-García 2008; Nisén 2016). For instance, women who eventually become mothers have been shown to reduce their investment in education well before the occurrence of parenthood or pregnancy (Stange 2011).

The contributions in this volume document well the context-specific nature of the link between education and family behaviours, especially with respect to fertility levels, fertility timing, childlessness, non-marital childbearing, and fertility intentions. Before reviewing the individual articles, we highlight broader links between them, as summarised in Table 1. Besides their common focus on education several features stand out among the eight published research articles (not counting the debate contributions and the review by Adserà):

- Five studies (by Merz and Liefbroer, Lakomý, Trimarchi and Van Bavel, Oppermann, and Testa and Stephany) apply a comparative perspective that gives their findings broader relevance than those of single-country studies. The first two studies (Merz and Liefbroer, Lakomý) compare the completed fertility levels of larger groups of countries.
- Six studies go beyond the usual focus on women's fertility by analysing the fertility or the fertility intentions of both women and men (Merz and Liefbroer, Lakomý, Testa and Stephany), or by adopting a couple perspective to study fertility and childbearing outside marriage (Trimarchi and Van Bavel, Peri-Rotem, Bagavos).
- Six studies (Merz and Liefbroer, Lakomý, Trimarchi and Van Bavel, Bagavos, Oppermann, Dubuc) apply a cohort perspective that allows the authors to investigate the quantum and the timing of fertility without having to deal with the tempo effect, which can distort period indicators.

- Four studies provide a more detailed look at family size distributions (Oppermann, Dubuc), at parity-specific patterns of family building (Bagavos), and at reproductive intentions (Testa and Stephany). Both Oppermann and Dubuc also explore childlessness, while the two studies dealing with non-marital childbearing (Peri Rotem, Trimarchi and Van Bavel) focus on union status prior to and at the first birth.
- Five studies focus on fertility levels (Merz and Liefbroer, Lakomý, Bagavos, Oppermann, Dubuc). Two of these studies also look at the timing of childbearing (Bagavos, Dubuc).

In the following sections, we outline the contents of the contributions in this volume. We first provide highlights from the invited review and the research articles. Then we explore the key messages and arguments of the contributions in the "demographic debate" section. We conclude by discussing selected findings and proposing an agenda for future research.

Education-fertility links in context: the role of labour market, policies, welfare systems, attitudes, and family status

The review article by Alícia Adserà provides a broad perspective on changing labour market conditions, rising inequality, and differences in fertility by educational level across rich, low-fertility countries. In particular, Adserà discusses the effects of structural changes in the labour market, including widening income disparities and "disappearing" middle-income jobs. This *job polarisation* is likely to place downward pressure on the fertility of medium educated women. Adserà also highlights the continuing salience of gender pay gaps and the selection of women into lower-paid jobs (especially in the public sector) that are more secure and more flexible, and thus enable women to combine employment with raising children, but that also hinder their career prospects. She notes that despite these barriers, highly educated women are arguably in a better position to realise their fertility plans now than they were in the past. The better career prospects and higher income levels of highly educated women, coupled with their rising levels of partnership homogamy, imply greater chances of having a stable partnership. Thus, "increases in fertility among women at the top of the educational distribution" are anticipated. In contrast, women and men with lower levels of education are more likely to have unstable partnerships and limited resources, which may be expected to depress their fertility rates. These trends will lead to either a flattening of the educational gradient in fertility or the emergence of a U-shaped pattern.

Two contributions, by Eva-Maria Merz and Aart C. Liefbroer and by Martin Lakomý, analyse completed fertility by level of education among men and women in broader groups of countries, controlling for selected individual characteristics. Merz and Liefbroer use data from the *European Social Survey* (ESS), and refine the widely used welfare state typology by Esping-Andersen to structure their

Table 1:
Key approaches and issues covered in the studies published in this volume

Study	Comparison of countries or regions	Women	Men	Couples	Cohort analysis	Period analysis	Fertility level
Merz & Liefbroer	√	√	√		√		√
Lakomý	√	√	√		√		√
Trimarchi & Van Bavel	√			√	√ (union cohort)		
Peri-Rotem		√		√		√	
Bagavos				√	√		√
Oppermann	√	√			√		√
Dubuc		√			√	√	√
Testa & Stephany	√	√	√				
	Fertility timing	**Childlessness**	**First births**	**Parity-specific analysis**	**Subgroups**	**Non-marital births**	**Intentions**
Merz & Liefbroer							
Lakomý							
Trimarchi & Van Bavel			√			√	
Peri-Rotem			√			√	
Bagavos	√		√	√			
Oppermann		√		√	√		
Dubuc	√	√	√	√	√		
Testa & Stephany				√			√

findings. They report a negative educational gradient in fertility for both sexes, which is, however, weaker among men and among more recent cohorts born since 1945. Among women, the educational gradient has weakened more in Western European countries with a "conservative corporative" welfare regime. This trend may be the result of family policies that encourage the reconciliation of work and parenthood, especially in Belgium and France. In contrast, the strongest and most stable negative educational gradient in fertility among women is found in post-communist countries in Central and Eastern Europe (except for the former Soviet Union). Such patterns are especially interesting given the official egalitarianism and limited income differences between social groups that characterised these countries during the state-socialist era (i.e. until the 1980s). Lakomý's study also finds that there is a negative education-fertility gradient among women across broader regions in Europe. Among men, the impact of education is much weaker and varies by region. The paper contrasts two broad perspectives on fertility: the rational choice framework and the second demographic transition perspective, which stresses the importance of values focused on higher-order needs, self-realisation, and self-fulfilment. To gain insight into the possible role of values, the author uses data from the *European Values Survey* (EVS), which contains a battery of questions on values and attitudes towards marriage, reproduction, family, and family relations. The analysis shows that higher socio-economic status (education and occupation) as well as having more "liberal" and less family-centred values and attitudes are associated with lower fertility. These findings suggest that the negative education-fertility link operates in part via the less traditional values centred on leisure time and self-realisation that are more typical of the women and men with high levels of education.

The next two contributions, by Alessandra Trimarchi and Jan Van Bavel and by Nitzan Peri-Rotem, look at the role of the partner's education in determining an individual's union status at first birth. This research is motivated in part by the ongoing debate about the deepening social status divides in parenthood, and the likely long-term consequences of these differences for families and children. The study by Trimarchi and Van Bavel uses *Generation and Gender Surveys* (GGS) data for 12 European countries to look at the effects of both partners' education on the pathways to the first birth by analysing separately transitions from cohabitation to marriage, from marriage to first birth, and from cohabitation to first birth. The authors find that the partners' combined education (i.e. the "overall human capital of the couple") has a stronger effect on the likelihood of having a child within marriage than the relative education levels of the partners. Highly educated partners are more likely to get married once they start planning to have a child together, even if they were initially cohabiting. In addition, if at least one partner in a couple has tertiary education, the couple's chances of non-marital childbearing are lower. Peri-Rotem analyses changes in the partnership context at first birth, looking at the influence of education and employment status among women and couples in Great Britain. Using the *British Household Panel Survey* (BSPS), she focuses on the period between 1991 and 2012, when childbearing in cohabiting unions increased across all social groups in Britain, and marriage rates fell among women and men with medium and low levels of education. In line with the findings of Trimarchi and Van Bavel, the results of this study confirm that the educational levels of both partners influence the likelihood of a couple experiencing a non-marital first birth, with the man's (but not the woman's) unemployment or inactivity being conducive to out-of-wedlock childbearing. The educational level of the male partner has the strongest influence on the marital status at first birth of medium educated women. These findings confirm that a couple's economic resources, earning capacity, and level of economic insecurity have large effects on their marital status at first birth.

The following two contributions, by Christos Bagavos and by Anja Oppermann, use census and microcensus data to explore the link between education and cohort fertility, while also explicitly considering childlessness. Bagavos applies a couple perspective to study the influence of women's and men's education on completed fertility, childlessness, parity progression ratios, and first birth timing in Greece. Using three rounds of population census data (1991, 2001, and 2011) to analyse the fertility behaviour of native-born couples born between 1945 and 1969, he finds that there are surprisingly small differences between different educational pairings in final levels of childlessness. At the same time, homogenous couples with low levels of education have considerably higher completed fertility than all the other pairings. This finding may be attributable to the higher second and third birth transition rates of these couples, or to their relatively young ages at the first birth. The negative effect of education on fertility appears to be more pronounced for women. Couples in which the woman is highly educated are found to have comparatively low fertility and a late first birth, especially if the woman is married to a man with less education. This pattern persists across cohorts, and disparities in first birth timing have widened considerably. These results suggest a lack of policy support and continuing low levels of compatibility between career and family plans. Oppermann's study uses German microcensus data from 2008 to look at the links between educational attainment, field of study, childlessness, and completed fertility. Her analysis focuses on women in western Germany born in 1955–59, but she also compares the childlessness levels across broader educational field groups in western Germany and eastern Germany, and – drawing from previous research – in Sweden, Austria, and Greece. This analysis reveals a relatively strong educational gradient in childlessness and completed fertility in western Germany, with educational level and field contributing equally to the variation in completed fertility. As in other countries analysed in the past, women in western Germany who were trained in teaching or childcare are found to have lower levels of childlessness and higher levels of completed fertility than women trained in other professions. Oppermann also highlights the role of self-selection, arguing that "the choice of educational field is an expression of preferences or even personality traits that are independent of institutional context".

Sylvie Dubuc uses pooled *Labour Force Survey* data for the United Kingdom in 2001–10 to reconstruct the timing of childbearing and fertility levels among immigrants and their children (second generation) originating from four Asian countries: Bangladesh, Pakistan, China, and India. Dubuc's analysis reveals consistent patterns across these groups as well as among native women, including a tendency among highly educated women (especially women of Chinese origin) to delay childbearing and have relatively low fertility. A large share of the observed fertility differences between women of different ethnic origins is explained by the differences in educational attainment between these groups. Highly educated women of Indian and especially of Chinese origin are found to be far more likely than the UK average to have low and delayed fertility, or to be childless. In contrast, less educated women from Bangladesh and Pakistan – who make up substantial shares of the immigrant populations from these countries – are shown to have higher fertility than the UK average, with many having three or four children.

The final contribution, by Maria Rita Testa and Fabian Stephany, examines fertility intentions by level of education. The study is the first to use meta-analysis to provide a systematic quantitative assessment of the past research on the topic, assessing 29 published studies covering 13 countries. The results indicate that the gradient is not significant in most study lines, but that several studies show a positive educational gradient in intended family size for women and men. This trend appears to be driven by the positive gradient in second birth intentions among women with one child, which has been explained by the "time squeeze" effect; i.e. the tendency among highly educated women to start childbearing at later ages, and thus to attempt to realise their reproductive plans over a relatively short period of time (Kreyenfeld 2002). The regression model with country clusters reveals that the regional divides in reproductive intentions are somewhat counter-intuitive: a strong positive educational gradient in fertility intentions is reported for Southern Europe, where the educational gradient in fertility is strongly negative.

Will highly educated women have more children in the future?

This volume of the *Vienna Yearbook* features six invited debate contributions. The authors were asked to discuss the question of whether highly educated women will have more children in the future. Because the precise question and the time horizon were not explicitly stated, the authors were invited to reflect on the general question of whether the fertility of better educated women is likely to eventually surpass that of their less educated counterparts, thereby reversing the long-term negative association between education and fertility; or whether better educated women are likely to have higher fertility in the future than today. Similarly, the authors were free to consider the general question of whether a future reversal in the education-fertility association is more likely to be caused by a recovery in the fertility of highly educated women, or by a decline in the fertility of less educated women.

The relatively open debate format resulted in engaging contributions that discuss the nature of the education-fertility relationship from different angles. The authors provide a wide range of theoretical and empirical arguments about the past and the likely future of this relationship, and about the forces shaping it. They also shed critical light on the prevailing theoretical approaches, especially the rational "new home economics" approach pioneered by Gary Becker (e.g. Becker 1981).

Alícia Adserà argues that due to their rising share in the population, the childbearing behaviour of highly educated women will be crucial for the future development of fertility. In particular, she looks at the extent to which labour market-related factors, institutions, and policies facilitate or hinder the realisation of fertility intentions among the better educated, and notes the continuation of the gender wage gap and the "sorting" of women into lower paid and more protected job positions. Wolfgang Lutz highlights the empowering capacity of education, which allows highly educated women and men to plan and "organise their lives according to their intentions"; and, as a result, to "reach their personal target for family size, regardless of what the target is". Understanding the fertility targets of highly educated women is therefore "key for understanding future trends in fertility". He also emphasises that the conflict between pursuing a professional career and having a family is most acute among highly educated women. Similarly, Maria Rita Testa argues that in order to design effective policy interventions, it is important to understand the fertility intentions of women and men with different levels of education. Noting that the two-child family norm is shared by all educational groups across the low-fertility countries, Testa points out that the main challenge faced by highly educated women in meeting the two-child family target is their tendency to delay family formation. She observes that women may find it difficult to have children later in life not only because infertility increases with age, but because they may have competing activities and goals.

Jan Van Bavel puts a spotlight on the role of the male partner in fertility, and stresses the importance of understanding men's preferences, attitudes, and skills regarding family formation. He also looks at the extent to which union formation and assortative mating drives some of the observed education-fertility interactions, noting that highly educated women are increasingly likely to be the main "breadwinner" in the family, and are more likely to partner with a man who is willing to take on more childcare and family responsibilities. With the reversal of the gender gap in education, the Beckerian framework of specialised gender roles is seen as increasingly outdated, and thus less useful in analyses of fertility decisions. Diego Ramiro-Fariñas, Francisco J. Viciana-Fernández and Víctor Montañés Cobo comment on the implications of changes in the education-fertility relationship in the context of the rapidly changing labour market conditions in the region of Andalusia in Spain, especially during the recent economic crisis. Remarkably, they point out, the fertility rates among highly educated women were the least affected during the economic downturn. They observe that over this period, employment status was of key importance: women with a permanent job continued to have relatively high first and second birth rates regardless of their educational level, whereas fertility plummeted among non-working women with tertiary as well as lower levels education. Finally, Gøsta Esping-Andersen focuses on the role of the "gender revolution" and of more gender-symmetric practices in allowing better educated women to achieve a larger family size. He argues that a "return to fertility levels that are more aligned with people's preferences will require the consolidation of a new, 'gender-egalitarian' family equilibrium". According to Esping-Andersen, this trend can be encouraged by institutional adaptations, including improvements in reconciliation policies.

Do these contributions offer an explicit answer to the question posed in the debate? Most authors suggest that the answer is "it depends". Notably, the future fertility of better educated women will depend on their fertility goals and broader institutional conditions. Most of the authors envision a broad convergence in fertility among women with different levels of education – in line with their fertility preferences – rather than clear reversals in the education-fertility gradients (e.g. Adserà, Lutz). What then are the conditions that will determine the future education-fertility link? Lutz suggests that the fertility goals of highly educated women will be of key importance. In contrast, Van Bavel emphasises the role of men's preferences and plans. Adserà stresses the role of labour market policies in reducing the barriers to fertility among the better educated. Similarly, Ramiro-Fariñas et al. highlight the role of labour market opportunities, especially in reducing unemployment and temporary employment. Testa emphasises the reconciliation of work and family life and the promotion of gender equality in the family and in the labour market. Esping-Andersen focuses on the role of gender egalitarianism, while stating most clearly the expectation that highly educated women are likely to have more children in the future. In contrast, Ramiro-Fariñas et al. suggest that unstable labour market conditions will not "give much potential for an increase in fertility in any of the education groups".

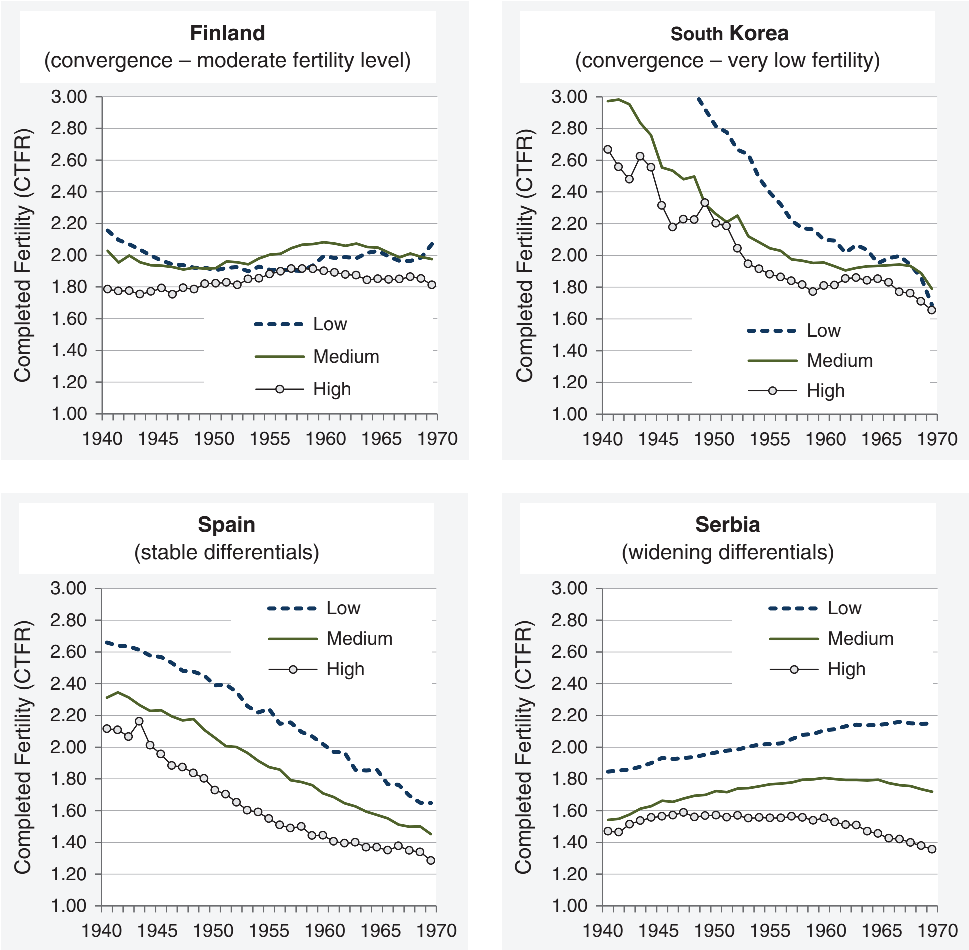
Discussion: the continuing diversity of educational gradients in fertility across countries

The debate contributions and research articles in this volume provide a broad range of perspectives on the changing nature of the education-fertility relationship in different contexts and populations, and its future development. For the analysed periods and cohorts of women and men (typically, cohorts born up to the late 1960s), these studies show a continuation of the negative educational gradient in fertility among women, and a weaker and less significant gradient among men. Among couples and among women in particular, having a higher level of education is still associated with lower fertility. The size of the educational gradient differs by welfare regime, and appears to have weakened in the more recent cohorts in a range of countries. It is, however, unclear whether the recently observed flattening of the educational gradient in fertility in the Nordic countries and Belgium (e.g. Kravdal and Rindfuss 2008; Neels 2012; Jalovaara et al. 2017), as well as in the United States (e.g. review contribution by Adserà in this volume), signals a wider trend across the developed countries. Additional empirical evidence drawn from the *Cohort Fertility and Education* (CFE) database suggests that there is considerable cross-country variation among women born between 1940 and 1970, with women in some countries (e.g. Finland) experiencing a convergence across educational groups to a stable moderately low fertility level, and women in other countries (e.g. Korea) experiencing a convergence across educational groups to a very low fertility level. Moreover, women in a number of countries (e.g. Spain) seem to be following a "permanent difference model" in which different groups have similar relative fertility levels over time, while women in a few other countries (e.g. Serbia) are experiencing a widening of education-fertility differentials (see Figure 1).

Most of the contributors to this volume appear to be reluctant to offer any clear predictions of future trends. However, the authors seem to share the view that a series of interrelated factors will likely affect the ability of better educated women and men to realise their reproductive plans, and thus to have larger families. These factors include the greater stability of unions and marriages among higher educated women and men, the widening disparities in income and labour market prospects, the spread of gender-egalitarian attitudes and the actual shift towards a more equal division of childcare and household tasks among higher educated couples, and the expansion of work-family reconciliation policies. Some of these factors might reinforce each other: if highly educated women and men increasingly prefer to live with similarly highly educated partners, these "power couples" (Dribe and Stanfors 2010) might become even more advantaged than they are currently. While highly educated people are likely to have the wealth, career success, and social capital needed to realise their reproductive plans, less educated people are likely to face economic insecurity, a scarcity of jobs, unstable partnerships, and unstable family contexts at first birth that will make it harder for them to reach their fertility goals. It is possible that women and especially men in economically disadvantaged positions will increasingly "miss out" on their reproductive plans, and will have higher rates of childlessness than the other social groups. In addition, as discussed in the contributions by Adserà, Trimarchi and Van Bavel, and Peri-Rotem in this volume, depleted parental resources might affect the well-being of children, resulting in lifelong disadvantages for people born into these families.

The functioning of the labour market and gender equality are two context-specific factors that are repeatedly mentioned in the contributions. These two factors may also have the greatest impact on the future fertility of highly educated women, men, and couples; as well as on overall fertility trends. Considerations such as whether the person has a relatively secure job, a stable income, and sufficient socioeconomic resources are likely to be even more salient for fertility decisions in the future than they were in the past. Therefore, especially among young adults, factors such as unemployment, job instability, work flexibility, and career prospects may be expected to have large effects on the future educational gradient in fertility, as Adserà argues in her review. Gender inequalities in the division of childcare and household tasks still hinder the fertility decisions of many university educated women. Gender inequalities also persist in the labour market, where these differences may paradoxically support the fertility decisions of women and their partners. Women's and men's jobs continue to be segregated to a large degree. Even

Figure 1:
Educational differences in completed fertility among women born in 1940–1970



Notes: Educational categories are defined using standardised 1997 ISCED categories: Low: ISCED 0-2 (up to lower secondary and the second stage of basic education); Medium: ISCED 3 + 4 (upper secondary and short post-secondary education); High: ISCED 5 + 6 (tertiary education, university degree). For details on country-specific categories and educational systems, see the country documentation in the CFE database. Data for Finland and Spain pertain to native-born women only and exclude migrant women.

Sources: Data provided in the *Cohort Fertility and Education* (CFE) database (www.cfe-database.org), accessed on 18 December 2017. The original data are based on 2015 register data for Finland (provided by Statistics Finland), 2010 census data for South Korea (1% sample), 2011 census data for Spain, and 2011 census data for Serbia.

in the highly egalitarian Nordic countries, women are overrepresented in health care, social work, education, and retail jobs that are more compatible with raising children (OECD 2017b).

Despite the vast literature on education and fertility, the discussions in this volume clearly show that many aspects of this relationship are not sufficiently covered. In conclusion, we provide a selected list of themes that should be explored in future research.

- *Focus on more detailed and more precisely defined educational categories.* Whereas in the past the majority of people had low levels of education, today in some countries the majority of the younger population have tertiary education. Thus, research would benefit from a wider application of a standardised framework that allows for a comparison of educational groups over time through, for example, the use of relative rather than absolute educational categories. A more refined system of categorisation is also needed to study the fertility of women and men at the top of the education distribution.
- *Spotlight on values and competing preferences.* As Lakomý's article in this volume shows, religiosity, values, and lifestyle preferences are important predictors of fertility behaviour. Future research should take these factors into account. In cross-sectional surveys individual's values and preferences are expressed at the time of survey, i.e. after the analysed life course event has taken place. As a result, this type of analysis may be biased by ex-post causal attribution (Hoem and Kreyenfeld 2006). The use of panel data can help researchers avoid these a posteriori adjustments, although attrition can introduce other types of biases.
- *Spotlight on men.* Much of the research in this volume has included the perspectives of men and of couples. Still, as Van Bavel points out in the debate section, more studies are needed to shed light on men's values and plans, and on their family history and fertility levels.
- *Research on subgroups and minorities.* Migrants and other population groups often face different constraints and opportunities than the majority population. Moreover, as they are socialised in a different context, they tend to have distinct values and preferences. As Dubuc's research in this volume shows, differences in the educational attainment levels of migrant groups may account for a substantial portion of their differences in completed fertility. Adserà points out that migrants are likely to continue to influence fertility in the receiving countries, and that their selectivity in terms of their region of origin, skills, and educational levels will be important in determining the future course of their fertility, and whether it converges with the fertility of the majority population.
- *Life course perspective on partnership, family formation, and reproduction.* Highly educated women and men tend to start the family formation process later than their less educated counterparts. While this is partly because these individuals are older when they complete their education, they also tend to

wait a long time after their graduation before having a first child (e.g. Neels et al. 2017). Thus, highly educated women and couples face a high risk of infertility, which could in turn lead to involuntary childlessness or having a smaller family than intended (as is pointed out by Testa in the debate section). More studies on the intersection of life course trajectories, first birth timing, ultimate family size, and age-related infertility are needed to better understand the link between late family formation and ultimate fertility among the highly educated.

- *Joint effects of education and family preferences.* Further exploration of the purposeful sequencing of births and educational outcomes in women's, men's, and couples' lives is called for; as is further investigation of the joint effect of preferences for both educational outcomes and family formation.
- *Future of work and digital technologies.* Finally, more research is needed on the likely implications of the rapidly changing nature of technology, employment, and labour relations for the fertility patterns of different education groups. Adserà's review article in this volume shows that these topics are also of key importance when considering the likely shift in educational gradients in fertility in the future.

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References

Becker, G. S. 1981. *Treatise on the Family*. Cambridge: Harvard University Press.

Cleland, J. 2009. Education and future fertility trends, with special reference to mid-transitional countries. *Completing the fertility transition, United Nations Population Bulletin*, Special Issue Nos. 48/49, 2002 (2009).

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: 847–878.

Esping-Andersen, G. and F. C. Billari 2015. Re-theorizing family demographics. *Population and Development Review* 41(1): 1–31.

Goldscheider, F., E. Bernhardt and T. Lappegård 2015. The gender revolution: A framework for understanding changing family and demographic behavior. *Population and Development Review* 41(2): 207–239.

Hoem, J. M. and M. Kreyenfeld 2006. Anticipatory analysis and its alternatives in life-course research: Part 1: Education and first childbearing. *Demographic Research* 15: 461–484.

Jalovaara, M., G. Neyer, G. Andersson, J. Dahlberg, L. Dommermuth, P. Fallesen and T. Lappegård 2017. Education, gender, and cohort fertility in the Nordic countries. *Stockholm Research Reports in Demography* 2017: 6.

James, K. S., V. Skirbekk and J. Van Bavel 2012. Education and the global fertility transition-Foreword. *Vienna Yearbook of Population Research* 2012(10): 1–8.

Klesment, M. and J. Van Bavel 2017. The reversal of the gender gap in education, motherhood, and women as main earners in Europe. *European Sociological Review* 33(3): 465–481.

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: 854–873.

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(2): 15–48.

Martín-García, T. 2008. A reassessment of the role of women's education in existing fertility research. *Genus* 64(1-2): 131–157.

McLanahan, S. and C. Percheski 2008. Family structure and the reproduction of inequalities. *Annual Review of Sociology* 34: 257–276.

Mills, M. and H. P. Blossfeld 2013. The Second Demographic Transition meets globalization: A comprehensive theory to understand changes in family formation in an era of rising uncertainty. Chapter 1 in *Negotiating the life course. Stability and change in life pathways*, ed. A. Evans and J. Baxter, 9–33. Springer: Netherlands.

Mills, M., R. R. Rindfuss, P. McDonald and E. te Velde 2011. Why do people postpone parenthood? Reasons and social policy incentives. *Human Reproduction Update* 17(6): 848–860.

Neels, K., M. Murphy, M. Ní Bhrolcháin and É. Beaujouan 2017. Rising educational participation and the trend to later childbearing. *Population and Development Review* 43(4): 667–93.

Ní Bhrolcháin, M. and É. Beaujouan 2012. Fertility postponement is largely due to rising educational enrolment. *Population Studies* 66(3): 311–327.

Nisén, J. 2016. Education and fertility: A study on patterns and mechanisms among men and women in Finland. Doctoral Thesis. University of Helsinki. *Publications of the Faculty of Social Sciences* 31-2016.

OECD. 2014. *Society at a Glance 2014. The crisis and its aftermath*. OECD Publishing. Available at http://www.oecd.org/els/societyataglance.htm.

OECD. 2016. *Society at a Glance 2016. A spotlight on youth*. Paris: OECD Publishing. Available at OECD Publishing, Paris. DOI: 10.1787/9789264261488-en.

OECD. 2017a. Education attainment statistics. OECD online library, data accessed 13 December 2017; DOI: 10.1787/025421e5-en.

OECD. 2017b. *The pursuit of gender equality: An uphill battle*. Paris: OECD Publishing. DOI: 10.1787/9789264281318-en.

Perelli-Harris, B. and M. Lyons-Amos 2016. Partnership patterns in the United States and across Europe: The role of education and country context. *Social Forces* 95(1): 251–282.

Piketty, T. and G. Zucman 2014. Capital is back: Wealth-income ratios in rich countries 1700–2010. *The Quarterly Journal of Economics* 129(3): 1255–1310.

Stange, K. 2011. A longitudinal analysis of the relationship between fertility timing and schooling. *Demography* 48(3): 931–956.

Van Bavel, J. 2012. The reversal of gender inequality in education, union formation and fertility in Europe. *Vienna Yearbook of Population Research* 2012(10): 127–154.

Van Bavel, J. and M. Klesment 2017. Educational pairings, motherhood, and women's relative earnings in Europe. *Demography* 54(6): 2331–2349.

Webbink, D., N. G. Martin and P. M. Visscher 2011. Does teenage childbearing reduce investment in human capital? *Journal of Population Economics* 24(2): 701–730.

DEMOGRAPHIC DEBATE

Vienna Yearbook of Population Research 2017 (Vol. 15), pp. 19–25

The future fertility of highly educated women: the role of educational composition shifts and labor market barriers

Alícia Adserà*

The childbearing patterns of highly educated women will be a key factor in the evolution of fertility – not only in developed countries, but in rapidly developing economies, where fertility rates are quickly declining to below replacement levels, and where educational attainment is rising rapidly as well. The answer to the question posed above is likely a function of multiple factors that are related, among other things, to fertility preferences, couple formation dynamics, labor market institutions, and gender roles; as the other contributions to the debate in this volume discuss. Here, I want to focus on three points: (1) who the college-educated are today; (2) what we know about the fertility preferences and the actual fertility of highly educated women, and about whether the mismatch between fertility preferences and realized fertility differs depending on educational attainment; and (3) whether highly educated women experience barriers in achieving their fertility goals, or their *personal target* (as Lutz discusses in his contribution).

First, to answer the question of whether highly educated women will have more children in the future, it is important to observe the current distribution of educational attainment across developed countries, to describe the shifts in its composition, and explore how these changes can affect our understanding of who is educated. In recent decades, educational expansion across the most developed countries, particularly in areas that traditionally had low levels of educational attainment, such as Southern Europe, has dramatically changed the profiles of young adults. Figure 1 shows the shares of 30–34-year-olds (i.e., adults of prime childbearing ages) in selected European countries who have tertiary education. The average for the European Union in 2016 is 44 percent among women and 34 percent among men. A majority of women have attained some level of tertiary education in many countries, including in Belgium, Sweden, the UK, Switzerland, the Netherlands, Lithuania, Germany, and Poland. In Italy and Spain, close to one-half of women have tertiary education. Furthermore, in all of the countries

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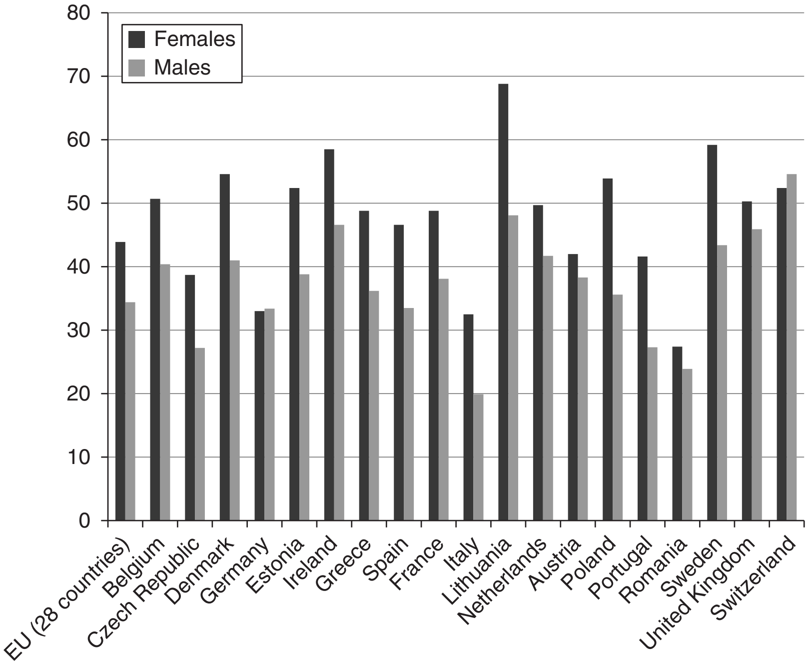
Figure 1:
Tertiary educational attainment of 30–34-year-olds by sex in selected European countries, 2016



Note: Here, tertiary educational attainment refers to having completed ISCED (International Standard Classification of Education) 2011 levels 5–8 for data from 2014 onward, and to having completed ISCED 1997 levels 5–6 for data up to 2013. The indicator is based on the EU Labour Force Survey. Author's calculations based on Eurostat data, accessed in April 2017 at http://ec.europa.eu/eurostat/.

in Figure 1 except for Switzerland, greater shares of women than of men have higher education. As Van Bavel (2012) carefully lays out in his overview paper on the reversal of gender inequality, this trend could have important consequences for fertility and partnership formation.

Moreover, the observed large compositional changes in Figure 1 imply that highly educated women now represent a larger share of the population – and that, as a result, they may be less selected – than their counterparts in previous generations.[1] Thus, highly educated women may be more representative of the population as a whole

[1] For example, at the turn of the 20th century, around 30 percent of US women who graduated from college between 1900 and 1920 never married; and among those who married, around 30 percent remained childless (Goldin 2004). However, only around 21 percent of US women born in 1970 who are in the top quartile of educational attainment have remained childless (Bailey et al. 2014).

in terms of their fertility and work preferences. Indeed, today less educated women may be more selected than highly educated women.

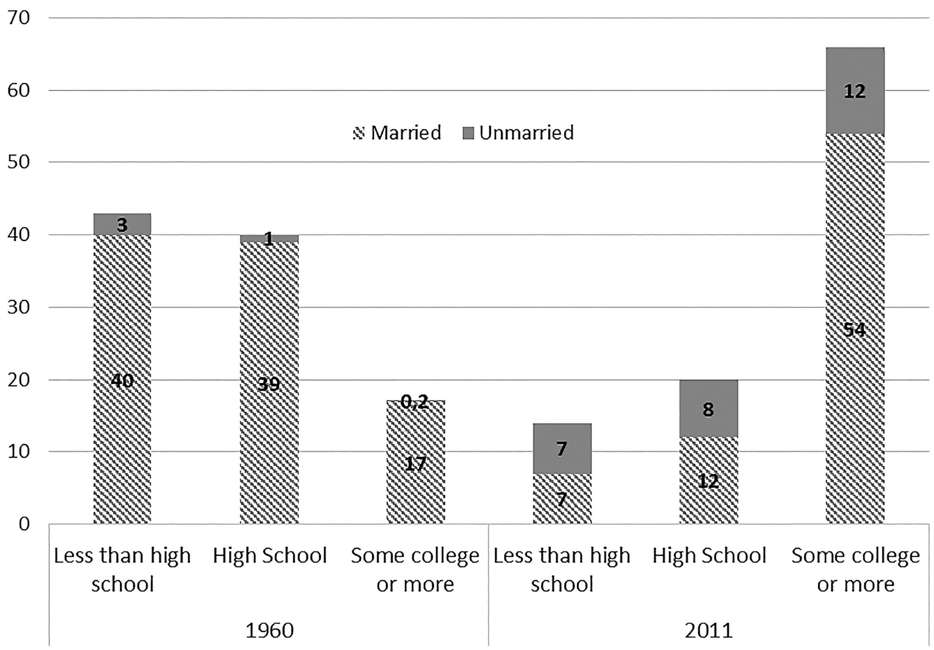
Therefore, when thinking of the behavior of "highly educated" women, we may need to consider what metric of education we want to employ: i.e., *absolute or relative* education. The right metric may vary by the realm of analysis (such as fertility, partnership formation, or labor market attachment).

On the one hand, having a high level of education, as measured by the *absolute* level of attainment, has important implications for the life course. Having better cognitive abilities is generally associated with lower morbidity, longer life, lower risks of engaging in adverse behavior, and better general skills for adapting to the changing environment (Lutz and Skirbekk 2014). Thus, as Lutz notes in his discussion piece, highly educated women may have better tools for reaching their life goals in many dimensions, such as fertility. Having higher educational attainment and lower morbidity (particularly at the top of the income/educational distribution) are also associated with increases in life expectancy. When thinking about human capital investments, women are likely to recognize that they will live more years without than with young children in the house, and that the potential returns to those investments are likely to be high. As I emphasize below, society as a whole should take into account this transformation of women's *life-cycle,* and should enact policies accordingly.

However, the expected change in the selection among the pool of highly educated women opens up the research question of whether we should use *relative* measures of education or some other index to understand behavior within that group. Some possible alternatives include years of schooling, educational quartiles (as in Bailey et al. (2014)), field of study, and occupational prestige (which implies labor market participation). On the one hand, due to shifting patterns in employment, education has come to play an increasingly important role in determining compensation levels (Autor 2014). On the other, unlike a few decades ago, having a college degree is no longer a passport to getting a stable and high-paying job. The income distribution of workers with college degrees has widened, partly because of the growth in the numbers of tertiary educated workers in the economy, and partly because of the heterogeneity in their fields of education. Whereas the best educated in certain fields are at the top of the income distribution, it is not unusual for college-educated workers (particularly young adults) to earn very meager salaries in very unstable jobs. In Spain, for example, these workers are called *mileuristas*, or "thousand euros." Moreover, some jobs traditionally performed by individuals with varying degrees of post-secondary education are now disappearing ("jobs in the middle").

Consistent with the trend in educational attainment just described, across rich countries, the share of women with children who are highly educated has been rising. Currently, the majority of new mothers in the United States have some years of college (although not all are college graduates). Figure 2 shows the shares of mothers of infants by education and marital status in the US in 1960 and in 2011. In 1960, the share of women who had an infant and some college was 18 percent, while the share of women who had an infant and a high school education or less

Figure 2:
Shares of mothers of infants by education and marital status in the US, 1960 and 2011



Source: Pew Research Center (2013), using data from the 2011 American Community Survey (ACS) (1% national random sample of the population available in Integrated Public Use Microdata Series (IPUMS; available at https://usa.ipums.org/usa/sampdesc.shtml)) and the 1960 census (1% national random sample of the population available in IPUMS).

was 82 percent. In 2011, the respective shares for these two groups were 66 and 34 percent. (Pew Research Center 2013). Recent Eurostat data show a similar trend in many European countries.

Second, we need to look at the fertility preferences and the behavior of the highly educated. The fertility intentions of tertiary educated women differ little from those of less educated women, and are still around the replacement level in most countries (Sobotka et al. 2015). Recent studies have found a positive relationship between intended fertility and overall educational attainment in a given country (Testa 2014). As Lutz and Testa (this volume) argue, the gap between intentions and actual fertility for highly educated women is larger in some countries than in others (see also *European Fertility Datasheet* (Sobotka et al. 2015)). However, this pattern may be shifting as a result of recent changes in the labor market. Bailey et al. (2014) showed that in the US, the differences in the completed fertility of women in the lowest quartile and in the highest quartile of the educational distribution have been closing among the most recent cohorts.

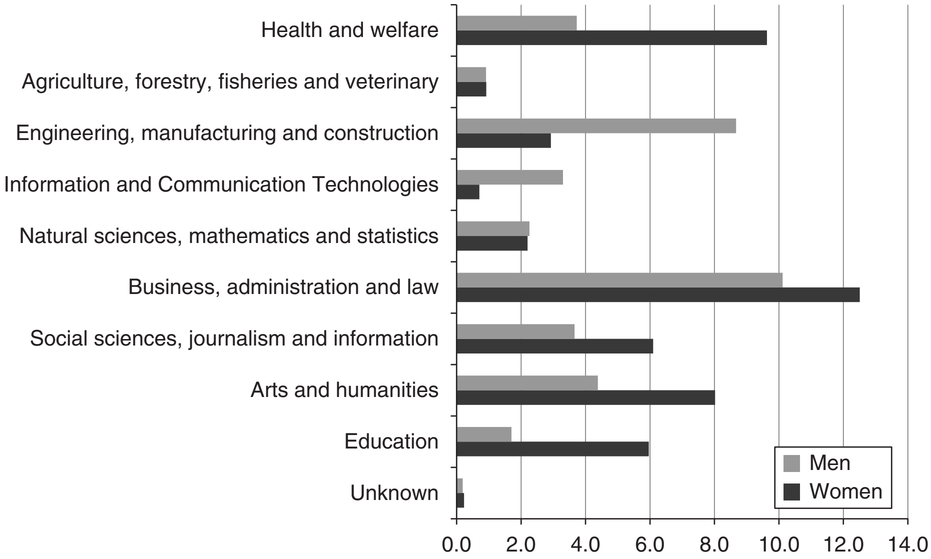
These latest trends seem to indicate that fertility preferences vary little by educational level; and that in some countries, the childbearing intentions of highly educated women appear to have converged and even surpassed the intentions of less educated women. The fertility rates of different educational groups seem to be converging as well. The decrease in selection among the pool of highly educated women, and the effects of the recent economic crises, which hit the least educated particularly hard, may have contributed to the shrinking of the gap.

Finally, the question of whether this convergence and flattening of the educational gradient in fertility is temporary remains open. Labor market data show that it is becoming more difficult for men (and women) with low or medium levels of education to get "good" jobs. In many developed countries, growing numbers of young people are returning to (or staying in) their parents' home. Today, many young adults are unable to become independent or have children unless they are in a two-income household. Thus, women in a stable, high-earning partnership should find it easier than women who are not in such a partnership to realize their personal fertility goals.

The data displayed in Figure 2 show that in 2011, 66 percent of all mothers had some college; 54 percent were married and had some college, and 12 percent were unmarried and had some college. In the same year, 19 percent of mothers had a high school diploma or less and were married, and 15 percent of mothers had a high school diploma or less and were unmarried. The educational gradient in out-of-wedlock births is relatively similar across Europe, with less educated women being more likely than highly educated women to have a non-marital birth (Perelli-Harris et al. 2010). Van Bavel notes in his contribution (this volume) that the rates of long-term union formation have increased more among the highly educated than among the less educated. Lundberg and Pollak (2014) argued that highly educated individuals prefer to have children within marriage as they want to ensure that their partner is committed to investing in the children. In the European context, being in a stable partnership could play the same role. Moreover, as Esping-Andersen notes in his contribution, gender roles are evolving, and are changing more rapidly among the highly educated than among the less educated. Thus, a highly educated spouse may be more likely than a less educated one to support his wife in combining career and family.

Women's low earnings may reduce their ability to afford to have their intended number of children, especially when faced with high child care costs. Across the rich countries, the gender wage gap is still pervasive, and can be partly explained by women's cumulative experience levels and main sectors of employment (Blau and Kahn 2016). Figure 3 shows the shares of students by field of tertiary education and by gender across the EU 28 countries. The more technical fields, such as engineering and information and communication technologies, are clearly dominated by men. Jobs in these technical fields have some of the highest average rates of pay. These gender differences are later amplified in men's and women's professional careers. Conversely, the arts and humanities, education, health, and the social sciences tend to be dominated by women. In some of the highest paying sectors, putting in long hours is rewarded with higher rates of hourly pay. This implies that highly educated women employed in these sectors who want to combine family and work

Figure 3:
Shares of students enrolled in tertiary education by field of study and gender across the EU 28 countries, 2014



Source: Author's calculations based on Eurostat data, accessed March 2017 at http://ec.europa.eu/eurostat/, file_[educ_uoe_enrt03].

are heavily penalized. Other sectors, including education and health, tend to be more accommodating to women with children, offering them greater security combined with more flexible schedules and more generous periods of leave. In many countries, some of these positions are in the public sector. Thus, it is not surprising that women tend to choose those professions (Figure 3).

Labor market institutions matter (Adserà 2011); women should not have to work exclusively in the protected public sector (as was initially the case in the pioneering Nordic countries) or in highly regulated sectors in order to combine work and family. Public policy should level the playing field for women in a broader sense. Since life expectancy is becoming longer as educational levels are rising, countries are increasingly able to take full advantage of women's skills. Policy-makers should thus enact policies with a longer time horizon. Testa (2014) found that in European countries where relatively large shares of women are highly educated, the gap between desired and realized fertility is relatively small. This is likely because these countries have favorable labor market conditions and strong welfare state institutions (which are possibly the product of lobbying by highly educated pioneers and far-sighted policy-makers) that offer women a better bargain. This trend has also been mentioned by Van Bavel (2012).

To sum up, I believe that the flattening of the educational gradient will be a relatively persistent phenomenon, but that there is a need for labor market policies that could remove or lower the barriers that highly educated women face in achieving their relatively high fertility goals.

References

Adserà, A. 2011. Where Are The Babies? Labor market conditions and fertility in Europe. *European Journal of Population* 27: 1–32.

Autor D. H. 2014. Skills, education, and the rise of earnings inequality among the “other 99 percent”. *Science* 344(6186): 843–51

Bailey, Martha J., Melanie Guldi and Brad J. Hershbein 2014. Is there a case for a second demographic transition? Three distinctive features of the post-1960 U.S. fertility decline. In *Human capital in history: The American record*, eds Boustan, Frydman, and Margo, 273–312. Chicago, IL: University of Chicago Press.

Blau, Francine D. and Lawrence M. Kahn 2016. The gender wage gap: extent, trends, and explanations. IZA DP No. 9656, January.

Goldin, C. 2004. The long road to the fast track: Career and family. *Annals of the American Academy of Political and Social Science* 596(1): 20–35.

Lundberg, Shelly and Robert A. Pollak 2014. Cohabitation and the uneven retreat from marriage in the U.S., 1950–2010, NBER Chapters. In *Human capital in history: The American record*, pp. 241–272. National Bureau of Economic Research, Inc.

Lutz, W. and V. Skirbekk 2014. How education drives demography and knowledge informs projections (Chapter 2). In *World population and human capital in the twenty-first century*, eds W. Lutz, W. P. Butz, and S. KC. Oxford University Press.

Perelli-Harris, B., W. Sigle-Rushton, M. Kreyenfeld, T. Lappegård, R. Keizer, and C. Berghammer 2010. The educational gradient of childbearing within cohabitation in Europe. *Population and Development Review* 36(4), 775–801.

Pew Research Center 2013. Long-term trend accelerates since recession. record share of new mothers are college educated. http://www.pewsocialtrends.org/2013/05/10/record-share-of-new-mothers-are-college-educated/ Retrieved November 2015.

Sobotka, T., K. Zeman, M. Potančoková, J. Eder, Z. Brzozowska, É. Beaujouan and A. Matysiak 2015. *European fertility datasheet 2015*. Vienna Institute of Demography/Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/ÖAW, WU).

Testa, Maria Rita 2014. On the positive correlation between education and fertility intentions in Europe: Individual-and-country-level evidence. *Advances in Life Course Research* 21: 28–42.

Van Bavel, J. 2012. The reversal of gender inequality in education, union formation and fertility in Europe. *Vienna Yearbook of Population Research* 2012: 127–154.

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Education empowers women to reach their personal fertility target, regardless of what the target is

Wolfgang Lutz*

When we study the effects of education on fertility, it is necessary to distinguish between setting a target for family size, and the ability to actually reach this target. In highly developed countries with low fertility, the interplay of these two independent forces can result in rather complex patterns of education-fertility associations. My main hypothesis here is that education typically empowers women (and couples) to reach their personal target for family size, regardless of what the target is. If the educated women in a given country want to have a family size that exceeds the average fertility rate in that country, the fertility rate of highly educated women may be higher than the average fertility rate. The empirical data do not yet show many examples of such cases. In highly developed countries with high levels of gender equity, such as the Nordic countries, some U-shaped patterns – in which the least educated and the most educated women have somewhat higher fertility than the women with medium levels of education – have been observed. In the future, such patterns may appear in more countries. But as I argue in this note, this pattern should not be seen as an indication that education is no longer a key determinant of fertility.

The effects of education on health and survival are more straightforward than they are on fertility, because the goals in health and survival are always in one direction. Irrespective of their stage of socioeconomic development, virtually all people at any given point in time want to be in good rather than in bad health, and want to avoid the premature deaths of themselves and their family members. This is also the reason why empirical research for virtually all settings shows that compared to their less educated counterparts, better educated women have lower child mortality, and better educated men and women have higher life expectancy. There have been a number of studies on the relationship between health/mortality and education, and the findings of this research leave little doubt that the many dimensions of empowerment that result from education have real and causal effects on health and survival. (Baker et al. 2011; Lutz and Skirbekk 2014). There is clear evidence that all learning experiences,

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including learning experiences through formal education, change our brains for the rest of our lives (Kandel 2007). Education tends to enhance our time horizons, and to influence our health-related behaviors in a multitude of ways that are mostly conducive to health and survival.

In terms of fertility, the effect of female education during the process of demographic transition, when family size gradually moves from a high and mostly uncontrolled condition to a low and planned condition, is also clear and straightforward. During this transition, it is evident that better educated women generally want to have fewer children, and that they find increasingly effective ways to ensure that they have fewer children. The desired family size tends to be smaller for better educated women than for their less educated counterparts, because the former group are more concerned about the quality of children. Thus, highly educated women tend to seek to maximize the life chances of their children by having fewer children who receive high levels of nutrition and education. Under poor sanitary conditions and in the absence of efficient health care services, having a large number of pregnancies also carries significant health risks for the mother. Under such conditions, better educated women are typically aware of these health risks, and may try to limit their number of pregnancies in the interests of their own health. Hence, in countries undergoing the demographic transition, there is a consistent and strong negative association between female education and desired family size. In addition, many studies have shown that education empowers women to achieve their lower goals, as they are often able to overcome resistance from their husband or extended family, and to access relevant information and reproductive health services (Fuchs and Goujon 2014). Based on data from DHS surveys in 30 African countries, John Bongaarts (2010) found that educational levels are systematically positively associated with the demand for and the use of contraception, and are negatively associated with desired family size. These two factors together clearly result in lower actual fertility among better educated women.

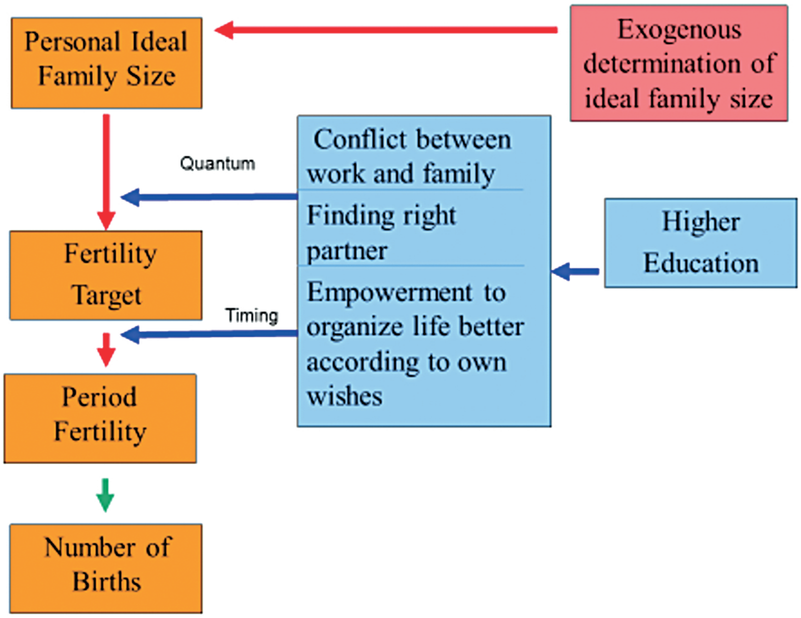
For highly developed countries with low fertility, there are good reasons to assume that the generally empowering effect of education also holds, as education places women in a better position to organize their lives according to their intentions. In terms of family planning, survey evidence shows that compared to less educated women, highly educated women are better able to realize their stated fertility plans; i.e., to determine the quantum and the timing of their births, and to have fewer unplanned births (Musick et al. 2009). Hence, if the fertility targets of better educated women in highly developed countries were consistently lower than those of less educated women, as they tend to be in countries undergoing the demographic transition, we would undoubtedly find a strong and consistent negative association between education and fertility. However, the data show that the fertility targets of better educated women are not consistently lower than those of less educated women in countries where fertility levels are around or below the replacement level (Sobotka et al. 2015). Hence, the key to understanding future trends in fertility among highly educated women in low fertility countries lies in understanding their fertility targets.

The figure below offers a possible conceptualization of the translation from the personal ideal family size to fertility targets and their realization in the form of actual births. The figure is a modification of the conceptual framework introduced in the context of the "low fertility trap hypothesis" of Lutz et al. (2006). This hypothesis distinguishes between the different aspects of fertility, ranging from ideal family size to actual births (as shown on the left side of the graph); and assumes that there are different forms of feedback from actual fertility experienced at the societal level, which is in turn based on the ideals and the realization of these ideals at the individual level. In particular, the hypothesis states that a high prevalence of one-child families in a society will influence the norms of the next generation; i.e., that the observed reality may be taken as the new norm, which could cause the ideal family size to fall well below two children per couple. While there is little empirical evidence of such a pattern in Europe, where the two-child norm still seems very strong; in East Asia, and particularly in the Chinese urban areas where a one-child policy had been enforced for several decades, it appears that a new one-child norm has become dominant, even in places where couples are now allowed to have two children (Basten and Jiang 2015).

The figure presented here does not include the feedback loops; instead, it only shows the different aspects of fertility (on the left-hand side of the figure), and some selected mechanisms that influence these aspects, which can in turn be seen as having been influenced by education. The personal ideal family size is seen here as fully exogenous and determined by culture and other forces, which may include the forces described in the low fertility trap hypothesis. Next, the personal ideal family size is translated into a more concrete fertility target. This target has already been shaped by the individual's awareness of certain trade-offs and of other life goals that compete with fertility desires. For better educated women in particular, there is often a clear conflict between the desire to have a successful professional career and the desire to have children. How this conflict is resolved depends greatly on the welfare system of the society, including on the availability of child care and on the degree of gender equity. Hence, it is hard to come up with a general assessment of how higher education contributes to the resolution of this conflict. For example, the empirical data for the 1966–70 birth cohorts show that highly educated women were much more likely to remain childless in Germany than in France (Sobotka et al. 2015). Another possible negative effect of education on fertility operates through the choice of partner. For example, in some societies, and particularly in East Asia, highly educated women do not want to marry a less educated man, and may therefore have problems finding an appropriate spouse for establishing a family.

The formation of the personal fertility target is thus very complex and hard to predict; and it is equally difficult to find a systematic effect of education on this aspect of fertility. However, the effect of education on the realization of the target, whatever it happens to be, is much clearer. I am confident that now and in the future better educated women will be more empowered to manage their lives in ways that allow them to actually meet their targets.

Figure 1:
A simple conceptualization of the possible effects of higher education on the decision-making processes that lead to actual fertility



Hence, in sum, my answer to the question of whether in the future better educated women in countries with low fertility will have lower or higher fertility has two parts: (a) We cannot know the effect of education on fertility targets because these targets depend on local and cultural conditions, and may change over time. (b) I am, however, quite confident that education affects the ability of women to realize their fertility intentions; and that in the future, better educated women will be able to better reach their targets.

Therefore, if we assume that in Europe the fertility targets of educated women will be somewhere around two children, we can expect to see slight increases in the actual fertility of better educated women, who, on average, still have much lower fertility than their less educated counterparts.

References

Baker, D. P., Leon, J., Smith Greenaway, E. G., Collins, J., and Movit, M. 2011. The education effect on population health: A reassessment. *Population and Development Review* 37(2): 307–332, DOI: 10.1111/j.1728-4457.2011.00412.x.

Basten, S. and L. Jiang. 2015. Fertility in China: An uncertain future. *Population Studies* 69(sup1): S97–S105.

Bongaarts, J. 2010. The causes of educational differences in fertility in Sub-Saharan Africa. *Vienna Yearbook of Population Research* 8: 31–50, DOI: 10.1553/populationyearbook2010s31.

Fuchs, R. and Goujon, A. 2014. Future fertility in high fertility countries. In *World population and human capital in the 21st century*, eds Lutz, W., Butz, W. P. and KC, S., 147–225. Oxford: Oxford University Press, http://ukcatalogue.oup.com/product/9780198703167.do.

Kandel, E. R. 2007. *In search of memory: The emergence of a new science of mind*. New York: W.W. Norton & Co.

Lutz, W. 2008. Has Korea's fertility reached the bottom? The hypothesis of a 'low Fertility Trap' in parts of Europe and East Asia. *Asian Population Studies* 4(1): 1–4, DOI: 10.1080/17441730801963110.

Lutz, W. and Skirbekk, V. 2014. How education drives demography and knowledge informs projections. In *World population and human capital in the 21st century*, eds Lutz, W., Butz, W. P. and KC, S., 14–38. Oxford: Oxford University Press, http://ukcatalogue.oup.com/product/9780198703167.do.

Lutz, W., Skirbekk, V., and Testa, M. R. 2006. The low-fertility trap hypothesis: Forces that may lead to further postponement and fewer births in Europe. *Vienna Yearbook of Population Research* 4: 167–192, http://www.jstor.org/stable/10.2307/23025482.

Musick, K., P. England; S. Edgington, and N. Kangas. 2009. Education differences in intended and unintended fertility. *Social Forces* 88(2): 543–572.

Sobotka, T., K. Zeman, M. Potančoková, J. Eder, Z. Brzozowska, É. Beaujouan, and A. Matysiak. 2015. *European fertility datasheet 2015*. Vienna Institute of Demography/Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/ÖAW, WU), http://www.fertilitydatasheet.org/.

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Will highly educated women have more children in the future? Looking at reproductive plans and outcomes

Maria Rita Testa*

"Will highly educated women have more children in the future?" In this contribution, I address this question by looking at both fertility and fertility intentions; i.e., the number of children people plan to have over their reproductive lives. Intended births are highly correlated with actual births, and in low-fertility settings, childbearing has become associated with the couple's agency.[1] On the other hand, education, which is a marker of income and social status, has remained an important driver of fertility choices.[2] Hence, understanding the reproductive decision-making of women and men with low, medium, and high levels of education is crucial when seeking to determine whether – and if so, to what extent – there is scope for additional policy interventions aimed at raising fertility levels.

1 Introduction

In recent decades, increasing numbers of women have earned a tertiary or a higher education degree. According to diffusion theory, individuals with high levels of education tend to be trendsetters who engage in novel forms of behaviour that are subsequently adopted by other societal groups (Goode 1993; Nazio 2008). Indeed, highly educated couples have driven both the decline and the turnaround in fertility levels observed over the past five decades (Esping-Andersen and Billari 2015). In terms of family planning, highly educated women are expected

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[1] Here, agency is defined in a general sense as the intrinsic human capacity to make choices and act. "Action depends upon the capability of the individual to 'make a difference' to a pre-existing state of affairs or course of events" (Giddens 1984: 14).

[2] In countries where the highly educated women have lower second birth rates than the less educated women, total fertility also tends to be low, and vice versa (van Bavel and Różańska-Putek 2010).

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to differ from their less educated counterparts. Past empirical evidence suggests that the relationship between fertility intentions and education is not necessarily identical to the relationship between actual fertility and education: i.e., that a highly educated woman is more likely than a less educated woman to end her reproductive life with fewer children than she had intended to have. This result is counterintuitive, given that education competes with childbearing, and that highly educated women and men may be expected to be more accurate than their less educated counterparts when reporting the number of children they expect to have. One potential reason for this apparent contradiction is the tendency to postpone childbearing and the parity-specific distribution of fertility intentions (Sobotka 2009). If we look at the distribution of highly educated women by their intended number of children, we see a clear clustering around the option of having two children (Testa 2012). However, official statistics show that the average highly educated woman of all cohorts and birth years has far fewer than two children (Sobotka et al. 2015). The question of whether highly educated women will have more children in the future can be rephrased as the question of whether the average highly educated woman will be able to meet her goal of having a two-child family, and will thus be able to overcome the disadvantage of starting her childbearing later in life. The issue is twofold: Will the group who started the low fertility trend continue to have fewer children in the future? How will the behaviour of the members of this group change if they become more numerous, and are thus no longer a small "elite"?

2 Education and reproductive plans

Previous studies have provided contradictory findings regarding the relationship between education and fertility intentions. Some studies have documented that highly educated women are more likely than their less educated counterparts to say they want to have or are planning to have a large family (e.g., Heiland et al. 2008; Mills et al. 2008); while other studies have found that better educated women have lower completed fertility levels than less educated women. These apparent discrepancies suggest that unplanned births or early childbearing are the reasons for the higher fertility levels among less educated women (e.g., Musick et al. 2009; Hayford 2009; Hayford and Guzzo 2016). A woman in a high-status occupation may plan from the beginning of her reproductive career to have only a small number of children (Friedman et al.1994), or she may decide later to have fewer children than she had initially planned (Iacovou and Tavares 2011). In general, better educated women are more likely than less educated women to say they want to have their first child later in life (Berrington 2004). This tendency to delay childbearing may cause a woman to end her reproductive life with fewer children than she had initially intended to have, either because of declining fecundity with age, or because of competing activities (Morgan and Rackin 2010). Recently, scholars have suggested that the relationship between education and fertility – and, presumably, fertility intentions – is positive in those countries in which institutional arrangements support the compatibility of work and family life, as well as gender equity in the family and in the labour market (Hobson and Oláh 2006; Matysiak 2011; Neyer 2013). A multi-level analysis conducted in the 28 countries of the European Union (Testa 2014) demonstrated that women of reproductive ages tend to invest more in both human capital and family size if they live in an institutional context that supports work-life balance; that is, in a country where having a career and having children are not seen as mutually exclusive choices. Interestingly, this study has suggested that both being highly educated and living in a country with a high share of college educated women are positively associated with wanting to have one or two children. A hypothesis that stems from this empirical evidence asserts that supporting the reconciliation of work and family life for highly educated women of advanced reproductive ages might have positive spill-over effects for highly educated women who have yet to complete their reproductive careers (Testa 2014).

3 Educational differences in intended and actual childbearing

When making assumptions about future trends in fertility among highly educated women, the first issue to consider is whether these women want to have more children than they currently have. In earlier research, I demonstrated that highly educated women are no less likely than their less educated counterparts to say they want to have two children (Testa 2012). The intention to have a two-child family is the predominant norm among women and men of all educational levels. One explanation for the near-universality of this normative level is that there are specific reasons for wanting to have one or two children that are shared by people of all social strata: i.e., the desire to become a parent and the desire to ensure that the first child has a companion. An alternative explanation for the prevalence of the two-child norm is that after controlling for age, highly educated women and men are more likely than their less educated counterparts to be *observed* at relatively early stages of their reproductive careers, since they tend to delay childbearing, and are thus unlikely to have started realising their fertility plans. Thus, the lifetime fertility intentions of highly educated people are artificially inflated, especially if they are being monitored at low parity levels (zero or one child). Meanwhile, less educated women at parity zero are more selected; i.e., they may be less family oriented or they may have yet to encounter the obstacles and experiences that lead many women with children to reduce their initial intentions. If this discrepancy is not merely the result of a selection bias, the relatively high fertility intentions expressed by highly educated women may be seen as a sign that their fertility levels could increase in the future. If we assume that the fertility levels of the highly educated will converge with the fertility levels of their least educated counterparts, we may expect that in the years to come, fertility levels will increase, especially in countries in which the fertility gap between educational groups is large, like the Eastern European countries (among the female cohorts born in the 1960s, the difference in the number of children born to women with high and with low levels of education is almost one child in Poland, Slovakia, Romania, and Russia); and will be lower in countries in which the differences in fertility levels by education are smaller, like the Scandinavian countries (the differences in completed fertility range from 0.04 in Finland to 0.17 in Norway). Interestingly, for the cohort born in 1972, the countries with the largest differences in completed fertility by education are those with the lowest completed fertility levels; while the countries with the smallest differences in completed fertility by education are those with the highest completed fertility levels (Sobotka et al. 2015).

4 Forces supporting a positive education-fertility link

Prior to the fertility transition, there was a clear positive relationship between social status and the number of surviving children. With the decrease in infant mortality — a trend that began in the higher social classes in almost every country — and the subsequent decline in fertility, a negative or neutral status-fertility relationship emerged (Skirbekk 2008). In recent years, there has been a negative relationship between educational attainment and first births, mainly due to the postponement of childbearing (see, among others, Brand and Davis 2011; Santarelli 2011; Martín-García and Baizán 2006; Billari and Philipov 2004; Rindfuss et al. 1996). This trend is attributable in part to the conflict between enrolment in education and childbearing (Blossfeld and Huinink 1991). Higher income couples tend to want their children to reach at least the same levels of social and economic status as they have; which may mean having fewer children, and at a later stage of life (Dalla Zuanna 2007). Another potential causal mechanism could run in the opposite direction: women who have children while still enrolled in education are less likely to achieve a high level of education (Cohen et al. 2011).

By contrast, a positive relationship between education and fertility after the transition to parenthood has been documented in several countries (Hoem and Hoem 1989; Hoem et al. 2001; Köppen 2006; Gerster et al. 2007; Kravdal and Rindfuss 2008). The sign of this association has been attributed to the effect of "uncontrolled" unobserved heterogeneity, which is interpreted as *family proneness* (Kravdal 2001; Kravdal 2007; Kreyenfeld 2002). According to this interpretation, once a woman has decided to become a mother, education has a positive effect on her propensity to have an additional child. Thus, a woman with strong family proneness may be expected to interrupt her working career to devote herself to childbearing and childrearing. Importantly, failing to account for such a self-selection mechanism in parity-specific modelling would result in biased estimates that suggest that there is a positive relationship between a woman's education and the progression to a second (or higher) birth order. Scholars have also offered substantive arguments for why a highly educated woman might have a greater propensity to have an additional child than a less educated woman. For example, a highly educated woman may have a relatively secure position in the labour market, as better educated women are especially likely to have a protective labour contract, a flexible work schedule, or a stable position in the public sector (Esping-Andersen 2013). In addition, a highly educated woman may have a relatively high family income that allows her to outsource child care (Ermish 1989). Moreover, a highly educated woman may be especially likely to appreciate the emotional returns of parenthood, given the diffusion of more child-friendly preferences among "cultural elites" (Kravdal 2001). Other scholars have argued that some highly educated women may not be as career-oriented as is commonly assumed (Sobotka and Testa 2006); and that these women are especially likely to be in a gender-equal relationship, which is known to stimulate the formation of a second birth intention (Mills et al. 2008) and the progression to higher birth orders (Brodmann, Esping-Andersen and Güell 2007; Duvander, Lappegård and Andersson 2010).

All of these arguments suggest that the increase in the number of highly educated women does not necessarily imply that a decrease in third birth order fertility is inevitable. In Italy, for example, education has been found to have a positive effect on the propensity to have an additional (a second or a third) child among women born in the northern regions of the country in the 1970s and the 1980s. This finding supports the claim that both the decline and the turnaround in fertility levels are driven by the same social group: i.e., highly educated couples (Impicciatore and Dalla Zuanna 2016). An analogous situation might be observed in other European and low-fertility settings (Esping-Andersen 2009; Esping-Andersen and Billari 2015).

5 Concluding remarks

I conclude with some reflections on the expectations for fertility among highly educated women in light of the literature, the empirical evidence, and the hypothesised mechanisms outlined above. First, a further postponement of motherhood among highly educated women may be predicted, as we can assume that highly educated women will continue to condition their start of childbearing on the achievement of other life goals, like finding stable employment or getting married. This is particularly likely to be the case in countries that have been severely affected by economic crises, and thus have high unemployment rates (Goldstein et al. 2013), increasingly precarious employment arrangements, and financial challenges (Testa and Basten 2014). Cohabitation, especially in the form of a prelude to marriage, can smooth the negative education-fertility link, even though fertility is still more likely to occur within marriage (Hiekel et al. 2014). It is difficult to make any predictions for the future use of contraception. Research conducted in the US has shown that unintended or miss-timed fertility is still more prevalent among women with low than with high levels of education (Hayford and Guzzo 2011). A similar observation has been made for Italy, where it was found that the transition to a third child is often unplanned among women with low levels of education (Castiglioni et al. 2001). Second, it may be expected that highly educated women will become more likely to have two or more children if the incomplete gender revolution – i.e., the revolutionary change in women's roles proposed by Esping-Andersen (2009) – evolves into a completely gender-equal system in which partners with similar levels of education will both pursue careers and evenly share in home production. Facilitating the reconciliation of work and family life and promoting gender equality in the family and in the labour market might help to resolve the role conflict that seems to be at the heart of the persistently low fertility levels in ageing societies. However, in predicting future fertility trends, it is important to consider the migration backgrounds of highly educated women. Having a high educational level increases an individual's ability to meet settled fertility targets, but having certain capacities and the skills necessary to master one's life in a given geographical context does not necessarily translate into having these skills in other socioeconomic, cultural, and geographical contexts (Wingens et al. 2011).

References

Berrington, A. 2004. Perpetual postponers? Women's, men's and couple's fertility intentions and subsequent fertility behaviour. *Population Trends* 10: 9–19.

Billari, F. C. and D. Philipov 2004. Education and transition to motherhood: a comparative analysis of Western Europe. *European Demographic Research Papers*, No. 3. Vienna Institute of Demography/Austrian Academy of Science.

Blossfeld, H.-P. and J. Huinink 1991. Human capital investments or norms of role transition? How women's schooling and career affect the process of family formation. *American Journal of Sociology* 97: 143–168.

Brand, J. and Davis, D. 2011. The impact of college education on fertility: Evidence for heterogeneous effects. *Demography* 48(3): 863–887.

Brodmann, S., G. Esping-Andersen, and M. Güell 2007. When fertility is bargained: second births in Denmark and Spain. *European Sociological Review* 23(5): 599–613.

Castiglioni, M., Dalla Zuanna, G. and M. Loghi 2001. Planned and unplanned births and conceptions in Italy, 1970–1995. *European Journal of Population* 17(3): 207–233.

Cohen, J. E., Ø. Kravdal, and N. Keilman 2011. Childbearing impeded education more than education impeded childbearing among Norwegian women. *Proceedings of the National Academy of the United States of America* 108(29): 11830–11835.

Dalla Zuanna, G. 2007. Social mobility and fertility. *Demographic Research* 17(15): 441–464.

Duvander, A. Z., T. Lappegård and G. Andersson 2010. Family policy and fertility: fathers' and mothers' use of parental leave and continued childbearing in Norway and Sweden. *Journal of European Social Policy* 20(1): 45–57.

Esping-Andersen, G. 2009. *The incomplete revolution. Adapting to women's new roles*. Cambridge: Polity Press.

Esping-Andersen, G. (ed.) 2013. *The fertility gap in Europe: singularities of the Spanish case*. Welfare projects. "La Caixa" Foundation, Social Studies Collection No. 36.

Esping-Andersen, G. and F. C. Billari 2015. Re-theorizing family demographics. *Population and Development Review* 41(1): 1–31.

Friedman, D., M. Hechter, S. Kanazawa 1994. A theory of the value of children. *Demography* 31(3): 375/401.

Gerster, M., N. Keiding, L. B. Knudsen, and K. Strandberg-Larsen 2007. Education and second birth rates in Denmark 1981–1994. *Demographic Research* 17(8): 181–210.

Giddens, A. 1984. *The constitution of society. Outline of the theory of structuration*. Berkeley, CA: University of California Press.

Goldstein, J., M. Kreyenfeld, A. Jasilioniene, K. Örsal, D. Dilan 2013. Fertility reactions to the "Great Recession" in Europe: Recent evidence from order-specific data. *Demographic Research* 29: 86–104.

Goode, W. J. 1993. *World changes in divorce pattern*. New Haven, CT: Yale University Press.

Hayford, S. R. 2009. The evolution of fertility expectations over the life course. *Demography* 46(4): 765–783.

Hayford, S. R. and K. B. Guzzo 2016. Fifty years of unintended births: education gradients in unintended fertility in the US 1960–2013. *Population and Development Review* 42(2): 313–341.

Heiland, F., Prskawetz, A., and Sanderson, W. C. 2008. Are individuals' desired family sizes stable? Evidence from West German panel data. *European Journal of Population* 24(2): 129–156.

Hiekel, N. and T. Castro-Martín 2014. Grasping the diversity of cohabitation: fertility intentions among cohabiters across Europe. *Journal of Marriage and Family* 76(3): 489–505.

Hobson, B. and L. Oláh 2006. Birthstrikes? Agency and capabilities in the reconciliation of employment and family. *Marriage and Family Review* 39(3–4): 197–227.

Hoem, B. and Hoem, J. M. 1989. The impact of women's employment on second and third births in modern Sweden. *Population Studies* 43: 47–67.

Hoem, J. M., Prskawetz, A. and Neyer, G. 2001. Autonomy or conservative adjustment? The effect of public policies and educational attainment on third births in Austria 1975–96. *Population Studies* 55: 249–261.

Iacovou, M. and L. P. Tavares 2011. Yearning, learning, and conceding: (some of) the reasons people change their childbearing intentions. *Population and Development Review* 37(1): 89–123.

Impicciatore, R. and G. Dalla Zuanna 2016. The impact of education on fertility. Changes across cohorts and south-north differences. *Quality and Quantity* 51(5): 2293–2317.

Köppen, K. 2006. Second births in western Germany and France. *Demographic Research* 14(14): 295–330.

Kravdal, Ø. 2001. The high fertility of college educated women in Norway: an artifact of the separate modelling. *Demographic Research* 5(6): 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: 211–246.

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: 854–873.

Kreyenfeld, M. 2002. Time-squeeze, partner effect or selfselection?: an investigation into the positive effect of women's education on second birth risks in West Germany. *Demographic Research* 7: 15–48.

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): 259–275.

Matysiak, A. 2011. *On the interdependencies between fertility and women's labour supply.* European Studies of Population. Springer.

Mills, M., Mencarini, L., Tanturri, M. L., and Begall, K. 2008. Gender equity and fertility intentions in Italy and the Netherlands. *Demographic Research* 18(1): 1–26.

Morgan S. P. and H. Rackin. 2010. The correspondence between fertility intentions and behaviour in the United States. *Population and Development Review* 36(1): 91–118.

Musick, K., England, P., Edgington, S., and Kangas, N. 2009. Education differences in intended and unintended fertility. *Social Forces* 88(2): 543–572.

Nazio, T. 2008. *Cohabitation, family and society*. New York: Routledge.

Neyer, G. 2013. Welfare states, family policies, and fertility in Europe. In *The demography of Europe*, 29–53. Springer Netherlands.

Rindfuss, R. R., S. P. Morgan, and K. Outt 1996. Education and the changing pattern of American fertility: 1963–1989. *Demography* 33(3): 277–290.

Skirbekk, V. 2008. Fertility trends by social status. *Demographic Research* 18(5): 145–180.

Sobotka, T. 2009. Sub-replacement fertility intentions in Austria. *European Journal of Population* 25(4): 387–412.

Sobotka, T. and M. R. Testa 2006. Attitudes and Childlessness in Europe. In *People, population change and policies: Lessons from the Population policy acceptance study*, eds C. Höhn, D. Avramov and I. Kotowska. Springer Netherlands.

Sobotka, T., K. Zeman, M. Potančoková, J. Eder, Z. Brzozowska, E. Beaujouan, A. Matysiak 2015. *European fertility datasheet 2015*. Vienna Institute of Demography/Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/ÖAW, WU).

Testa, M. R. 2012. Family sizes in Europe: evidence from the 2011 Eurobarometer survey. *European Demographic Research Paper*, No. 2. Vienna Institute of Demography, Austrian Academy of Science.

Testa, M. R. 2014. On the positive correlation between education and fertility intentions in Europe: individual- and country-level evidence. *Advances in Life Course Research* 21: 28–42. Open access.

Testa, M. R. and S. Basten 2014. Certainty of meeting fertility intentions declines in Europe during the 'Great Recession'. *Demographic Research* 31(23): 687–734.

Van Bavel, J. 2012. The reversal of gender equality in education, union formation and fertility in Europe. *Vienna Yearbook of Population Research* 10: 127–154.

Van Bavel, J. and J. Różańska-Putek 2010. Second birth rates across Europe: interactions between women's level of education and child care enrolment. *Vienna Yearbook of Population Research* 8: 107–138.

Wingens, M., H. deValk, M. Windzio, and C. Aybek 2011. The sociological life course approach and research on migration and integration. In *A life course perspective on migration and integration*, eds Wingens, M., M. Windzio, H. de Valk and C. Aybek, 1–27. Springer.

What do men want? The growing importance of men's characteristics for fertility

Jan Van Bavel*

In the generations who came of age in Europe around the turn of the 20th to the 21st century, women were, for the first time in history, more educated than men. According to UNESCO statistics, until the 1970s, women made up less than 50% of all students enrolled in university-level education in virtually all European countries. But by 2000, the only European country where women were still a minority in tertiary education was Switzerland.[1]

Based on the extrapolation of the associations between women's educational attainment and fertility observed in the past, we might expect to see further declines in fertility in the future. But as I have argued previously, the implications of the reversal of the gender gap in education for family life cannot be grasped by extrapolating what we know from the vast literature on women's education and fertility (Van Bavel 2012). The further expansion of advanced education among women does not necessarily mean that we get "more of the same": e.g., more postponement and more childlessness.

Rather, I suspect that this reversal implies that we have crossed a tipping point with non-linear implications, and that a new demographic landscape is opening up. To make sense of this new landscape, we need to incorporate insights about processes of union formation and assortative mating into our fertility theories. This also means that the next generation of fertility research needs to pay more attention to male characteristics.

In this contribution to the debate, I argue that the fertility of the coming generations of highly educated women will depend to a large extent on the characteristics of the men with whom these women form (or fail to form) partnerships. In this argument, which focuses on heterosexual couples, I will use some initial results from my own ERC-sponsored GENDERBALL research project, which set out to investigate these issues (see http://genderball.wordpress.com/).

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[1] http://www.uis.unesco.org/Education/

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Over the last three decades, two theoretical frameworks have dominated research on fertility: Beckerian new home economics and the second demographic transition. Both frameworks need major revisions if they are to be useful for making sense of the new demographic landscape.

1 From specialisation to pooling, combining, and bargaining

The Beckerian framework has been used in many studies to interpret how economic mechanisms affect fertility through income and price effects (Becker 1991). From earlier sociological models of the modern family (propagated by scholars like Talcott Parsons), Gary Becker copied a view of strongly specialised gender roles, with men specialising in gainful employment and women focusing on household chores and child care. For union formation, this view implies that a man's earning potential is an important factor in a woman's mate selection process, while a woman's earning potential is not as important to a man. In other words, it is assumed that women are looking for steady breadwinners, while men are looking for good homemakers.

This female homemaker-male breadwinner family model is clearly outdated. Even in its mid-20th-century heyday in Western Europe and North America, this model was mainly an ideal for the middle classes, but it was hardly universally realised, especially in the working classes. After reaching historically low levels in the 1950s and the early 1960s, the labour force participation of married women and mothers started to rise again (Pott-Buter 1993). In communist Eastern Europe, the male breadwinner family was neither a norm (quite the opposite) nor a reality, and female labour force participation levels were high. In these countries, women entered the labour market not just for ideological reasons, but also out of economic necessity (Brzozowska 2015). Currently, dual earner families are the norm across Europe and North America. In addition, men in these countries now do much larger shares of the household work than men of earlier generations (Goldscheider, Bernhardt and Lappegård 2015; Altintas and Sullivan 2016); even though, in general, women still take care of most of the work at home and men still earn most of the family income (Klesment and Van Bavel 2017).

While the shift in gender roles is thus "uneven" (England 2010) or "incomplete" (Esping-Andersen 2009), couples have effectively moved a long way in the direction of achieving a family model that involves pooling, bargaining, and combining, rather than strict specialisation along gender lines. In the new family model, the incomes of both partners are important for securing a respectable, middle-class standard of living. As a result, the woman's as well as the man's earning potential has become an important factor in mate selection. Today, women pursue higher education not just to improve their chances of meeting a well-educated partner, but to earn a degree that will pay off in the labour market. The returns to education have thus increased much more for women than for men, which may explain why college enrolment rates for women now surpass those of men (Goldin 2006; DiPrete and Buchmann 2006).

As having a high earning potential has become an attractive feature on the mating market for women as well as for men, unexpected demographic changes are being observed. Before the start of the GENDERBALL research project, I formulated hypotheses about the implications of the reversal of the gender gap in education for patterns of union formation (Van Bavel 2012). The hypotheses were based on conventional family demographic thinking, and were still heavily coloured by the Beckerian family model; i.e., they were based on the assumption that the typical woman, but not the typical man, was looking for a partner with a high earning potential; whereas a typical man was looking for a good homemaker. This assumption implies that there is a persistent tendency among men and women towards female hypergamy; i.e., a man is likely to select a female partner who is at most as highly educated as he is, and a woman is likely to select a male partner who is at least as highly educated as she is. The observation that more women than men have advanced education inspired the prediction that highly educated women would be more likely to remain single (as there are "too many" of them), and that highly educated men would be less likely to remain single (as they are in high demand).

The initial results of our project show that these predictions are wrong: rather than being more likely to remain single, women with a tertiary level degree are often partnered with a man who has a lower level degree (Grow and Van Bavel 2015; De Hauw, Grow and Van Bavel 2017). Assortative mating among highly educated people remains very strong, but the tendency of highly educated men to choose a partner of a similar attainment level has not increased with the gender gap reversal. If anything, it is the highly educated men rather than their highly educated female peers who have become more likely to remain single. At the lower end of the educational spectrum, the risk of remaining single has increased among women with low levels of education. Currently, less educated women are almost as likely to remain single as less educated men, who have very high rates of singlehood.

As a result of these developments, women are more likely than in the past to be the main breadwinner in the family. Women's relative contributions to the household budget are clearly associated with educational assortative mating: a woman who has more education than her husband is more likely to be the main earner in the family (Klesment and Van Bavel 2017). From a Beckerian perspective, this would imply that the opportunity costs of childbearing would be even greater for such a woman.

The Beckerian approach indeed implies that traditional hypergamic couples (in which the husband has more education than the wife) should have the highest fertility levels, while highly educated homogamous couples and hypogamic couples (in which the wife has more education than the husband) should have lower fertility levels. This turns out not to be the case. While highly educated homogamic couples have their first child at the most advanced ages, they eventually catch up to their peers, and have higher parity progression rates than hypergamic couples. The differences between hypogamic and hypergamic couples depend to a considerable degree on the context (Nitsche et al. 2018).

Whether women with a high income or a high income potential have lower or higher fertility depends to a large extent on the elasticity of gender roles with respect to the shifted gender balance in education and in the labour market. If a woman meets a partner who is willing to help with the child care and the housework, or is willing to invest in the outsourcing of these jobs, her opportunity costs of childbearing will be relatively limited. But if a college-educated woman does not meet a man who is ready, willing, and able to take on these responsibilities, she will be less inclined to have children.

In sum, the results of these studies have two main implications. First, highly educated women are now partnering with a broader educational spectrum of men, including men who have less education and earn less than they do. Second, the characteristics of the male partner matter for the association between female education and fertility. Taken together, these findings imply that when studying the relationship between education and fertility, we should take into account men's as well as women's characteristics.

2 Higher education, family formation, and union dissolution

A second theoretical framework that has dominated fertility studies in recent decades is that of the second demographic transition (Lesthaeghe 1995; Van de Kaa 2003). In this framework, it is assumed that advanced education among women is associated with a number of lifestyle choices that result in lower fertility, and that these choices are motivated by individualised, post-materialist needs for self-development. For a woman, this means that she is no longer focused solely on her roles as wife and mother. Thus, it is anticipated that higher levels of education will be associated with lower marriage rates and higher divorce rates (as educated women are ready, willing, and able to leave unhappy marriages), and with higher rates of childlessness. On the other hand, given that educated women no longer feel the need to follow the life trajectories traditionally prescribed by their church or their parents, they may come to see unmarried cohabitation and childbearing outside of marriage as viable options.

These assumptions were perhaps applicable to the generations who came of age around the period when the theory was formulated, and in the geographic region where the authors of the theory were living and working at that time; i.e., in Western Europe. But this framework does not yield accurate predictions for the trends that are currently being observed across Europe. While highly educated women tend to marry at later ages than women with less education, they are not less likely to marry in general. The educational gradient in marriage depends on the country context: in countries with more traditional, specialised gender roles, better educated women are less likely to be married than less educated women; whereas in more gender egalitarian countries, better educated women are more rather than less likely to be married (Kalmijn 2013). Moreover, there is, in general, no positive educational gradient in divorce. Having a higher education has been found to be positively correlated with an elevated divorce risk in a limited number of countries only; i.e., in countries that are in the early stages of the spread of divorce, when the social and economic costs of divorce are particularly high. Over time, the educational gradient in divorce has become increasingly negative (Härkönen and Dronkers 2006). Finally, although there is evidence that in some countries the spread of extramarital childbearing may be driven by women's increased education (Vitali, Aassve and Lappegård 2015), having children outside of marriage is generally associated with low rather than high levels of education. In most of Europe, the least educated have higher first birth rates within cohabitation, and the most educated have higher first birth rates within marriage (Perelli-Harris et al. 2010).

Apart from their personal attitudes and circumstances, the crucial factor that determines the fertility of highly educated women is their partnering behaviour: i.e., whether a woman meets a steady partner who is fit to help her raise children. I therefore argue that when analysing fertility, it is crucial to look at the characteristics of the male partner. Regardless of whether they have more or less education, most women want to start a family. But we can assume that highly educated women do not just want to give birth; rather, they hope to raise "high quality" children. In other words, highly educated mothers want their children not just to survive, but to be well-nourished and well-educated, and to achieve a good standard of living and reasonably high levels of social status in their adult lives. To reach these goals, it is helpful to have a good partner. In the male breadwinner model, a woman might define a good partner as a man who earns a sufficiently large and steady income. In the new model, this criterion may still be important (perhaps more or less so depending on how much the woman earns herself), but the male partner will also be expected to perform household chores and provide child care. As I noted above, this willingness to help with childrearing tends to become even more important as a woman's contribution to the household income goes up (because the opportunity costs of having to do all the child care and housework by herself are higher). The greater the woman's contribution to the family budget, the more likely it is that a potential male partner's attitudes regarding family and childrearing responsibilities will among her main selection criteria.

Men's attitudes and skills with respect to family responsibilities are correlated with education, as education has cultural as well as economic dimensions. Thus, men's education may be expected to be a predictor of fertility. While earlier studies failed to find a consistent effect of men's education on fertility, Trimarchi and Van Bavel (2017) showed that this is because male education affects fertility primarily through the selection of men into certain unions. This is another reason why union formation and assortative mating should be integrated into fertility studies more than they have been in the past.

3 Conclusion

In sum, the reversal of the gender gap in education may imply that male characteristics are becoming more important for childbearing decisions. Unlike in the past, when men and women occupied separate spheres, with the husband being responsible for earning the family income and the wife being responsible for childrearing, women now want their male partners to have characteristics that may give men more leverage in decisions regarding fertility and childrearing. Hence, to find out where fertility is going, it may become more important to find out what men want. It is clear that highly educated women typically want male partners who do their share of the work in the family. But what do men want?

References

Altintas, E., and Sullivan, O. 2016. Fifty years of change updated: Cross-national gender convergence in housework. *Demographic Research* 35(August): 455–470.

Becker, G. S. 1991. *A treatise on the family. Enlarged Edition*. Cambridge, MA: Harvard University Press.

Brzozowska, Z. 2015. Female education and fertility under state socialism in central and eastern Europe. *Population-E* 70(4): 689–725.

De Hauw, Y., A. Grow, and J. Van Bavel 2017. The reversed gender gap in education and assortative mating in Europe. *European Journal of Population* 33(4): 445–474, DOI: 10.1007/s10680-016-9407-z.

DiPrete, T. A., and Buchmann, C. 2006. Gender-specific trends in the value of education and the emerging gender gap in college completion. *Demography* 43(1): 1–24.

England, P. 2010. The gender revolution: Uneven and stalled. *Gender & Society* 24(2): 149–166.

Esping-Andersen, G. 2009. *The incomplete revolution. Adapting to women's new roles*. Cambridge, UK: Polity Press.

Goldin, C. 2006. The quiet revolution that transformed women's employment, education, and family. *American Economic Review* 96(2): 1–21.

Goldscheider, F., Bernhardt, E., and Lappegård, T. 2015. The gender revolution? A framework for understanding changing family and demographic behavior. *Population and Development Review* 41(2): 207–239.

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): 1–24.

Härkönen, J. and Dronkers, J. 2006. Stability and change in the educational gradient of divorce. A comparison of seventeen countries. *European Sociological Review* 22(5): 501–517.

Kalmijn, M. 2013. The educational gradient in marriage: A comparison of 25 European countries. *Demography* 50(4): 1499–520.

Klesment, M. and J. Van Bavel 2017. The reversal of the gender gap in education, motherhood, and women as main earners in Europe. *European Sociological Review* 33(3): 465–481, DOI: 10.1093/esr/jcw063.

Lesthaeghe, Ron. 1995. The second demographic transition in Western countries: an interpretation. In *Gender and family change in industrialized countries*, eds K. O. Mason and A.-M. Jensen, 17–62. Oxford: Clarendon Press.

Nitsche, Natalie, Anna Matysiak, Jan Van Bavel, and Daniele Vignoli 2018. Partners' educational pairings and fertility across Europe. *Demography* (forthcoming).

Perelli-Harris, B., Sigle-Rushton, W., Kreyenfeld, M., Lappegård, T., Keizer, R., and Berghammer, C. 2010. The educational gradient of childbearing within cohabitation in Europe. *Population and Development Review* 36(4): 775–801.

Pott-Buter, H. A. 1993. *Facts and fairy tales about female labor, family and fertility: A seven country comparison, 1850–1990*. Amsterdam: Amsterdam University Press.

Trimarchi, Alessandra and Jan Van Bavel. 2017. Education and the transition to fatherhood: the role of selection into union. *Demography* 54(1): 119–144, DOI: 10.1007/s13524-016-0533-3.

Van Bavel, Jan 2012. The reversal of gender inequality in education, union formation, and fertility in Europe. *Vienna Yearbook of Population Research* 10: 127–154.

Van de Kaa, Dirk J. 2003. Second demographic transition. In *Encyclopedia of population*, eds Paul Demeny and Geoffrey McNicoll, 872–875. New York: Macmillan.

Vitali, A., Aassve, A., and Lappegård, T. 2015. Diffusion of childbearing within cohabitation. *Demography* 52(2): 355–377.

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Will highly educated women have more children in the future? In Southern Europe, it will largely depend on labour market conditions

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The relationship between educational attainment and fertility dynamics has long been at the core of demographic and sociological studies, especially since the late 20th century, when the share of women with tertiary education expanded rapidly in advanced societies (Andersson et al. 2009). University educated women were forerunners in childbearing patterns that are commonplace today: the postponement of motherhood, childlessness, lowest-low fertility, and new partnership forms (Mills et al. 2011). However, recent studies have suggested that the negative educational gradient of fertility may be weakening or even disappearing, particularly in societies committed to reducing social and gender inequalities and supporting maternal employment and early childcare (Kravdal and Rindfuss 2008; Solera and Bettio 2013). The rapid spread of tertiary education among women has also altered traditional patterns of assortative mating (Esteve et al. 2012), and the reversal of the gender imbalance in education is affecting partnership and childbearing dynamics (van Bavel 2012). Furthermore, in most European countries, the effects of the recent economic crisis on the childbearing behaviour of women has varied across educational strata (Sobotka et al. 2011).

Spain is an interesting case study for examining the links between female education and fertility, because while Spain lagged behind the rest of Europe in

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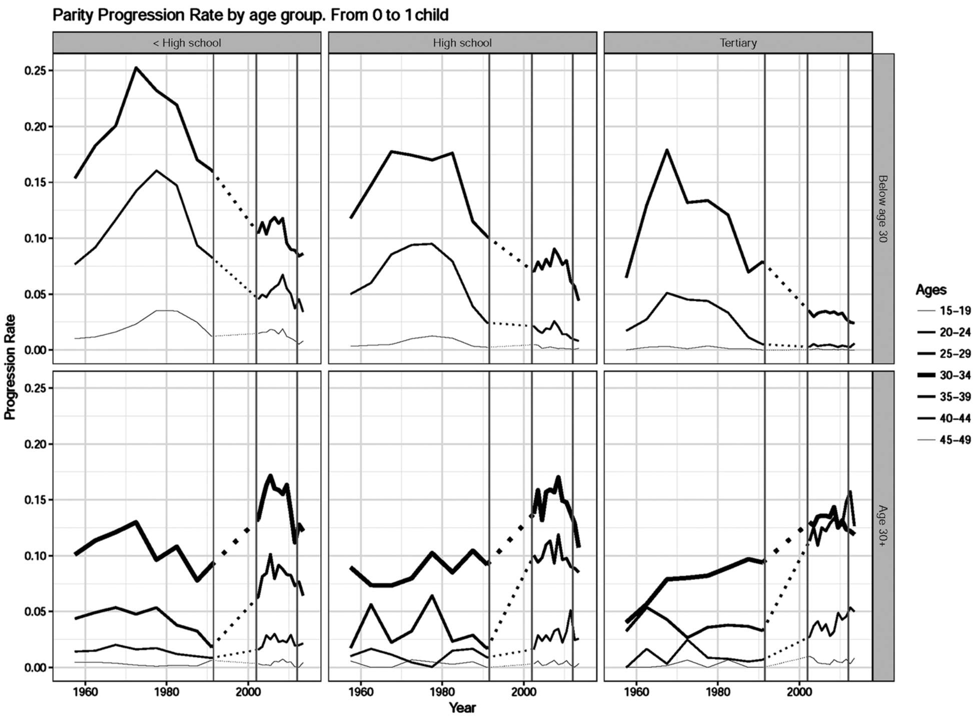
terms of both the expansion of tertiary education and the timing of the first and second demographic transitions (Lesthaeghe 2014), these processes occurred at faster rates in Spain than they did in other countries once they had been set in motion. Looking at trends in female education, we observe that although less than 5% of Spanish women born in the 1930s had access to university education; by 2011, the proportion of Spanish women aged 25–34 with a university degree (44%) exceeded that of their male counterparts (34%). Indeed, women's educational advancement is one of the most striking social changes that have taken place in Spain in the last few decades. Similarly, when we look at trends in fertility, we find that Spain went from having the highest levels of fertility in Europe for much of the 20th century to being a forerunner in lowest-low and latest-late fertility by the end of that century. After reaching a historic low of 1.15 in 1998, the total fertility rate underwent a moderate recovery in the years that followed – which was then halted by the economic crisis. Although highly educated women were pioneers of late motherhood, fertility postponement is now a widespread pattern across all educational groups. The educational gradient of completed fertility has weakened, but remains negative (Castro-Martín and Martín-García 2013).

In order to examine in more detail how the educational gradient of fertility has changed over time, and particularly during the recent economic crisis, we analyse parity-specific fertility trends in a southern region of Spain, Andalusia. This region is the only one in Spain that has a longitudinal population database. With a population of about eight million (comprising 18 per cent of the total population of Spain), Andalusia is less developed than other regions in Spain, and has persistently high unemployment rates. Nevertheless, in recent decades the region has undergone a series of rapid economic, educational, and family-related changes. More than one-third of Spanish women born before 1935 were illiterate or had no formal education (Pérez Díaz 2007). But by 2011, more than 40 per cent of Spanish women aged 25–40 had a university degree. Historically, the period total fertility rate was higher in Andalusia than in the rest of Spain (by about 0.5 children per woman on average). However, the period TFR in the region has recently followed a path of decline similar to the decreasing trend in the rest of Spain, and has even converged to the national level, dropping from 3.1 in 1975 to 1.4 in 2014.

We first present an overview of the changing patterns of fertility by age and educational attainment based on an analysis of the Longitudinal Population Database of Andalusia 1998–2016 and the Sociodemographic Survey 1991, which provides a wealth of retrospective information that allow for the reconstruction of fertility by age, parity, and educational attainment from 1950 to 1991. Drawing upon these two sources, we are able to reconstruct parity progression ratios among women with different socioeconomic characteristics for a relatively long period of time. Using this approach, we can provide insights into the socio-demographic transformations that have taken place in an area of Europe not yet studied at this level of detail.

Figure 1 presents the parity progression rate to the first child by age and educational attainment in Andalusia from 1955 to 2011. We categorised educational

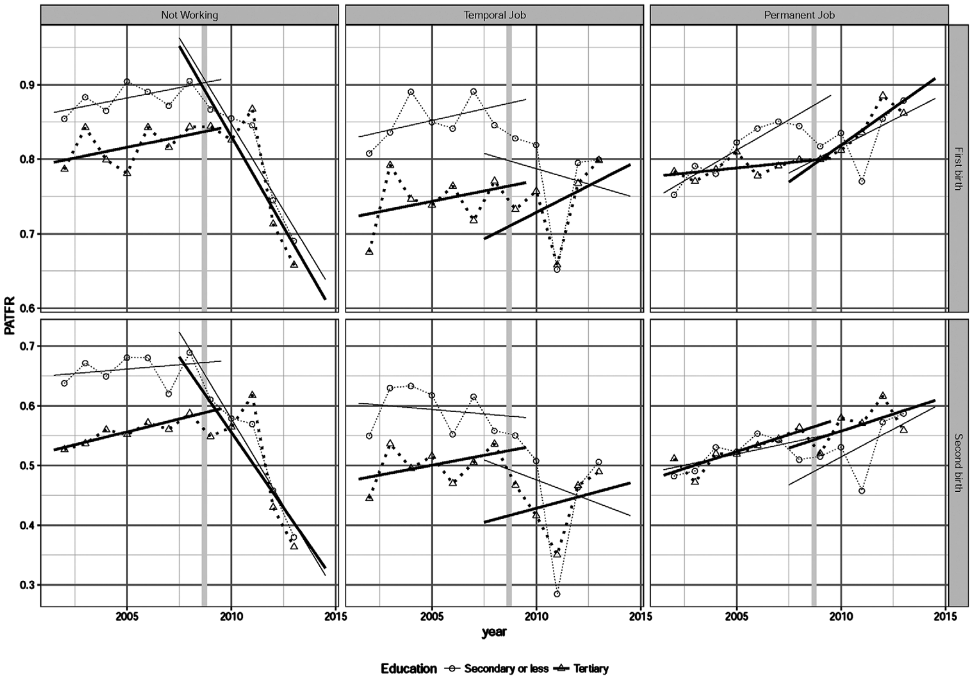
Figure 1:
Parity progression rate: from childless to first child by age and educational attainment. Andalusia 1955–2011



Source: Own elaboration from the 1991 Sociodemographic Survey of Spain and the Longitudinal Population Database of Andalusia.

attainment into three groups: lower than secondary, secondary, and tertiary education. The rate of transition to the first child declined sharply among university educated women in the younger age groups starting in 1970; whereas among the other educational groups, this decline occurred a decade later. Nevertheless, among women of all educational levels, the rate of progression to the first child increased in the older age groups, particularly starting in the late 1990s. These findings suggest that the postponement of motherhood has gradually become the norm across all social strata. Women with less than secondary schooling – an increasingly marginal group, since secondary education is compulsory and is fully subsidised in public schools – continue to be more likely than women with higher levels of education to have their first child at a relatively young age. For the large majority of better educated women, the transition to the first birth has increasingly shifted beyond age 30. These results suggest that the sizeable differences in fertility timing between educational groups that prevailed in the past have become smaller over the last

Figure 2:
Parity- and age-adjusted total fertility rate (PATFR) by birth order (first and second births), education and employment. Andalusia 2002–2013



Source: Own elaboration from the Longitudinal Population Database of Andalusia.

two decades. During the recent economic crisis, the fertility patterns of highly educated women were the least affected; i.e. whereas among women with secondary education, the rate of transition to the first birth declined in all age groups; among women with tertiary education, the rate of transition to the first birth remained relatively stable.

In order to examine in more detail fertility patterns across educational groups in the most recent period and the intervening role of employment status, we use data from the Longitudinal Population Database of Andalusia. For the educational groups, we calculate parity- and age-adjusted fertility rates, as well as employment status at the time of the 2001 census. We distinguish between women who were not working, were in a temporary job, or were in a permanent job. The results are presented in Figure 2. After employment status is taken into account, the educational gradient for both first birth and second birth rates virtually disappears among women with a permanent job. During the economic crisis, fertility differentials by education narrowed among women who were not working or had a temporary work contract. Moreover, women who were not employed were the most affected by the economic crisis, as their fertility rates dropped considerably after 2008, regardless of their educational attainment. By contrast, women with a permanent job experienced a slight increase in fertility, again regardless of their educational attainment. Fertility differentials by education are found only among women with a temporary job, with less educated women experiencing a larger drop in fertility than their better educated counterparts. However, women in both educational groups who had a temporary job experienced a fertility recovery in the most recent years.

In sum, although the negative educational gradient of fertility persists in Spain, it has weakened considerably in recent decades. Moreover, the differential impact of the economic crisis on the fertility behaviour of various educational groups has not only further weakened the traditional educational gradient; it has shown that the impact of employment on fertility is much stronger than that of educational attainment. During the decade-long economic crisis, unemployed women, regardless of their educational attainment, have reduced their fertility. By contrast, during the same period, both less educated and more educated women with a permanent job have slightly increased their fertility. Our observation that employment status influences reproductive decision-making more than educational attainment is consistent with the findings of other studies (Adsera 2011; Esping-Andersen 2007; Esping-Andersen et al. 2002).

In the near future, if there is a positive shift in the economy and a considerable reduction in unemployment and temporary employment, women with secondary education or less could experience a recuperation of the fertility postponed during the economic crisis. However, this is not the most likely scenario in the short term, especially considering that in Spain, large shares of the population are neither in employment nor in education or training (NEET); of young adults aged 20–24, 30 per cent are in the NEET category (OECD 2015). Among Andalusian women aged 25–44, the unemployment rate is 45 per cent for those with secondary education or less, and is 25 per cent for those with tertiary education. Furthermore, the share of workers with a permanent job has been rapidly declining, especially among the lower educated population. In light of these trends, the potential for an increase in fertility is low for all educational groups.

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References

Adsera, A. 2011. Where are the babies? Labor market conditions and fertility in Europe. *European Journal of Population* 27(1): 1–32.

Andersson, G., L. B. Knudsen, G. Neyer, K. Teschner, M. Rønsen, T. Lappegård, K. Skrede and A. Vikat 2009. Cohort fertility patterns in the Nordic countries. *Demographic Research* 20(14): 313–352. DOI: 10.4054/DemRes.2009.20.14.

Castro-Martín, Teresa and Teresa Martín-García 2013. The fertility gap in Spain: Late parenthood, few children and unfulfilled reproductive desires. In *The fertility gap in Europe: Singularities of the Spanish case*, ed. Gøsta Esping-Andersen, 45–81. Social Studies Collection, 36. Barcelona: Fundación La Caixa.

Esping-Andersen, G. 2007. *Family formation and family dilemmas in contemporary Europe*. Bilbao Spain: Fundación BBVA. ISBN 9788496515352.

Esping-Andersen, G., D. Gallie, A. Hemerijck and J. Myles 2002. *Why we need a new welfare state*. Oxford: Oxford University Press.

Esteve, A., R. Lesthaeghe and A. López-Gay 2012. The Latin American cohabitation boom, 1970-2007. *Population and Development Review* 38(1): 55–82. DOI: 10.1111/j.1728-4457.2012.00472.x.

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): 854–873. Stable URL: http://www.jstor.org/stable/25472561.

Lesthaeghe, Ron 2014. The second demographic transition: A concise overview of its development. *PNAS* 111(51): 18112–18115. DOI: 10.1073/pnas.1420441111.

Mills, M., R. R. Rindfuss, P. McDonald and E. Velde 2011. Why do people postpone parenthood? Reasons and social policy incentives. *Human Reproduction Update* 17(6): 848–860. DOI: 10.1093/humupd/dmr026.

OECD 2015. *Education at a Glance 2015*. OECD Indicators. OECD Publishing. DOI: 10.1787/eag-2015-en.

Pérez Díaz, J. 2007. La revolución educativa en las generaciones españolas. *Revista de Demografía Histórica* XXV(I): 137–163.

Sobotka, T. 2004. Is lowest-low fertility in Europe explained by the postponement of childbearing? *Population and Development Review* 30(2): 195–220. DOI: 10.1111/j.1728-4457.2004.010_1.x.

Sobotka, T., V. Skirbekk and D. Philipov 2011. Economic recession and fertility in the developed world. *Population and Development Review* 37(2): 267–306. DOI: 10.1111/j.1728-4457.2011.00411.x.

Solera, C. and F. Bettio 2013. Women's continuous careers in Italy: The education and public sector divide. *Population Review* 52(1): 129–148.

Van Bavel, J. 2010. Choice of study discipline and the postponement of motherhood in Europe: The impact of expected earnings, gender composition and family attitudes. *Demography* 47(2): 439–458.

Van Bavel, J. 2012. The reversal of gender inequality in education, union formation, and fertility in Europe. *Vienna Yearbook of Population Research* 10: 127–154.

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Education, gender revolution, and fertility recovery

Gøsta Esping-Andersen*

In the contributions in this volume, varying explanations are given for why increasing levels of education among women are paving the way for higher birth rates. While this debate will no doubt continue, I think we can all agree that each and every one of the arguments made here is valid.

Diego Ramiro-Fariñas and colleagues focus on labor market conditions. Very much echoing the current Spanish situation, they argue that unemployment and job mismatches tend to depress fertility, even though unemployment (but not the mismatch problem) is less likely to affect the highly educated than the less educated.

Wolfgang Lutz hones in on the opportunity costs associated with satisfying fertility targets by observing that multiple births among the highly educated means foregoing quite a lot of income and career mobility. These cost-benefit considerations will, however, vary, as they depend on individual values and preferences. As I will discuss below, I, too, am convinced that values may over-determine how individuals conduct their cost-benefit calculus.

Maria Rita Testa, in contrast, argues that higher education enhances individuals' ability to meet settled fertility targets, which are centered around a preference for having two (or more) children across all social strata.

Meanwhile, Jan Van Bavel contends that in the coming cohorts of highly educated women, fertility will depend to a large extent on the characteristics of the men with whom these women choose to partner. He also notes that current trends suggest that highly educated women are more likely than less educated women to marry, which is in turn associated with higher fertility; and that a high family income potential is positively associated with fertility. Specifically, he argues that as women are expected to make increasingly large contributions to the family income, the childrearing skills and the attitudes toward family roles of potential male partners may become increasingly important mate selection criteria for women.

The overall aim is, of course, not to maximize fertility *per se*. I think that all of the contributors would agree with the notion that fertility is a welfare issue. This implies

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that the core challenge is to enable people to have the number of children they want to have. Taken together, the arguments represented at the roundtable add up to a comprehensive explanatory catalog for why contemporary birth rates fall short of people's stated preferences.

My modest contribution is to take one step backward in an effort to create a theoretical framework that can simultaneously embrace and unify all of these valid explanations. My point of departure is equilibrium theory.

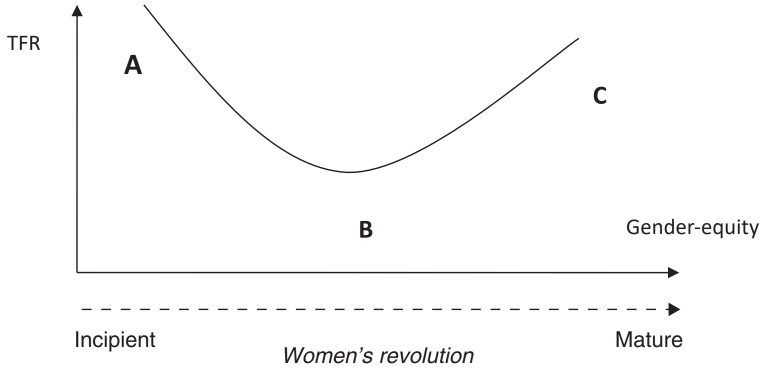
Equilibria are premised on normative expectations. They are endogenously self-reproducing across time as long as they are not disrupted by some (major) exogenous shock that fundamentally alters their core *modus operandum* (Durlauf 2001). Within a stable equilibrium, any given individual will know what to expect, and what is expected of him or her. A person's expectations may be modest or extravagant, but the life course scenario is quite predictable. However, under conditions of equilibrium rupture, stability and predictability give way to uncertainty; and, possibly, to heightened anxiety about what the future has in store.

A stable family equilibrium could be observed in the postwar era. A woman's place was in the home, and girls were raised to become homemakers. As Goldin (2006) has argued, this model was disrupted by a number of exogenous shocks, including birth control, new time-saving household technologies, and the surge in women's educational attainment. These developments spurred women to invest in labor market skills, and to take up employment. In other words, the changes in women's roles helped to erode the traditional family equilibrium, and these trends in turn altered people's expectations, and fueled uncertainty about gender roles.

My core thesis is that a return to fertility levels that are more aligned with people's preferences will require the consolidation of a new, "gender egalitarian" family equilibrium. As McDonald (2000; 2002) has argued, institutional adaptation in the form of reconciliation policies is needed to achieve such an equilibrium. But adaptation at the micro level of the partnership and day-to-day family life are also needed (Esping-Andersen and Billari 2015). In a gender egalitarian equilibrium, any given woman can expect that any given man will behave in a gender symmetric fashion. When this is the case, a woman can be far more confident that her career and her childbearing goals can be realized in tandem.

Using the example of fertility, these dynamics are depicted in Figure 1. At stage A, the dominant norm of family life remains very much the traditional housewife-cum-male breadwinner arrangement (which, as long as it remains broadly accepted, will produce high fertility rates – and also more marriages and fewer divorces). Theoretically speaking, under such conditions, changes occur only if a society experiences *exogenous* shocks. As women's roles evolve, but partnerships and societal institutions fail to adequately adapt to these changes, we find ourselves moving into stage B; i.e., a situation of normative flux and confusion about which partnership and family life arrangements are seen as desirable and proper. A widely cited example of this stage is the "double shift" phenomenon, whereby even a wife who is employed outside the home is expected to do the lion's share of the housework and the child care.

Figure 1:
The revolution in women's roles and fertility



Economists would characterize stage B as a "multiple equilibrium" situation; i.e., a situation in which several and possibly contradictory normative guidelines co-exist. Under these circumstances, normative confusion is likely to prevail, and people are likely to be uncertain about what to expect. This confusion in turn weakens people's trust in their fellow citizens, and fuels their uncertainty about the future. There is strong empirical evidence that trust is a decisive precondition for partnering and having children (Aassve et al. 2012). In sum, fertility levels are likely to be low when the normative guidelines for family formation are unclear.

What would a new stable equilibrium (i.e., stage C in Figure 1) look like, and what are the dynamics that would bring it about? The answer to the first question is quite straightforward: since the revolution in women's roles is irreversible (at least in the advanced democratic nations), it must clearly be founded on norms *and* practices that are genuinely gender symmetric. Only when such practices are broadly adopted and are socially accepted can we expect to see a return to pervasive trust and confidence in family life.

The answer to the second question is similarly straightforward: an acceleration of the diffusion of the new norms regarding gender roles and relations is needed. The news that the diffusion of egalitarian gender norms plays a central role in this process can be seen as positive. since people who are highly educated (and who are ideologically influential) are clearly the forerunners in this trend toward the adoption of new values.

I believe that the theoretical model I have sketched out here can be used to make sense of the rollercoaster ride that family life has been on over the past half century. This model can help us better understand why some societies (like the Nordic countries) have made far greater progress than others in moving in a more family-friendly direction. The populations of these countries tend to have more stable partnerships, and fertility levels that more closely match their preferences.[1] In Scandinavia, both family life and public policy were adapted in response to the revolution in women's roles at an earlier stage, and to a far greater degree than in most other countries. To illustrate, the average Danish man does 41 percent of the housework in his family, and almost 30 percent of Danish men do more than 50 percent of the housework (Esping-Andersen et al. 2013). Thus, the Nordic countries have arguably entered stage C. In contrast, Germany, like Italy and Spain (among other countries), lag far behind in the adoption of gender symmetry in their welfare state policies and in their domestic spheres. These countries appear to be stuck in a (stage B) multiple equilibrium, in which normative uncertainty and confusion deter people from maximizing their welfare.

As we know, nothing is written in stone. As the American case suggests, the "gender revolution" may stall before it reaches full maturation (Cotter et al. 2011). We should also not forget that the Scandinavian path to gender egalitarianism is unique when viewed from an international perspective. In the Nordic countries, active family support policies were introduced at an early stage in the revolution in women's roles, and these policies were extraordinarily generous and comprehensive. The transformation in women's roles was no doubt eased by the plentiful supply of (more family-friendly) public sector jobs. Such conditions are almost non-existent not only in the US, but in much of Europe.

The equilibrium model also provides a clear rationale for why we should expect to observe higher fertility levels among more educated women. It is very clear that the highly educated strata are the vanguards of gender egalitarianism, just as they were the vanguards of fertility decline in the past. But we should also expect to see a gradual convergence across the social strata if and when the less educated are swept up by the diffusion dynamics of gender egalitarianism.

References

Aassve, A., Billari, F., and Pessin, L. 2012. Trust and family dynamics. Dondena Centre for Research on Family Dynamics Working Paper, no 55 (November).

Andersson, G. 2002. Fertility developments in Norway and Sweden since the early 1960s. *Demographic Research* 6: 67–86.

Cotter, D., Hermesen, J. and Vanneman, R. 2011. The end of the gender revolution? Gender role attitudes from 1977 to 2008. *American Journal of Sociology* 117: 259–289.

[1] As we would expect, the U-shaped curve is more accentuated in some countries, and less so in others. Sweden is an example of the former case, arguably thanks to its early introduction of active family policies. If measured using the TFR, Swedish fertility was around 2.5 in the 1960s (an era indisputably dominated by the traditional family model), declined to 1.6 in the late 1970s, and then recovered (with oscillations) to a level of around 1.9–2.0. A fairly similar profile emerges if we instead focus on fertility trends by birth orders (Andersson 2002).

Durlauf, S. 2001. ‘A framework for the study of individual behavior and social interaction’. *Sociological Methodology* 31: 47–87.

Esping-Andersen, G., D. Boertien, J. Bonke and P. Gracia 2013. A multiple equilibrium approach to couple specialization. *European Sociological Review* 29(4): 1280–1295.

Esping-Andersen, G. and Billari, F. 2015. Retheorizing family demographic change. *Population and Development Review* 41: 1–31.

Goldin, M. 2006. The quiet revolution that transformed women’s employment, education, and family. *American Economic Review* 96(2): 1–21.

McDonald, Peter. 2000. Gender equity in theories of fertility transition. *Population and Development Review* 26(3): 427–39.

McDonald, Peter 2002. Low fertility: unifying the theory and the demography. Paper presented at Population Association of America Meetings, Atlanta, 9–11 May.

REVIEW ARTICLE

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Education and fertility in the context of rising inequality

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Abstract

Two main factors arguably account for the fact that the negative gradient of fertility by educational attainment, which has been prevalent in developed countries in most of the 20th century, has recently become weaker in most Western countries: rising inequality and educational composition shifts that change the selectivity of educated mothers in terms of their preferences regarding career and children. In this paper I review how four drivers of inequality mediate the childbearing behavior of women of different educational backgrounds: first, the impact of rising employment *polarization*; second, the slowdown in gender convergence in labor participation and wages since the late 1990s; third, the fertility behavior of newly-arrived immigrants contingent on economic opportunities in destination countries; and fourth, widening gaps in resources children receive from parents with different levels of educational attainment. These gaps can have lasting intergenerational impact both in economic and social outcomes such as fertility and union formation.

1 Introduction

An extensive literature has highlighted the complexity of the relationship between education and fertility, and, particularly, how the childbearing behaviors of women with different educational backgrounds may vary depending on the social and economic context (Skirbekk 2008; Ní Bhrolcháin and Beaujouan 2012; Merz and Liefbroer 2017). This review considers an additional factor mediating fertility patterns: rising economic inequality in most developed nations, particularly in the U.S.

Economic and labor market conditions affect household choices in many dimensions, including parenthood, and may influence a couple's ability to attain their preferred family size. The constraints faced by a household when making those choices vary by educational attainment. In recent years, and particularly since the

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last recession of the late 2000s, economic inequality has been on the rise across most developed countries, most notably in the U.S. With increasing inequality, the types of constraints that matter for childbearing decisions among families with different levels of education may diverge even further than in the past.

To analyze how inequality might influence childbearing patterns, this review draws from the current understanding of the relationship between educational attainment and both fertility and fertility intentions (Van Bavel 2012; Testa 2014). As women (re)entered the labor force in large numbers during the latter decades of the 20th century — when their human capital became more valuable in the labor market — fertility continued to drop. Fertility was lowest among the most-educated women, many of whom chose to devote more resources to each child rather than more time to childbearing, and thus reduced their family size. However, because fertility intentions among the most-educated remained relatively high, the gap between their intended and actual fertility became relatively wide in most countries (Testa 2014; Beaujouan and Berghammer 2017). Interestingly, new evidence, particularly since the recent Great Recession, suggests that there has been a gradual convergence in fertility rates among educational groups and a flattening of the existing negative educational-fertility gradient in some countries, such as the United States (Pew Research 2013 for the U.S.). In this study, I argue that this trend is likely driven in part by both economic inequality and the decreased selectivity of highly-educated women, as their share of the population has grown. Furthermore, I explore the factors that could cause this convergence to be long-lasting, and discuss the role of increasing inequality in fueling it.

Of the significant changes in economic distribution that have occurred across advanced countries in the last 20 years, four sources of inequality are among the most relevant for shaping recent trends in fertility. I examine two key dynamics in the labor market: first, recent structural changes in the labor market that have varying effects on workers with different levels of educational attainment; and second, the evolution of the gender wage gap (with a particular focus on U.S. data). Next, I explore how the fertility behavior of newly-arrived immigrants – mediated by the economic opportunities they are offered at their destination – may affect a country's educational gradient of fertility. Finally, I discuss the implications of widening gaps in human capital investments in children by parents with differing levels of educational attainment (again, with a particular focus on the U.S.). I conclude the article with an examination of how these inequality dimensions may shape the education-fertility relationship in the future.

2 Are the fertility rates of different educational groups converging?

Education is a key element in theories explaining fertility behavior. The existing literature has shown that there are multiple pathways through which education may affect childbearing decisions, and that the relative importance of these pathways varies over time and across contexts. More education is usually associated with having a higher income that could help support a larger family. Yet a high market return to women's education also increases women's labor market opportunities, and makes the trade-off between time spent working and time spent caring for children more expensive. Furthermore, compared to their less-educated counterparts, highly-educated women are generally better informed and empowered to make their own independent choices, and may have better access to family planning (see Skirbekk 2008).

2.1 Fertility and education in a historical perspective

An extensive literature has reviewed the relationship between education and fertility across history. However, this relationship has been difficult to evaluate due to a lack of proper measures of the educational attainment of mothers in earlier data. In a meta-analysis of research on the association between fertility and social status, Skirbekk (2008) noted that in societies that had not yet undergone the first demographic transition, higher household income (which was positively correlated with the husband's socioeconomic status) and higher fertility seemed to go hand-in-hand: as having a higher income was found to be correlated with having more wealth and better health, it is probable that higher-income women were able to bear more children and obtain additional child care support if needed. Higher fertility was thus likely a marker of social status in married couples. In contrast, since the early 20th century, when educational data became more widely available, the historical data show a negative relationship between women's educational and fertility levels.

The causal direction of that relationship is difficult to establish, and is still a matter of debate. On the one hand, early childbearing may lead a woman to discontinue her education. In the context of a developed country, Cohen et al. (2011) employed data that tracked the 1964 birth cohort of Norwegian women from age 17 to age 39 to show that women who became mothers earlier were prone to leave (or to not even enter) long educational tracks. Likewise, in a study conducted in a less developed setting, Lutz and Skirbekk (2014) found evidence that African women tend to stop their education after they become pregnant. However, they argued that this pattern does not seem to be the main driver of the association between education and fertility. On the other hand, social norms that foster later marriage and childbearing provide women with the opportunity to stay in school longer and to increase their educational attainment. In an analysis in which they instrumented the age at marriage with the age at menarche, Ambrus and Field (2008) argued that later marriage caused higher educational attainment in rural Bangladesh, where child marriage is prevalent. Thus a policy restricting child marriages could result in higher educational attainment among girls, and in later births. Similarly, extending compulsory schooling may delay childbearing, as Skirbekk et al. 2004 showed in a study for Sweden. A third possibility is that preferences may affect both educational and childbearing choices. Stange (2011), for example, showed that among college students, women who would go on to have children early differed from other women in their educational behavior before they conceived; and therefore concluded that preferences may drive both first birth timing and educational trajectories.

Leaving issues of reverse causality aside, we note that since the first demographic transition, more-educated women have given birth to fewer children than their less-educated peers. Since the late 19th and the early 20th centuries, several forces have led to the inversion of the relationship between social status (or education) and fertility. These forces include the slow but steady (re)entry of women into formal employment; rural to urban migration, which meant that women became detached from the extended family structures typical of agricultural settings that tended to support childrearing and lower the cost of working outside the home; and improvements in family planning, which first became available to the most-educated.

Goldin (2006) provided a very illuminating historical account of the changes in female labor force participation through the 20th century in the U.S. context, which resemble the changes that occurred in other rich countries. By the end of the 19th century, urbanization was accelerating, and there were more opportunities to work in blue-collar jobs. As women were finding it more difficult to combine childrearing with working than they had when living on the family farm, they retreated to the home environment. Because their husbands were earning relatively large incomes and working a "dirty" job was stigmatized, the majority of married women stayed out of the workforce. The blue-collar jobs available to women did not pay enough to compensate for the fixed costs of working away from home, particularly for women who had migrated to an urban area, and whose social networks had shrunk. Highly-educated women felt pressure to choose between work and family. Of the U.S. women who graduated from college between 1900 and 1920, around 30 percent never married; and of those who married, around 30 percent remained childless (Goldin 2004).

In the decades that followed, the educational attainment levels of women continued to rise, and women started to (re)enter the labor force in greater numbers. This trend is attributable to several factors, including improvements in household technologies, such as washing machines; the increased acceptance of women working in newly-available white-collar jobs; and the shock of World War II, during which large numbers of women took the places of absent men in the factories. Also during this period, marriage bans, or laws that effectively excluded married women from working in most positions in the labor market, were eliminated in the U.S.

With the labor market opportunities open to women growing, the expected returns to women's education were also rising. Galor and Weil (1996) noted that as the prevailing forms of employment in the economy shifted away from jobs that require more physical strength, and toward jobs that require a broader spectrum of skills, the value of women in the labor market and their potential wages increased. These sectoral and technological transformations had clear implications for childbearing patterns, as the microeconomic models of fertility of Becker (1960) and Willis (1974) indicated.

In his 1960 article, "An Economic Analysis of Fertility," Becker modeled fertility choices as parental demand for children, and argued that these choices could be analyzed using standard consumer theory. According to this framework, women who are making fertility choices are constrained by factors such their economic and educational resources, social norms regarding family size and out-of-wedlock children, and the availability of family planning tools. A key initial insight in Becker's paper is the idea that the cost of raising children is partly endogenous, because the time the mother (or the parents) spends caring for children is valuable in the labor market. As the demand for women in the labor force increases, the relative wages of women also rise. If women are forgoing income to spend time caring for children, the opportunity cost of raising a child also increases. Although higher wages for women has a positive income effect that should drive up overall consumption (including demand for children), the move away from costly options (such as having children) and toward the consumption of goods could lead to lower fertility.

A second important insight of Becker's work is that the couple's utility can be derived from both the quantity of children and their quality (i.e. investments in their human capital, such as health or education); and that households may have different demand elasticities for quantity and quality. Therefore, an increase in a woman's wages (or, for that matter, any increase in the family's income) might be spent primarily on investments in individual children (quality), rather than on increasing the number of children. Willis (1974) developed a model of fertility that integrated Becker's quality-quantity tradeoff with a model of household production and human capital investment. The model predicted a negative relationship between income and fertility based on assumptions about the value of women's time and the quantity-quality interaction. Willis therefore predicted that fertility would decline more among highly-educated women than among less-educated women.

As women's barriers to entering the labor market were being lowered, sizable gains in life expectancy were being made. This implies that women had more time to reap the returns to their human capital investments, even after their children left home. Another factor that boosted female education and labor force participation was the increased divorce risk. As partnerships became less stable, women sought to improve their earning options in case of divorce by acquiring experience in the labor market (Stevenson 2008).

All of these educational and labor market choices were facilitated by the availability of modern contraception, which enabled women to control the timing of childbearing. Of the three preconditions for the sustained fertility decline identified by Coale (1973), access to technology for regulating fertility was the most important, as birth control enabled women to choose to have a smaller family. Historically, better educated women had greater access to contraception, and tended to use it more effectively than less-educated women (Lutz and Skirbekk 2014). During the late 1960s and the early 1970s – a period when large numbers of women entered the labor force in most post-transition countries – having access to the contraceptive pill lowered the costs of acquiring more human capital (college and beyond) and of starting a long-term career, because it reduced the risk of pregnancy. By exploiting variation over time across U.S. states in unmarried women's access to the pill, Goldin and Katz (2002) convincingly showed that having access to contraceptives delayed marriage, increased post-graduate education among women, reduced the desired number of children, and increased the fraction of never-married women with graduate degrees who were having sex. For the 1960–1975 period, Bailey (2006) studied the variation across the U.S. states in the legal right of unmarried women aged 18 to 21 to obtain the pill without parental consent. She found that the expansion of legal access to the pill led to significant reductions in the likelihood of becoming a mother before age 22, and to increased female labor force participation.

A development that followed naturally from the increase in women's educational attainment was that women who devoted more time to acquiring human capital were also likely to have postponed multiple adulthood transitions, such as work, household formation, and childbearing. Ní Bhrolcháin and Beaujouan (2012) reviewed a large sample of literature that looked at the role of education in late childbearing. They found that increases in rates of enrolment were partly responsible for the sharp rise in the mean age at first birth during the 1980s and the 1990s in Britain and in France. Similarly, in an analysis of the effects of a shift in educational policy in Sweden, Skirbekk et al. (2004) showed that a one-year increase in the school-leaving age had causal effects on the timing of childbirth.

Unsurprisingly, it has been found that while the postponement of childbearing deflates aggregate measures of fertility via the tempo effect, it can further reduce completed cohort fertility via social feedback effects on the timing of childbearing, whereby members of the cohort are influenced by the behavior of their peers (Kohler et al. 2002). With fewer years to complete their fertility and decreased fecundity later in life, many women fall short of their plans, and some may overestimate the capacity of ART to compensate for their rising infertility (Bewley et al. 2005). Postponement of the first birth has been singled out as a major explanation for the gap between desired and completed fertility. Because tertiary-educated women spend more time acquiring human capital than women with less education, they are also more likely to postpone childbearing (Morgan 2003; Quesnel-Valleé and Morgan 2003). Predictably, childlessness rates have historically been higher among the most-educated women; although the differences between the educational groups seem to be closing somewhat, at least in the U.S. (Goldin 2004, Bailey et al. 2014). In Europe, childlessness continues to be most common among women with very low or very high levels of education. The generally positive educational gradient in childlessness may be weakening in some countries (Miettinen et al. 2015), as the childlessness rates of less-educated women are becoming closer to those of medium-educated women (Beaujouan et al. 2016).

2.2 Selection and convergence?

Even though the major forces reviewed above, such as the longer school enrolment periods and the higher rates of labor market participation among highly-educated women, seem to predict a negative educational gradient of fertility, recent data indicate a weakening of that relationship in some developed countries (see Pew Research Center 2013, Bailey et al. 2014 for the U.S.; Kravdal and Rindfuss 2008 for Sweden). It is likely that several forces are driving the trend toward a moderate degree of convergence across educational groups. As women's educational levels have been increasing, greater shares of women than of men in most developed countries are college-educated (OECD 2014; Van Bavel 2012). Across the EU countries, the average share of 30- to 34-year-old women with some tertiary education was 44% in 2016 (Eurostat 2017). Data from the American Community Survey show that the majority of U.S. women aged 15–50 have at least some college education, and that the majority of births in the U.S. are to highly-educated women. In 2012, fewer than 16% of new mothers had less than a high school diploma, and around 23% had a high school degree only. The remaining 61.6% of women aged 15 to 50 who had given birth in the previous 12 months had at least some college (ISCED 5-8). Around 19% of new mothers had a college degree, and 10.6% had a graduate or professional degree (US Census Bureau 2014). Table 1 shows the shares of live births by mother's educational attainment level in 2015 for selected European countries (Eurostat 2017). The shares of new mothers with some tertiary education were close to or more than 40% in most countries; and in Sweden and Denmark, over half of new mothers had tertiary education.

The evidence that a rising share of mothers across rich countries has at least some tertiary education implies that highly-educated women are currently less selected in their household behavior and preferences than was the case when a much smaller share of women had tertiary education. This decrease in selectivity should weaken the educational gradient of fertility (Goldin 2004). The distribution of highly-educated women with respect to their desired family size and willingness to trade off work for family responsibilities is more representative of society as a whole today than in the past. Whereas, in the past, tertiary education automatically led to high income and social standing, today's outcomes are more heterogenous as a function of fields of study and career paths (Van Bavel 2012). Women with tertiary education may be overrepresented in fields in which the earnings tend to be lower (Charles and Bradley 2002). Interestingly, less-educated mothers may be more selected in their socioeconomic resources, fertility, and work preferences and behaviors today than in the past.

Recent data on cohort fertility in the U.S. points to increased convergence in fertility across educational groups. Bailey et al. (2014) divided a sample of U.S. women by educational quartiles (rather than by attained degree) to allow them to better compare women across different parts of the distribution over time. Their results indicated that the trend toward convergence in the number of children born to women in the top and the bottom quartiles of the educational distribution in the U.S. has accelerated in recent years. Among the 1970 cohort, the most educated women had an average of 1.7 children, while the least educated women had an average of 2.2 children – which represents the smallest gap in the 90 years studied. This reduction in the gap was driven in part by an increase in the number of children

Table 1:
Shares of live births by mother's educational attainment in selected European countries, 2015

	Less than primary, primary and lower secondary education (levels 0–2)	Upper secondary and post-secondary non-tertiary education (levels 3 and 4)	Tertiary education (levels 5–8)
Belgium	17.3	38.3	44.4
Czech Republic	10.2	54.3	35.5
Denmark	14.4	34.4	51.2
Estonia	15.5	39.1	45.4
Greece	14.1	45.0	40.9
Spain	35.7	28.0	36.4
Austria	15.3	62.8	21.9
Portugal	29.5	31.8	38.6
Finland	14.6	40.4	45.0
Sweden	15.5	37.1	47.4
Norway	18.4	24.6	57.0

Source: Eurostat database [demo_faeduc]. Accessed in March 2017 at http://ec.europa.eu/eurostat/web/population-demography-migration-projections/births-fertitily-data/database. ISCED levels. Data for Belgium, Estonia, and Austria is for 2012.

born to the most-educated women. Moreover, among women in the 1970 cohort who were in the top quartile of the educational distribution, the childlessness rate was much lower (around 21.4%) than it was for women who were born 10 or 20 years before, and it was much closer to that of women in the bottom quartile (14.9%). Even though the gap in cohort fertility has narrowed in the U.S., the differences in the average age at first birth by education have been widening continuously starting with the 1940s cohorts. For the 1970 cohort, the gap stands at 6.8 years, as the average age at first birth was 28.3 for women in the highest quartile and was 21.5 for women in the lowest quartile (Bailey et al. 2014).

Researchers have found evidence of convergence in fertility rates across educational groups in other contexts as well. In many European countries, higher-order births no longer display a negative educational gradient, particularly in settings where the trade-offs between work and family are tempered by family-friendly institutions (Kravdal and Rindfuss 2008 for Sweden; Adserà 2011b across a large set of European countries). For example, Van Bavel (2014) found that during the recovery of Belgian fertility in the post-war period, a flattening of the educational gradient was instrumental to boosting births. Thus, if increasing levels of female education are accompanied by reforms in the labor market and the welfare state that lessen the penalties for combining work and family, we would expect to see the gradient continue to weaken in the near future (Myrskylä et al. 2009)

During recent periods of economic uncertainty, such as during the Great Recession of the late 2000s, the need for households to have two incomes to sustain their expenditures increased the pressure on women to actively participate in the labor market. Across the OECD countries, fertility has decreased the most among those population groups who were hit hardest by the Great Recession: namely, young adults, people with low levels of education, and migrants. This trend has contributed to the current weakening of the educational gradient. Over the 2008–2012 period in the U.S., birth rates increased only among women in their forties, and decreased the most among the youngest and the least-educated women (Cherlin et al. 2013). According to a report by the Pew Research Center (2013), from 2008 to 2011 birth rates declined 13% for women without a high school diploma, 11% for women with a high school diploma only, 8% for women with some college education, and only 7% for women with a B.A. degree or higher. A similar pattern can be found in the European data (Lanzieri 2013).

In addition to changes in the selection of the highly-educated and the uneven effects of economic shocks across educational groups, the reversal of gender inequality in educational attainment is bound to have an impact on union formation and fertility. Changes in the relative numbers of men and women with different educational levels will shape marriage markets. In turn, the types of men highly-educated women marry or partner with may affect their fertility choices, and, ultimately, their number of children. Van Bavel (2012) described in some detail the different pathways through which the reversal of the gender gaps in educational attainment can ultimately affect fertility via union formation. His two main hypotheses have implications for the education-fertility gradient. First, he posited that if homogamy increases as the number of educated women rises (see Blossfeld and Timm 2003), the partnerships of women at the top of the educational distribution may become more stable, and their fertility may increase. Second, hypogamy, which is also expected to rise, could have an ambiguous impact on the fertility of highly-educated women. If the less-educated men married to these women participate in the household chores more than they typically have in the past, these partnerships could boost fertility. However, union instability in hypogamous relationships may depress fertility. Thus, using a couple's perspective when analyzing fertility decisions is key to understanding the behavior of different groups of women and the evolution of the educational gradient.

So far, the focus of this study has been on actual fertility by educational level. However, the question of whether or not fertility intentions vary in the same ways as achieved fertility is fundamental to understanding the relationship between women's education and fertility. Across European countries, dispersion in stated preferences regarding family size has been found to be smaller than that of observed fertility differentials. Thus, the gap between desired and actual fertility varies substantially across Europe (Bongaarts 2001; Goldstein et al. 2003). Consistent with previous work (Bongaarts, 2001; Quesnel-Valleé and Morgan 2003), both Testa (2012) and Beaujouan and Berghammer (2017) find that, across educational groups, the shortfall in births is larger on average among highly-educated women in Europe.

Understanding the reasons why highly-educated women fail to achieve their stated goals is central to predicting whether the observed flattening of the educational gradient in fertility is a temporary phenomenon, or whether it will continue in the future. In a recent study analyzing data from 27 European countries from the 2006 and 2011 Eurobarometer survey, Testa (2014) found that lifetime fertility intentions are higher in countries with higher average educational attainment. She argued that an interpretation of these findings is that, in these countries, the trade-offs faced by women when entering the labor market are tempered by good institutional and economic conditions. Thus, the income effect arising from higher human capital is more relevant in childbearing decisions in these contexts than where the family-work tradeoffs are more challenging. In addition, Testa found a similar positive relationship between intentions and education at the individual level. These findings indicate that across the most developed countries, highly-educated women continue to have relatively high fertility intentions – whether they realize these intentions or not hinges on their socioeconomic conditions.

3 The educational fertility gradient and inequality

3.1 Labor market polarization and inequality

During recent economic downturns, less- and medium-educated workers have been hit particularly hard by unemployment, and the sectoral distribution of employment has undergone important transformations in the richest countries. *Polarization* in the labor market has increased, as some middle-income jobs seem to be disappearing (Autor 2014b). This section explores how this change in the structure of the labor market could exert downward pressure on the fertility of medium- and less-educated couples, and could therefore lead to a further flattening of the educational gradient.

The economic conditions under which households make childbearing decisions have long been recognized as crucial for understanding fertility patterns. There has been a long-running debate on the question of whether fertility is boosted by good economic conditions, rising employment, and earnings; or whether women prefer to have children in times of job scarcity, when the opportunity costs of childbearing in terms of forgone wages are lower. It was generally agreed that patterns of procyclical fertility were dominant throughout much of the 20th century until Butz and Ward (1979) suggested that countercyclical fertility had emerged in the U.S. during the late 1960s, when women were entering the labor force in large numbers. Sobotka et al. (2011) have provided a comprehensive review of the literature on the impact of economic recessions in developed countries over the last century. Most of these studies found that fertility is procyclical, but that the long-run aggregate effects of recessions are small, and their impact on birth timing tends to be relatively short-lived.

Economic uncertainty may affect family decision-making in multiple ways. Both aggregate and individual unemployment shocks, as well as unstable employment conditions, may prompt families to delay or even forgo births (e.g. Adserà 2011a & b; Kravdal 2002, Mills and Blossfeld 2005, Goldstein et al. 2013, Kreyenfeld and Andersson, 2014). In a set of papers, I showed that from the mid-1980s into the early 2000s, low fertility in OECD countries was associated with: 1) large gender gaps in unemployment rates (Adserà 2005); 2) long-term unemployment, which fueled the postponement of births among women in their twenties in particular (Adserà 2004); and 3) a high prevalence of unstable jobs in the form of short-term contracts, and a lack of part-time employment opportunities (Adserà 2011b). Transitions to second and third births were faster among women whose partner had a stable job, such as those in the public sector in Southern European countries, where unemployment was especially high (Adserà 2011b).

To understand whether recessions affected women of different educational backgrounds through different channels and with varying intensities, Adserà (2011a) studied the transition to a second birth across educational groups among women in 12 European countries using data from the European Community Household Panel (ECHP) and the 2006 Spanish Fertility Survey (obtaining similar findings). The ECHP data indicated that between 1992 and 2000, the transition to a second birth occurred later when the unemployment rate was high, not only among women who were unemployed but also among employed women, and among the least-educated women in particular. Women who held temporary jobs instead of permanent positions were also less likely to deliver a second child across all education groups, but the impact of precariousness was slightly greater for medium- and highly-educated women who might have expected to have more job stability than for women with less education. Consistent with these expectations, the results showed that college-educated women with the least stable jobs (e.g. casual work, a job with no contract, a job with a fixed-term contract of less than a year) were most likely to delay having a second birth, and that job instability mattered more to them than the overall level of unemployment. Thus, during the 1990s, high unemployment likely contributed to the flattening the educational gradient of fertility, but job instability may have had the reverse or an ambiguous effect.

The depth and pervasiveness of the Great Recession of the late-2000s had important level and distributional impacts on demographic behavior. Berghammer and Adserà (2016) employed data on families in 21 European countries and the U.S. to study the prevalence of unemployment during the period among families of different educational backgrounds. The analysis uncovered a steep increase in the educational gradient in unemployment in the 2007–2013 period for all age groups. Furthermore, the study showed that the share of households in which both spouses were unemployed surged – a consequence of increased educational homogamy that concentrated risk at the bottom of the education ladder. Families in which both spouses were low -educated were doubly disadvantaged. These findings are consistent with the results of research by Schwartz (2010), which show that the rise in assortative mating is another mechanism behind the increase in household inequality across developed countries, and in the U.S. in particular.

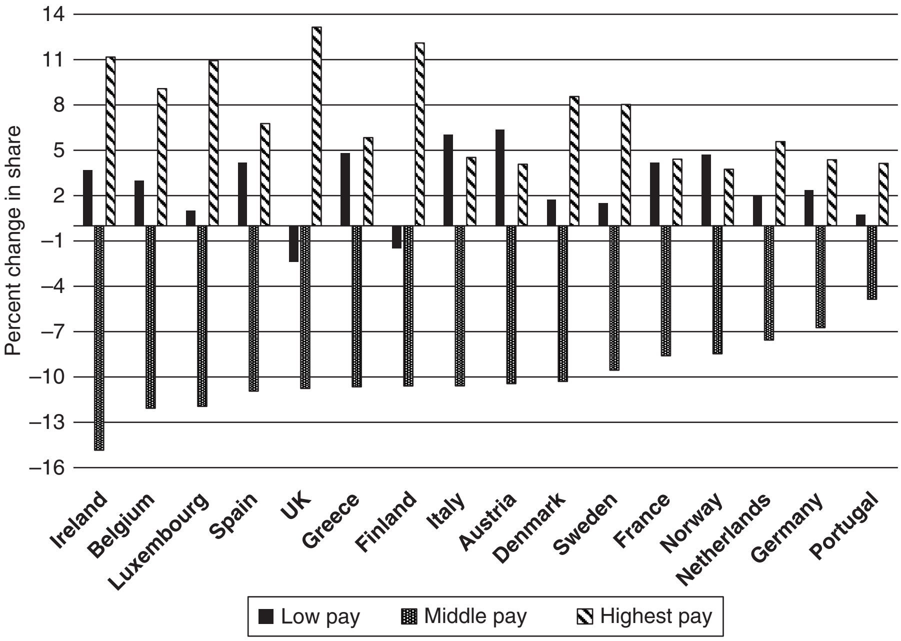
In the U.S., the recession disrupted household formation, and resulted in a rapid rise in the share of young adults who were living with their parents (Cherlin et al. 2013). Fertility rates dropped sharply over the 2008–2011 period, with the largest declines occurring among the least-educated (Pew Research Center 2013). In the 2007–2011 period, Fertility decreased the most in the U.S. states with the largest increases in unemployment in 2007–2009, and among people whose incomes were below the poverty level or were less than 150% of the poverty level (Cherlin et al. 2013). Birth rate patterns during this period were similar across Europe (Lanzieri 2013). Goldstein et al. (2013) showed that the onset of the economic crisis and the rise in unemployment resulted in significant declines in period fertility in many European countries, and interrupted the positive trends that had started in some of these countries. The fertility shock was particularly large among young adults and in the countries where joblessness increased the most, such as in Italy and Spain. Overall, the fertility changes brought about by the Great Recession continued to weaken the negative educational gradient in fertility.

A major characteristic of the recent recession is that it hit developed countries at a time when their labor markets were already undergoing rapid change with extensive consequences on their income distributions. Inequality had been rising before the recession, but it widened considerably in its aftermath. Autor (2014a, Figure 6a) has shown that between 1980 and 2012, the real hourly earnings of full-time employed U.S. men increased by around 20% for those with a bachelor's degree, and by around 56% for those with post-graduate education. Conversely, the earnings of men with less than a high school diploma or with a high school diploma dropped by 22% and 11%, respectively, over the period. The earnings of men with some tertiary education but less than a bachelor's degree did not change. Women fared better, but the gains made by women without a college degree were very small. The relationship between education and employment (and labor force participation) displayed an increased divergence similar to that observed for earnings. Income inequality also rose within education groups.

A series of changes in the labor market explain this trend. First, skill-biased technical changes weakened the demand for less-skilled labor and increased the demand for more-educated workers with skills that complemented the new technologies. Second, increased globalization, which forced workers in developed countries to compete with cheaper labor from poorer countries, was a major driver of the decline in real wages at the bottom of the educational distribution. Furthermore, large institutional changes, such as extensive de-unionization and the spread of performance pay and bonuses, intensified earnings heterogeneity both across and within educational groups. Finally, major structural changes in production associated with the rise of robots disproportionately hurt workers with jobs that were easily displaced by those new technologies (see Lemieux 2008 for a more detailed discussion of each of these issues).

While the introduction of innovative technologies can increase overall productivity in the economy, such technologies are generally more complementary with skillsets common among educated workers, such as problem-solving and

Figure 1:
Percentage changes in the share of hours worked in low-, middle-, and high-paying occupations over 1993–2010 by country



Source: Data from Goos et al. (2014, Table 2) and graph based on Autor (2014b). Data from the four lowest-paying occupations, the nine middle-paying occupations, and the eight highest-paying occupations in 1993.

creativity. As a result, the use of machines may amplify the differences in productivity across educational groups. Individuals with higher education can benefit from gains in productivity in ways that less-educated workers cannot. To better understand what types of positions were more threatened by the new changes in technology and globalization, Autor (2006) analyzed the skills required to undertake different jobs in the economy. His findings showed that routine jobs that were easily mechanized or could be cheaply off-shored to other countries were starting to disappear. Many of those positions – such as office or customer service clerks; or workers in precision, handicraft, craft printing, and related trades – are traditional middle-income jobs (Goos et al. 2014). At the same time, the shares of workers with less than a four-year college degree who were employed in more manual and less routine occupations was growing. As we can see in Figure 1, across all European countries between 1993 and 2010, the employment shares of the core middle-wage occupations shrank, whereas the shares of both low- and high-paying jobs rose, which resulted in increased job polarization and income inequality. Thus, some women and men with medium levels of education, or even with some college education, have been forced to accept much lower-paying (and potentially unstable) jobs than they had anticipated. This mismatch between workers' labor market expectations and available jobs, and its negative impact on household income, may exert downward pressure on fertility rates, particularly among individuals in the middle of the educational distribution. Furthermore, Autor et al. (2015) have shown that in the United States, negative shocks to male employment (mostly in traditionally well-paying manufacturing jobs) resulting from competition from Chinese imports significantly reduce marriage rates and fertility, while raising the shares of teen births and of poor and single-headed households. Thus, *job polarization* may exert downward pressure on the fertility of not just the least-educated, but the medium-educated in particular.

3.2 Pervasive gender wage gaps

A second dimension of inequality in the labor market is the persistence of *gender wage gaps* (even among the highly-educated), despite large gains for women since the 1960s (Blau and Kahn 2000, 2016). Gender earnings inequality affects both the resources women (and their households) have at their disposal, and the incentives women have to trade time spent at work for family activities. In particular, gender wage gaps may differentially affect the childbearing choices of women across educational levels via the returns they receive from their human capital investments.

During the 1970s and the 1980s, the gender wage gap in most OECD countries decreased substantially. However, starting in the 1990s, the pace of progress made toward closing the earnings gap slowed, and then petered out. In the U.S., this pervasive gender wage gap has lingered at 75%–83% during the most recent decade, even among full-time workers (Bureau of Labor Statistics 2015). Across Europe, the average gender wage gap is around 83% (Eurostat 2015).

In a study of cohorts born between 1923 and 1978, Goldin (2014) noted that despite the great advances women have made over the last century, convergence in earnings is far from complete. In recent years, the earnings gap between U.S. college-educated women and men in full-time employment has been closing after hours of work and education are taken into account. The gap was well below 20% when women born since the late 1950s entered the labor market in their early twenties, and was between 25% and over 40% for earlier cohorts at the same ages. However, the gap grew during the childbearing years of all of the cohorts in the study (reaching a maximum at around age 45), and never fully recovered to starting levels at later ages. For cohorts born since the late 1950s, the lifetime profile is flatter than for earlier cohorts (with a gap of around 35% by age 45 among those born in 1958, and a gap of around 60% for cohorts born in the 1920s and the 1930s) (Goldin 2014, Figure 1B).

The literature points to two main forces that drive gender earning differentials. On the one hand, gender disparities in qualifications, hours worked, and type of occupation or sector result in wage discrepancies. On the other hand, the wage gap may be the outcome of discrimination.

Analyses of differences in worker characteristics have suggested that women may shy away from riskier or more physically demanding jobs that offer *compensating differentials* in the form of higher wages. In terms of qualifications, the formal educational attainment levels of women have risen continuously in recent decades, and now surpass those of men in most developed countries. This trend has led to substantial wage convergence. In addition to formal education, labor market experience is a key factor in a worker's remuneration; and within occupations, the gender gap in levels of experience is the single most important reason why men earn more than women (Blau and Khan 2000). Women tend to have lower levels of accumulated labor market experience than similarly educated men because women are more likely than men to make trade-offs between family and work. As Kravdal and Rindfuss (2008) reminded us, fertility is associated not just with childbirth, but, more importantly, with *childrearing.* Both women's and potential employers' expectations that women will have intermittent careers could also affect the types of occupations and sectors women are able or choose to enter, as well as their opportunities to participate in continuous on-the-job-training. Because of their lower levels of experience (or the presumption that they will work less in the future), women are less likely than men to be promoted to higher levels of the organization. In a recent analysis of the trends in the gender wage gap in the U.S. over the 1980–2010 period, Blau and Khan (2016) showed that conventional measures of human capital such as education and experience, combined with race, account for very small shares of the gender wage gap today. While the unadjusted difference in the female-to-male log wage ratio was around 79.3% in 2010, adjusting for measures of human capital merely closed the gap to 82.1%. The gap closed to 91.6% only after adding controls for industry and occupation, as well as unionization. However, 8.4% of the gap remained unexplained.

In a society where there are still clearly delineated differences in the division of work within the household, women may anticipate having to work a "second shift" even when they decide to enter the labor force. This heavy burden likely exerts downward pressure on fertility (Torr and Short 2004). The evidence regarding the degree to which fathers' contributions to child care and other household tasks have an impact on fertility has been mixed; and the results of such analyses depend on the context, the parity, and the specific tasks examined. Most analyses have found that men's contributions in the home are key to boosting fertility, particularly among highly-educated women, who are generally more committed to their careers (Cooke 2009; de Laat and Sevilla-Sanz 2011; Van Bavel 2012). However, some studies have found that the share of housework done by the male partner is irrelevant (see Craig and Siminski 2011 for second births in Australia).

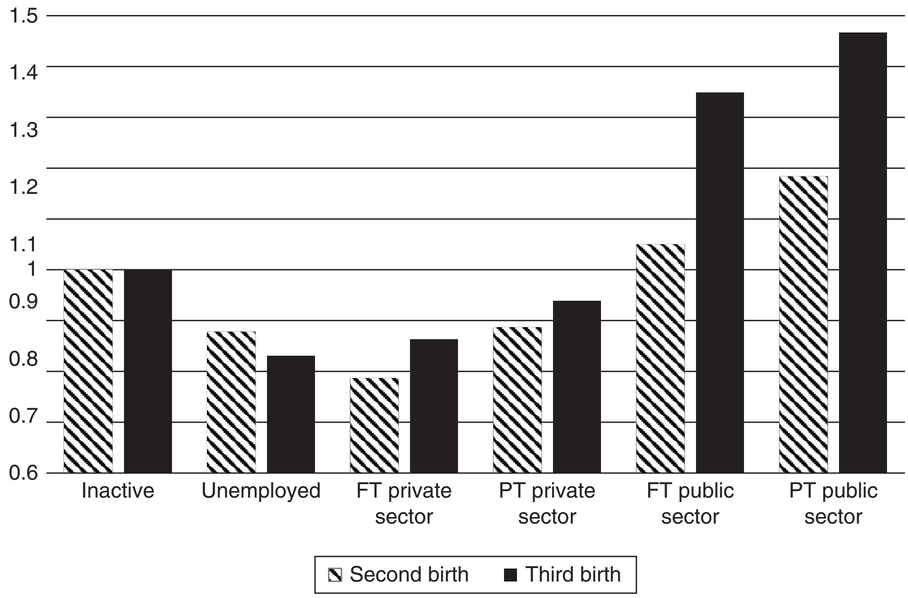
Women with young children may adapt to the expectation of a "second shift" by choosing part-time work over full-time work, or by taking positions that allow for more flexible schedules and little overtime. These women either self-select or are pushed into more family-friendly jobs. Positions that are considered family-friendly, such as jobs in the public sector, may offer more employment security, but tend to be lower-paying than those that do not have as many benefits or have more demanding schedules.

Figure 2 shows that the estimated hazards rates to second and third births by a woman's labor force status in 13 European countries are the highest among women working part-time in the public sector (Adserà 2011b). The simulated proportion of women who have a second child within five years of the birth of their first child ranges from 52% for women working full-time in the private sector, to 60% for women who are inactive, to 62% for women working full-time in the public sector, and, finally, to 66% for women working part-time in a public sector job. Correspondingly, the gap between actual and intended fertility among Spanish women in 2006 was smallest among women in permanent positions in the public sector, and was largest among women in temporary jobs in the private sector (Adserà 2006).

Many of these women-friendly positions are in the fields of teaching or health care, and generally require relatively high levels of formal education (Martín-García and Baizán 2006). Van Bavel (2010) studied the impact of field of study and the share of female graduates in a sector on postponement of motherhood in Europe using data from European Social Survey in 21 countries. He found that among employees in sectors with relatively large shares of women (such as teaching and education), first births occur at earlier ages. Conversely, women entering sectors with relatively high entry wages and steep wage profiles, in which experience translates into higher earnings, tend to become mothers at later ages or to remain childless (Neyer et al. 2017).

These findings are consistent with Goldin's (2014) main argument that when more-educated women attempt to enter the high end of the labor market, they are confronted with the reality that in many high-paying sectors such as business or law, hourly wages increase with effort. Thus, the total earnings profiles are not linear with the number of hours worked, but are rather much steeper for those prepared to put in long hours. Given that labor market entry for college graduates coincides with the peak childbearing years, highly-educated women who are trying to "have it all," and are thus devoting time to both work and family, enter the labor force with a much flatter earnings profile than similarly-educated men. If some of these highly-educated women want to continue to pursue careers in those sectors, they may find that they are compelled to giving up childbearing (or at least to postpone it until much later ages, when they might be able to negotiate part-time arrangements that are otherwise scarce in their sectors), and to put in long hours in the workplace in order to achieve the steeper wage profiles men enjoy. Since, as I discussed above, educated women may be less selected in their preferences for work today than in the past, childbearing patterns and hours of work within this group may be more heterogenous than ever before, and could depend on which career path these women choose. The ultimate effect on the education gradient in fertility of the forces discussed in this section may therefore be ambiguous.

Figure 2:
Second and third birth hazards from the previous birth in 13 European countries by woman's labor force status, sector of employment, and full- or part-time employment relative to inactive women, 1994–2000



Source: Adserà (2011b). Estimates from Cox proportional hazard models to transitions to second and third births from the previous birth that include basic demographic controls (education of both spouses, marital status, migration background, income, age at first birth, and gender of previous children), as well as country labor market and maternity benefits controls. Monthly individual data from European Community Household Panel (ECHP) 1994–2000 of women who were 40 years old or under at the first interview, and who had given birth to their first or second child in January 1992 or after in 13 European countries (Netherlands, Belgium, Luxembourg, France, the United Kingdom, Ireland, Italy, Greece, Spain, Portugal, Austria, Finland, Sweden) from European Community Household Panel (ECHP) 1994–2000. Labor force status is lagged seven months. FT stands for full-time, and PT stands for part-time.

3.3 Persistent fertility differences by migration background?

Are the childbearing patterns of immigrants and their children different from those of native women? Most of the literature on immigrant fertility in highly-developed countries has shown that the fertility of immigrants tends to converge with that of the native-born population (Adserà and Ferrer 2014a, b). The recent economic crisis and the continuous rise in income inequality have exerted downward pressure on the economic status of immigrants, and thus on their birth rates across developed countries, particularly in the U.S. (Cherlin et al. 2013, Lanzieri 2013). The impact of those trends on the educational gradient of fertility in the destination countries is both ambiguous (as it depends on the degree of labor market integration of immigrant women, among other things) and likely relatively modest (i.e. similar to the net effect of immigrants on the period total fertility of most reception countries; Sobotka 2008).

When evaluating how increases in immigration are poised to affect the shape of family structure and fertility patterns in developed countries, two potential sources of inequality come to mind. On the one hand, immigrants may have childbearing patterns that differ from those in the most-developed countries. On the other hand, because the socioeconomic integration of immigrants as they enter the labor market and as their children join the educational system in their new setting also shape their future demographic behavior, rising inequality in the destination country may hamper this process.

The literature on immigrant fertility in rich countries has focused on three underlying mechanisms, which were first described in Goldstein and Goldstein (1981, 1983), that shape it: selection (whether those who migrate already resemble the destination population more than the population at origin), disruption (whether there is a temporary decrease in fertility before migration that is recuperated soon after arriving in the new destination), and adaptation to native fertility patterns over time in the country (see Adserà and Ferrer 2014b for a review).

Most studies on this topic have found that selection and adaptation lead to the convergence of immigrant fertility patterns with native patterns, particularly among members of the second generation, and in countries with more selective migration regimes that tend to receive relatively highly-educated immigrants (Anderson 2004; Bean et al. 2000; Choi 2014; Milewski 2007; Parrado and Morgan 2003; Georgiadis and Manning 2011; Coleman et al. 2012; Fernandez and Fogli 2006; Toulemon 2004, among many others). Nonetheless, there is some variation in the speed and the degree of convergence across countries of origin and contexts of reception (e.g. Anderson, 2004; Georgiadis and Manning, 2011), and the TFRs of immigrants across European countries are still higher than those of natives (Sobotka 2008).

In many countries, the convergence of native and immigrant fertility patterns also seems to occur within education groups, particularly in the upper end of the educational distribution. Adserà and Ferrer (2014a) showed that the fertility behavior of individuals who migrated as children (before age 18) to Canada and who attained tertiary education is similar to that of natives, regardless of their age at migration (between zero and 17). For child immigrants who do not reach the tertiary education level, age at migration matters, and those who arrived during their teenage years tend to have higher fertility than natives with similar characteristics (for an analysis of Canada, France, and the UK, see Adserà et al. 2012).

In rich countries with relatively large foreign-born populations, intermarriage rates have been increasing. Lanzieri (2012) showed that for the 2008–2010 period, the share of natives married to foreign-born individuals was between 6% and 7% in Germany, France, Austria, and Belgium; and was around 5% in the UK, Sweden, and the Netherlands. What are the consequences of the increase in mixed marriages on fertility? On the one hand, as Van Bavel (2012) noted, intermarriage may be associated with increased marital instability, and thus with decreased fertility. Whether this instability is expected to be more or less widespread among the highly- or the less-educated is an open question, but since having a higher educational level is associated with having more information and being more open to cultural differences, it is possible that highly-educated mixed couples have low levels of union conflict, and thus have average levels of fertility. On the other hand, natives who believe in more traditional roles for women may choose to enter mixed unions and have larger families. This latter type of mixed marriage is likely more prevalent among less-educated couples, and should strengthen a negative educational gradient of fertility.

A key factor in the evolution of fertility and household formation patterns among immigrants is how their economic position in the receiving society evolves over time and compares to their aspirations, as well as the types of jobs they hold and their level of female labor force participation. If immigrant women are more adapted to the local labor market, they may reduce their family size. Socialization through broader female participation in the recipient culture should exert downward pressure on their fertility. Yet, of the immigrants who are active on the labor market, the most-educated may access more stable jobs with benefits that allow them to combine family and work more easily than their less-educated counterparts. This trend would contribute to the flattening of the aggregate educational gradient. Conversely, if the least-educated female immigrants remain outside of the labor market, they are more likely to maintain childbearing patterns close to those in their countries of origin. This trend would reinforce a negative gradient of education and fertility. The socioeconomic integration of immigrant women is also fundamental to the demographic behavior of subsequent generations, as mothers may serve as role models for their children.

During the recent Great Recession, foreign-born populations were hit particularly hard in most developed countries, and their unemployment rates increased more sharply than those of natives (Cherlin et al. 2013). As a result, immigrant fertility has declined in recent years. In the U.S., the sharp decrease in fertility among Hispanics has been largely attributed to the severe decline in the influx of new Mexican immigrants. But even if those flows had continued, the immigrants' fertility rates would have fallen in parallel to the decreases in the rates of natives (Cherlin et al. 2013). In Europe, the fertility rates of non-naturalized foreign-born populations decreased between 2009 and 2011, and in most countries, they declined more than the rates of natives (Lanzieri 2013).

3.4 Unequal parental resources

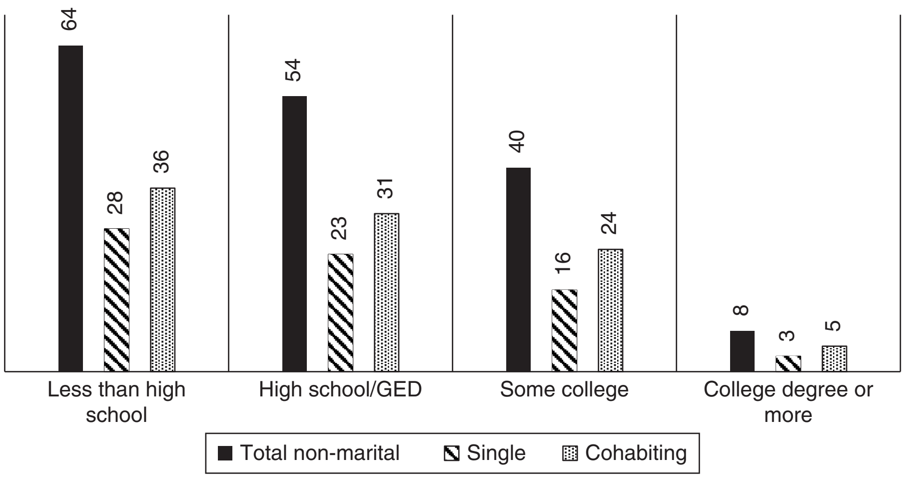
The gaps in the resources children receive from parents with different levels of educational attainment and different union statuses have widened, particularly in the U.S., with children born to less-educated single mothers being the most disadvantaged (McLanahan 2004; Perelli-Harris et al. 2010; McLanahan and Jacobsen 2014). A lack of childhood resources may adversely affect economic and fertility choices in adulthood, unless social policies are successful in limiting the intergenerational transmission of poverty and demographic behavior. This, in turn, could impact a society's future educational fertility gradient.

As the second demographic transition (SDT) unfolded, rates of cohabitation and out-of-wedlock childbearing climbed. Among the most-developed countries, the trend toward non-marital childbirth first started in the Nordic and in a few other Northern European countries, and was not homogeneous across education groups (Lesthaeghe, 2010). In many European countries, such as in France, cohabitation was more prevalent among the highly-educated before spreading to all groups. In the English-speaking countries, especially in the United States, the educational gradient of cohabitation was negative from the beginning.

Across rich countries, marriage rates have declined, but continued to be higher among college-educated women than among those without a high school diploma, even though the rising numbers of highly-educated women might have worsened their prospects in marriage markets where hypogamy was still relatively rare (Van Bavel 2012). While among U.S. women born around 1900 the least-educated were 10 to 15 percentage points more likely to ever marry by age 35 than those in the top educational quartile; the gap closed in the subsequent cohorts, rose again in the 1940–1950s cohorts, and has reversed in the latest cohorts (Bailey et al. 2014). Within these general trends, Kalmijn (2013) noted that the gradient for marriage (or stable union) varies with the degree of gender equality across the most-developed countries (with more-educated women being more likely to be married than less-educated women in gender-equal countries), and with the degree of economic inequality (with educated men being more attractive in more unequal settings). A phenomenon that is concurrent with the relative increase in marriage rates among highly-educated women is the low prospects for a stable union or marriage (likely resulting in low fertility) among less-educated men (Van Bavel 2012), particularly in more unequal economies (Kalmijn 2013).

As the patterns of partnership formation changed, rates of non-marital childbearing increased. This trend started in the Nordic countries and in France, where it became widespread by the early 1990s; and then increased sharply elsewhere in Europe starting in the late 1990s. As in the case of marriage, non-marital fertility rates differ by education, with more children being born outside of marriage to the least-educated women in most European countries, and, notably, in the U.S. (Perelli-Harris et al. 2010, McLanahan 2004, McLanahan and Jacobsen 2014, Bailey et al. 2014). The rise of cohabitation and non-marital fertility among the least-educated can be partly attributed to unemployment and job instability, which makes it difficult for couples to reach the high marriage bar they have set for themselves (Perelli-Haris et al. 2010; Kalmijn 2013; Cherlin et al. 2013; McLanahan and Jacobsen 2015). Perelli-Harris et al. (2010) studied the educational gradient of first births to cohabiting women relative to first births to married women in eight European countries since the 1970s. They found that the gradient is negative in most countries – except for Italy, where cohabitation is still emerging, and where the gradient thus has a U-shape. Still, in countries such as France, the highly-educated were the pioneers in childbearing within cohabitation in the 1970s

Figure 3:
Shares of births to single and cohabiting mothers under age 40 by educational attainment; United States 2005–2009



Source: Manning et al. (2014). Analysis using National Survey of Family Growth (NSFG) 2006–2010. High school or general education degree (GED) imply the completion of the upper secondary education level, which is the ISCED 2011 (International Standard Classification of Education) level 3; some college corresponds to levels 4-5; and college degree or more implies the completion of at least level 6. Retrieved from National Center for Family & Marriage Research in November 2016 at https://www.bgsu.edu/content/dam/BGSU/college-of-arts-and-sciences/NCFMR/documents/FP/FP-14-05_TrendsInBirths.pdf.

and the 1980s, and the gradient did not shift until the end of the 1990s. Among single women, the education gradient is strongly negative in all countries. Perelli-Harris et al. (2010) conclude that the SDT alone cannot explain those patterns, but rather the SDT combined with some of the economic constraints I discussed in previous sections. In the U.S. case, the shares of births to single and cohabiting mothers by education for the 2005–2009 period display a steep negative gradient (Figure 3). While 64% of births to women with less than a high school diploma happened outside of marriage (28% among single women), the corresponding share for those with college degrees was only 8% (3% among single women). These rates stood at 43% and 5% in 1980–84 (Manning et al. 2014). Furthermore, less-educated women are becoming mothers at earlier ages. In 2011, around 45% of new U.S. mothers with a high school diploma or less were younger than age 25, while the corresponding rate for college graduates was 3% (Pew Research Center 2013).

These demographic changes have resulted in an increasing divide in the amount of parental resources children receive, which is linked to a large extent with differences in the educational attainment levels, ages, and marital statuses of their parents (McLanahan 2004). Lundberg and Pollak (2014) noted that while some highly-educated couples may cohabit before entering marriage, they typically have children within relatively stable marriages in the U.S. (and in long-term unions in Europe, where cohabitation is more widely accepted and stable). For highly-educated parents who devote considerable resources of time and money into raising their children, a stable union is the commitment mechanism that enables such investments. The amounts of time both fathers and mothers spend caring for their children under five, and the amounts of money they spend per child, have increased since the early 1970s, particularly among the college-educated and households in the top income quartile (Lundberg and Pollak 2014). Similarly, maternal education in the U.S. is positively associated with time devoted to different forms of child care across ages zero to 13 (Kalil et al. 2012).

As McLanahan (2004) pointed out, the unequal educational, material, and emotional resources that children in different types of families receive sets them on different paths that continue into adulthood. These *diverging destinies* are mainly the result of rising inequality, and can in turn contribute to the persistence of inequality through intergenerational continuities (McLanahan and Percheski 2008). Of the children born outside of marriage, those born to less-educated single mothers are the most vulnerable, as they are at risk of having low educational attainment, of entering the labor market at the low end with a series of unstable jobs, and of becoming a parent while young and unmarried. Despite their tendency to have children early, the absence of a stable partnership and the lack of economic resources may depress the fertility of less-educated women (and men), and may thus strengthen the convergence in fertility across educational groups.

Although births outside of marriage are widespread in most parts of Europe, including in the Nordic countries, they are not as closely associated with large social status disadvantages as they are in the United States. Whether or not being born to unmarried parents negatively affects a child's outcomes depends to a large extent on the workings of the welfare state and on the stability of the union.

4 Inequality: implications for the future of the fertility educational gradient

The negative gradient of fertility by educational attainment that was prevalent during most of the 20th century seems to have weakened in developed countries. Even though more-educated women still have fewer children and are more likely to fall short of their intentions than their less-educated counterparts, the gap in the number of children born to these groups has shrunk. In this article, I have suggested some mechanisms that could underlie this apparent convergence, such as the depth of the Great Recession and rising inequality; as well as the decline in the social status selectivity of high-educated mothers in terms of their preferences regarding career and children, which is due to the sharp increase in the share of the population with post-secondary education. Among these mechanisms, this study has examined how different drivers of inequality could mediate the childbearing behavior of women of different educational backgrounds. Here, I briefly review how each of those sources of inequality could sway the education-fertility relationship in the future. Furthermore, I outline some policy implications for the labor market integration of both women and immigrants, and describe the role of social policy in moderating the intergenerational persistence of poverty.

First, I have discussed how the least- and mid-educated have been particularly affected by the recent Great Recession, and by rising employment *polarization*. Whether or not these structural changes in the labor market continue to interfere with the childbearing plans of households at the bottom of the educational distribution will determine the persistence of the fertility convergence. The trend toward young adults returning to (or staying in) their parental home has yet to stop, at least for young women (Cherlin et al. 2013). It has become more difficult for less- and medium-educated men (and women) to sustain what are generally considered "good" jobs, with relatively high levels of pay, stability, and benefits. Some routine jobs that can easily be off-shored or mechanized are disappearing, while the relative demand for more manual and more abstract jobs at either end of the income distribution is increasing (Autor 2014b). This loss of "jobs in the middle" affects not only medium-educated workers, but also some university graduates in particular fields who may have to adapt their career and childbearing plans accordingly. If their job aspirations and plans to make large investments in their children's human capital endure, they may have to adjust their family size downward. Such a trend would lead to further convergence in fertility levels across educational groups, or even to the appearance of a U-shaped relationship between education and fertility – which has already been observed to some extent in previous economic crises (e.g. in the transition to third births by education in Europe during the 1990s, Adserà 2011b).

Second, gender convergence in labor participation and wages has stalled since the late 1990s. Even after adjusting for traditional human capital variables, such as education (in which women are now at a relative advantage) and experience, the unexplained gender wage gap is still substantial, and is driven largely by differences in occupations and sectors (Blau and Khan 2016). Wages in the high-end professions to which many highly-educated women aspire tend to increase non-linearly with hours of work, and thus elicit a commitment of extended worktime (Goldin 2014). As a result, some women find themselves – either by choice or because of their cumulated employment and childbearing history – in professions that temper the trade-offs between work and family, but that pay less and limit their progress within the firm hierarchy. The heterogeneity of career trajectories among highly-educated women may pull their fertility in different directions, making it difficult to predict the ultimate impact on the education fertility gradient. Women who work in demanding positions at the top of the labor market may be able to sustain fertility levels close to those of women in more family-friendly jobs by either postponing childbearing or by outsourcing child care (Raz-Yurovich 2014). As life expectancy rises and families become smaller, institutions need to level the playing field for women so that the whole society benefits from the long-term returns to their human capital investments. Labor market institutions may become more friendly as more educated women gain political power, and change the incentives in the workplace to promote overall gender equality, and to avoid penalizing women early in their careers who choose to devote time to childrearing (Myrskylä et al. 2009, Van Bavel 2012). Finally, men need to support this process by doing more housework and by adjusting their own labor market choices (de Laat and Sevilla-Sanz 2011; Van Bavel 2012, Esping-Andersen 2017).

Third, I have noted that if migrant fertility patterns continue to converge with those of the native-born population, immigrant inflows should neither greatly affect the educational gradient of fertility nor total fertility. Sobotka (2008) showed that the net effect of immigrants coming from high-fertility countries on the period total fertility of most of the receiving countries in Europe is relatively small, ranging from 0.05 to 0.10 in absolute terms. However, if there are large shifts in the composition of the migrants or if the economic barriers they encounter upon arrival (in part due to rising inequality) are large, their future patterns of fertility would be harder to forecast. Nonetheless, even if the origins of the migrants change dramatically, most sending countries are also experiencing large and rapid decreases in fertility (see the case of Mexico, for example). Thus, the idea of migrant fertility patterns "converging" with native patterns is starting to become outdated, even though there are still a few sending countries, such as those in sub-Saharan Africa, in which the period TFRs remain above the replacement-level threshold. Migration policy will be key in determining the selectivity of immigrants and their educational composition, as has been observed in contexts such as Canada (Adserà and Ferrer 2014a and 2014b). Finally, national policies that foster immigrant female labor force participation and women's socioeconomic integration by giving these women access to good jobs and enabling them to combine work and family may strengthen the compression of fertility rates across educational groups at the country level.

Finally, I argue that inequality in childhood conditions can be more consequential and can lead to lasting *diverging destinies* in countries where intergenerational mobility levels are low, and where access to educational resources and high-quality schools is strongly linked to household income, such as in the U.S. In those settings, the gaps in non-marital fertility and the average age at first birth between the top and the bottom of the education ladder are bound to persist over time. Public policy can moderate the impact of initial conditions for the future of the next generation. Universal benefits based on individual needs (as in Scandinavian and other European countries), rather than on family (means-tested) eligibility encourage work-family balance, strengthen union stability, and improve children's future chances (McLanahan 2004). Unstable partnerships, the scarcity of good jobs, and the low marriageability of less-educated men could exert downward pressure on completed fertility among the least-educated, and could contribute to the continuous convergence of family sizes across educational attainment levels (Perelli-Haris et al. 2010, Kalmijn 2013, Cherlin et al. 2013, McLanahan and Jacobsen 2015). Policies that foster the employability of less-educated men (and women) and provide more resources to households at the bottom may lessen these dynamics, and reduce inequalities among children.

References

Adserà, A. 2004. Changing fertility rates in developed markets. The impact of labor market institutions. *Journal of Population Economics* 17: 17–43.

Adserà, A. 2005. Vanishing children: From high unemployment to low fertility in developed countries. *American Economic Review* 95(2): 189–193.

Adserà, A. 2006. An economic analysis of the gap between desired and actual fertility: The case of Spain. *Review of Economics of the Household* 4(1): 75–95, March.

Adserà, A. 2011a. The interplay of employment uncertainty and education in explaining second births in Europe. *Demographic Research* 25: 513–544.

Adserà, A. 2011b. Where are the babies? Labor market conditions and fertility in Europe. *European Journal of Population* 27: 1–32.

Adserà, A., A. Ferrer, W. Sigle-Rushton and B. Wilson (2012). Fertility patterns of child immigrants: Age at immigration and ancestry in comparative perspective. In *The ANNALS of the American Academy of Political and Social Science*, eds M. Tienda and A. Adserà, September 643(1): 134–159.

Adserà, A. and A. Ferrer 2014a. Fertility adaptation of child migrants to Canada. *Population Studies* 68(1): 65–79.

Adserà, A. and A. Ferrer 2014b. Immigrants and demography: Marriage, divorce, and fertility. In *Handbook on the Economics of International Migration*, eds B. R. Chiswick and P. W. Miller, for the Handbooks in Economics Series, Kenneth J. Arrow and Michael D. Intriligator, Volume 1. Elsevier B.V.

Ambrus, A. and E. Field 2008. Early marriage, age of menarche, and female schooling attainment in Bangladesh. *Journal of Political Economy* 116(5): 881–930.

Anderson, Gunnar 2004. Childbearing after migration: Fertility patterns of foreign-born women in Sweden. *International Migration Review* 38(2): 747–774.

Autor 2006. The polarization of the U.S. labor market. *American Economic Review Papers and Proceedings* 96(2): 189–194, May 2006 (with Lawrence F. Katz and Melissa S. Kearney).

Autor, David 2014a. Skills, education and the rise of earnings inequality among the other 99 percent. *Science* 344(6186): 843–851, 23 May 2014.

Autor, David 2014b. Polanyi's paradox and the shape of employment growth. Proceedings of the federal reserve bank of Kansas city, Jackson Hole Economic Policy Symposium (August 2014), 129–177.

Autor, David, David Dorn, and Gordon H. Hanson 2015. The labor market and the marriage market: How adverse employment shocks affect marriage, fertility, and children's living circumstances. MIT Working Paper.

Bailey, Martha J. 2006. More power to the pill: The impact of contraceptive freedom on women's lifecycle labor supply. *Quarterly Journal of Economics* 121: 289–320.

Bailey, Martha J., Melanie Guldi and Brad J. Hershbein 2014. Is there a case for a second demographic transition? Three distinctive features of the post-1960 U.S. fertility decline. NBER Chapters. In *Human Capital in History: The American Record*, 273–312. National Bureau of Economic Research, Inc.

Bean, F., C. Swicegood, and R. Berger 2000. Mexican-origin fertility: New patterns and interpretations. *Social Science Quarterly* 811: 404–420.

Beaujouan, Éva, Zuzanna Brzozowska, and Kryštof Zeman 2016. The limited effect of increasing educational attainment on childlessness trends in twentieth-century Europe, women born 1916–65, *Population Studies* 70(3): 275–291.

Beaujouan, Éva and Caroline Berghammer 2017. The gap between lifetime fertility intentions and completed fertility in Europe and the United States: A cohort approach, Working paper, VID.

Berghammer, Caroline and Alícia Adserà 2016. Inequality between families after the great recession: The education gap in unemployment across Europe and in the United States, mimeo. Princeton University.

Bewley, Susan, Melanie Davies, and Peter Braude 2005. Which career first? The most secure age for childbearing remains 20–35. *British Medical Journal* 331(7517): 588–589.

Blau, Francine D. and Lawrence M. Kahn 2000. Gender differences in pay. *Journal of Economic Perspectives Fall* 75–99.

Blau, Francine D. and Lawrence M. Kahn 2016. The gender wage gap: Extent, trends, and explanations. IZA DP No. 9656. January.

Blossfeld, H. P. and A. Timm 2003. *Who Marries Whom? Educational Systems as Marriage Markets in Modern Societies*. Dordrecht: Kluwer.

Bongaarts, J. 2001. Fertility and reproductive preferences in post-transitional societies. *Population and Development Review* 27: 260–281.

Bureau of Labor Statistics 2015. Highlights of women's earnings in 2014, BLS reports, REPORT 1058, November. http://www.bls.gov/opub/reports/womens-earnings/archive/highlights-of-womens-earnings-in-2014.pdf.

Butz, W. and M. Ward 1979. The emergence of countercyclical U.S. fertility. *American Economic Review* 69: 318–328.

Charles, M. and K. Bradley 2002. Equal but separate? A cross-national study of sex segregation in higher education. *American Sociological Review* 67(4): 573–599.

Cherlin, A., E. Cumberworth, S. P. Morgan, and C. Wimer 2013. The effects of the great recession on family structure and fertility. *The ANNALS of the American Academy of Political and Social Science* 650: 214–231.

Choi, K. 2014. Fertility in the context of Mexican migration to the United States. *Demographic Research* 30(24): 703–738.

Coale, A. J. 1973. The demographic transition reconsidered. In *International Population Conference*. Liège, 1973, Volume I, pp. 53–72. Liège, Belgium: International Union for the Scientific Study of Population.

Cohen, J. E., Ø. Kravdal and N. Keilman 2011. Childbearing impeded education more than education impeded childbearing among Norwegian women. *Proceedings of the National Academy of the United States of America* 108(29): 11830–11835.

Coleman D., P. Compton and J. Salt 2002. Demography of migrant populations: The case of the United Kingdom. In *The Demographic Characteristics of Immigrant Populations*, eds W. Haug, P. Compton and Y. Courbage, 497–552 (Population Studies No. 38). Strasbourg: Council of Europe.

Cooke, L. 2009. Gender equity and fertility in Italy and Spain. *Journal of Social Policy* 38(1): 123–140.

Craig, Lyn and Peter Siminski 2011. If men do more housework, do their wives have more babies? *Social Indicators Research* 101(2): 255–258.

de Laat, J. and A. Sevilla 2011. The fertility and women's labor force participation puzzle in OECD countries: The role of men's home production. *Feminist Economics* 17(2): 87–119, Taylor & Francis Journals.

Esping-Andersen, G. 2017. Education, gender revolution, and fertility recovery. Vienna yearbook of population research 2017(15): xx–xx.

Eurostat. 2015. The gender pay gap in the European union, European commission, 2015. Accessed http://ec.europa.eu/justice/gender-equality/files/gender_pay_gap/gpg_eu_factsheet_2015_en.pdf.

Eurostat 2017. Eurostat database. Accessed in March 2017 at http://ec.europa.eu/eurostat/data/database.

Fernandez, R. and A. Fogli 2006. Fertility: The role of culture and family experience. *Journal of the European Economic Association*.

Georgiadis, A. and A. Manning 2011. Change and continuity among minority communities in Britain. *Journal of Population Economics* 24: 541–568.

Galor and Weil 1996. The gender gap, fertility, and growth. *The American Economic Review* 86(3): 374–387.

Goldin, C. 2004. The long road to the fast track: Career and family. *Annals of the American Academy of Political and Social Science* 596(1): 20–35.

Goldin, C. 2006. The quiet revolution that transformed women's employment, education, and family. *American Economic Review* 96(2): 1–21.

Goldin C. A. 2014. Grand gender convergence: Its last chapter. *American Economic Review* 104(4): 1091–1119.

Goldin, C. and L. Katz 2002. The power of the pill: Oral contraceptives and women's career and marriage decisions. *Journal of Political Economy* 110(4): 730–770.

Goldstein, Joshua, Michaela Kreyenfeld, Aiva Jasilioniene, and Deniz Dilan Karaman Örsal 2013. Fertility reactions to the 'great recession' in Europe: Recent evidence from order-specific data. *Demographic Research* 29: 85–104.

Goldstein, Joshua R. and Catherine T. Kenney 2001. Marriage delayed or marriage forgone? New cohort forecasts of first marriage for U.S. women. *American Sociological Review* 66(4): 506–519.

Goldstein, J., W. Lutz and M. R. Testa 2003. The emergence of sub-replacement fertility ideals in Europe. *Population Research and Policy Review* 22(5–6): 479–496.

Goldstein, S. and A. Goldstein 1981. The impact of migration on fertility: an 'own children' analysis for thailand. *Population Studies* 35: 265–284.

Goldstein, S. and A. Goldstein 1983. Migration and fertility in peninsular Malaysia: An analysis using life history data. Santa Monica, CA: RAND Corporation.

Goos, Maarten, Alan Manning and Anna Salomons 2014. Explaining job polarization: Routine-biased technological change and offshoring. *American Economic Review* 104(8): 2509–2526.

Juhn, Chinhui and Kristin McCue 2017. Specialization then and now: Marriage, children, and the gender earnings gap across cohorts. *Journal of Economic Perspectives* 31(1): 183–204.

Kalil, Ariel, Rebecca Ryan, and Michael Corey 2012. Diverging destinies: Maternal education and the developmental gradient in time with children. *Demography* 49(4): 1361–1383.

Kalmijn M. (2013). The educational gradient in marriage: A comparison of 25 European countries. *Demography* 50(4): 1499–1520.

Kohler, H. P., F. C. Billari and J. A. Ortega 2002. The emergence of lowest-low fertility in Europe during the 1990s. *Population and Development Review* 28(4): 641–680.

Kravdal, Øystein 2002. The impact of individual and aggregate unemployment on fertility in Norway. *Demographic Research* 6: 263–293.

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): 854–873.

Kreyenfeld, M. and G. Andersson 2014. Socioeconomic differences in the unemployment and fertility nexus: Evidence from Denmark and Germany. *Advances in Life Course Research* 21: 59–73.

Lanzieri, Giampaolo 2012. Merging populations: A look at marriages with foreign-born persons in European countries. *Statistics in Focus* 29/2012. Luxembourg: Eurostat.

Lanzieri, Giampaolo 2013. Towards a 'baby recession' in Europe? Differential fertility trends during the economic crisis. *Statistics in Focus*, Eurostat 13/2013.

Lemieux, Thomas 2008. The changing nature of wage inequality. *Journal of Population Economics* 21(1): 21–48.

Lesthaeghe, R. 2010. The unfolding story of the second demographic transition. *Population and Development Review* 36(2): 211–251.

Lundberg, Shelly and Robert A. Pollak 2014. Cohabitation and the uneven retreat from marriage in the U.S., 1950–2010, NBER Chapters. In *Human Capital in History: The American Record*, 241–272. National Bureau of Economic Research, Inc.

Lutz, W. and V. Skirbekk 2014. How education drives demography and knowledge informs projections (Chapter 2). In *World Population and Human Capital in the Twenty-First Century*, eds Wolfgang Lutz, William P. Butz and KC Samir. Oxford University Press.

Manning, W. D., S. L. Brown, E. Lamidi and K. K. Payne 2014. Trends in births to single and cohabiting mothers, 1980–2009. (FP-14-05). *National Center for Family & Marriage Research*. Retrieved from https://www.bgsu.edu/content/dam/BGSU/college-of-arts-and-sciences/NCFMR/documents/FP/FP-14-05_TrendsInBirths.pdf.

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): 259–275.

McLanahan, S. 2004. Diverging destinies: How children fare under the second demographic transition. *Demography* 41(4): 607–627.

McLanahan, S. and C. Perchewski 2008. Family structure and the reproduction of inequalities. *Annual Review of Sociology* 34: 257–276 (August 2008).

McLanahan and Jacobsen 2014. Diverging destinies revisited. In *Families in an Era of Increasing Inequality* (forthcoming 2015). Springer.

Merz, E.-M. and A. C. Liefbroer 2017. Cross-national differences in the association of educational attainment with completed fertility. Do welfare regimes matter? *Vienna Yearbook of Population Research* 2017(15): xx–xx.

Miettinen, A., A. Rotkirch, I. Szalma, A. Donno and M. L. Tanturri 2015. Increasing childlessness in Europe: Time trends and country differences. Families and Societies working paper Series N. 33.

Milewski, N. 2007. First child of immigrant workers and their descendants in west Germany: Interrelation of events, disruption, or adaptation? *Demographic Research* 17(29): 859–896.

Mills, M. and H. P. Blossfeld 2005. Globalization, uncertainty and the early life course. A theoretical framework. In *Globalization, Uncertainty and Youth in Society*, eds H. P. Blossfeld, E. Klijzing, M. Mills and K. Kurz, 1–24. London: Routledge.

Morgan, S. P. 2003. Low fertility in the twenty-first century. *Demography* 40(4): 589–603.

Myrskylä, M., H. P. Kohler and F. C. Billari 2009. Advances in development reverse fertility decline. *Nature* 460(6): 741–743.

Neyer G., J. M. Hoem and G. Andersson 2017. Education and childlessness: The influence of educational field and educational level on childlessness among Swedish and Austrian women. In *Childlessness in Europe: Contexts, Causes, and Consequences*, eds M. Kreyenfeld and D. Konietzka. Demographic Research Monographs (A series of the Max Planck Institute for Demographic Research). Cham: Springer.

Ní Bhrolcháin, M. and Éva Beaujouan 2012. Fertility postponement is largely due to rising educational enrolment. *Population Studies* 66(3): 311–327.

OECD 2014. *Education at a Glance 2014: OECD Indicators*, OECD Publishing. DOI: 10.1787/eag-2014-en.

Parrado, E. A. and S. P. Morgan 2003. Intergenerational fertility among hispanic women: New evidence of immigrant assimilation. *Demography* 45.

Perelli-Harris, B., W. Sigle-Rushton, M. Kreyenfeld, T. Lappegård, R. Keizer and C. Berghammer 2010.The educational gradient of childbearing within cohabitation in Europe. *Population and Development Review* 36(4): 775–801.

Pew Research Center 2013. Long-term trend accelerates since recession. Record share of new mothers are college educated. http://www.pewsocialtrends.org/2013/05/10/record-share-of-new-mothers-are-college-educated/, retrieved November 2015.

Quesnel-Vallée, A. and S. P. Morgan 2003. Missing the target? Correspondence of fertility intentions and behaviour in the U.S. *Population Research and Policy Review* 22(5–6): 497–525.

Raz-Yurovich, L. 2014. A transaction cost approach to outsourcing by households. *Population and Development Review* 40(2): 293–309.

Schwartz, C. R. 2010. Earnings inequality and the changing association between spouses' earnings. *American Journal of Sociology* 115: 1524–1557.

Skirbekk, V. 2008. Fertility trends by social status. *Demographic Research* 18(5): 145–180.

Skirbekk, V., H. P. Kohler and A. Prskawetz 2004. Birth month, school graduation, and the timing of births and marriages. *Demography* 41(3): 547–568.

Sobotka, T. 2004. Is lowest-low fertility in Europe explained by the postponement of childbearing? *Population and Development Review* 30(2): 195–220.

Sobotka, T. 2008. The rising importance of migrants for childbearing in Europe. *Demographic Research* 19(9): 225–248.

Sobotka, Tomás, Vegard Skirbekk and Dimiter Philipov 2011. Economic recession and fertility in the developed world. *Population and Development Review* 37: 267–306.

Stange, Kevin 2011. A longitudinal analysis of the relationship between fertility timing and schooling. *Demography* 48(3): 931–956.

Stevenson, B. 2008. Divorce law and women's labor supply. *Journal of Empirical Legal Studies* 5(4): 853–873, December 2008.

Testa, M. R. 2012. Family sizes in Europe: Evidence from the 2011 Eurobarometer survey. European demographic research paper 2. Vienna institute of demography, Austrian academy of sciences.

Testa, Maria Rita 2014. On the positive correlation between education and fertility intentions in Europe: Individual-and-country-level evidence. *Advances in Life Course Research* 21: 28–42.

Torr, B. M. and S. E. Short 2004. Second births and the second shift: A research note on gender equity and fertility. *Population and Development Review* 30(1): 109–130.

Toulemon, L. 2004. Fertility among immigrant women, new data, a new approach. *Population & Societies* 400(April 2004): 1–4.

U.S. Census Bureau 2014. Fertility of women in the united states: 2012. *Population Characteristics*, Report by Monte, Lindsay M. and Renee R. Ellis.

Van Bavel, J. 2012. The reversal of gender inequality in education, union formation and fertility in Europe. *Vienna Yearbook of Population Research* 2012: 127–154.

Van Bavel, J. 2014. The mid-twentieth century baby boom and the changing educational gradient in Belgian cohort fertility. *Demographic Research* 30(33): 925–962.

Willis, R. 1974. Economic theory of fertility behavior. In *Economics of the Family: Marriage, Children and Human Capital*, ed. Schultz, 25–80, UMI, NBER.

REFEREED ARTICLES

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Cross-national differences in the association between educational attainment and completed fertility. Do welfare regimes matter?

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Abstract

The decline in fertility has been linked to changes in educational attainment, particularly among women. Most studies on this topic have, however, focused on the impact of education on fertility timing. In this study, we examine the association between education and completed fertility; specifically, whether the educational gradient differs between women and men and between younger and older birth cohorts. Importantly, we investigate whether the educational gradient varies across European welfare systems. In our analysis, we applied multilevel modelling to individual-level data on fertility quantum in 25 countries from the European Social Survey. Overall, women and older cohorts had higher completed fertility rates than men and younger cohorts. The total number of children born to each individual decreased with increasing educational levels. This negative gradient was stronger among women than among men, and was weaker among younger than among older cohorts in western Europe. At the macro level, we found the weakest negative educational gradients in the social-democratic countries and in the post-Soviet states. The negative gradient was strongest in the Mediterranean countries and in the post-communist countries.

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1 Introduction

Over the last half century, the fertility patterns of Europe have changed markedly. With some variation between countries, throughout Europe the timing of entry into parenthood has been postponed, the prevalence of childlessness has increased, the total number of children in each family has decreased, and the proportion of children born outside of marriage has increased (Frejka 2008; Frejka and Sobotka 2008; Kreyenfeld 2010). Numerous theories have been put forward to explain these changes (e.g. Becker 1981; Lesthaeghe 1995; Van de Kaa 1996; McDonald 2000; Blossfeld et al. 2003; Esping-Andersen 2009; Perelli-Harris et al. 2010). What all of these theories have in common is that they suggest that educational attainment – and particularly the increase in educational attainment among women, which is linked to higher rates of female labour force participation – is a key driving force of these changes in fertility.

In tandem with the emergence of these theoretical ideas, a burgeoning empirical literature has developed that examines cross-national differences in the relationship between educational attainment or female employment on the one hand and fertility on the other. This is a very challenging research area, as researchers wishing to study this topic are faced with a number of questions. In our view, researchers have to make at least four decisions, either explicitly or implicitly. The first of these decisions pertains to the "dependent variable". It is possible to analyse either the relationship between educational attainment and specific parity progression ratios (e.g. Kreyenfeld 2010; Van Bavel 2010; Stange 2011; Wood et al. 2014), or the relationship between educational attainment and completed or total fertility (e.g. Engelhardt et al. 2004; Hilgeman and Butts 2009). The second decision concerns the type of macro-level explanation that is used. Does the explanation focus on cultural, economic, or institutional factors? While these three broad types of factors are obviously not mutually exclusive (as is made clear in, for instance, Van Bavel 2010), studies tend to focus on one of these factors more than the others. The third decision involves determining whether the macro-level explanation emphasises specific characteristics of national contexts; and, if so, whether it is preferable to test the relevance of these specific characteristics (e.g. Kalwij 2010) or to focus on a constellation of characteristics that form a kind of package (e.g. Matysiak and Vignoli 2007). The fourth and final decision involves choosing whether to classify countries on a one-dimensional or a multidimensional scale (e.g. Hilgeman and Butts 2010), or to use a typological approach in which countries are grouped based on how similar or dissimilar they are on the key dimensions of interest is preferable (e.g. Matysiak and Vignoli 2007).

Which of these approaches an individual researcher takes depends on both theoretical and practical considerations. The practical considerations are usually related to the type of data that are available. Richer data are needed when using a parity-specific approach than when using an approach that focuses on completed or total fertility only; and more specific data at the macro level are needed when employing a scaling approach than when using a typological approach. Theoretical considerations are important as well. For example, should the study take into account specific macro characteristics only, or a package of characteristics? What kinds of macro characteristics are considered most important? In our view, there is no single approach that is best suited to investigating cross-national differences. Rather, we contend that it is useful to stimulate the application of different types of approaches that – when viewed in conjunction with each other – can offer complementary insights.

In this article, we take a broad approach to our subject matter. We examine the association between educational attainment and completed fertility among cohorts who have (almost) finalised their reproductive careers, and study whether this association varies across Europe. In particular, we consider differences across welfare systems. We have both practical and theoretical reasons for focusing on completed fertility. Our data source (the European Social Survey) includes information on a larger number of European countries than other data sources (e.g. GGP or SHARE), but lacks full information on the timing of all childbirths. Although the information provided by a parity-specific approach is richer, our approach is simpler, and provides a relatively straightforward answer to the question of whether the relationship between educational attainment and final levels of fertility differs across countries. We also have practical and theoretical reasons for focusing on welfare systems. As the cohorts in our dataset were born between 1905 and 1966, we lack indicators of specific welfare arrangements during the childbearing ages of a large share of these cohorts. It is, however, possible to use a more global approach to the categorisation of welfare systems. Theoretically, it could be argued that the package of institutional arrangements matters more than the specific arrangements. If this is the case, it makes sense to use a broad welfare state typology to test whether the relationship between educational attainment and completed fertility differs across countries. A final defining feature of our approach is that we examine the educational gradient in completed fertility not only among women, but also among men. To empirically test our hypotheses, we have applied multi-level modelling to individual-level data on fertility quantum collected in 25 countries in the 2006 wave of the European Social Survey.

2 Background and hypotheses

In this section, we discuss the literature on the differences in the educational gradient of completed fertility across welfare systems, and develop hypotheses regarding these differences. First, however, we provide a brief overview of the main arguments that have been made in the debate over the relationship between educational attainment and completed fertility.

2.1 Educational attainment and completed fertility

A number of arguments regarding the link between educational attainment and the total number of children have been put forward. First, with reference to the

Second Demographic Transition (SDT) framework (Lesthaeghe and Van de Kaa 1986; Van de Kaa 1987; Lesthaeghe 1995), several scholars have argued that men and women with high levels of education tend to value autonomy more than their counterparts with low levels of education. This tendency has been attributed in part to the emphasis placed on values of self-reliance and autonomy in the curricula of higher education institutions (Meyer 1986). It has thus been posited that the highly educated have learned that they should not take existing lifestyles for granted, but should instead critically reflect upon these lifestyles (Giddens 1991). It has also been pointed out that highly educated individuals often spend considerable amounts of time away from the parental home, which may strengthen their desire for autonomy (Waite et al. 1986). This *autonomy* argument therefore suggests that through the experience of becoming educated, men and women come to place less value on traditional family life, which in turn leads them to choose to have no children or fewer children. The autonomy argument may apply to the younger cohorts in particular. According to the SDT theory, the processes of emancipation that have taken place in recent decades have led to a growing emphasis on individual autonomy and independence. These trends appear to be particularly salient among younger individuals.

A second, related argument is that highly educated people spend more time on childrearing than less educated individuals (Sayer et al. 2004; Craig 2006). This line of reasoning reinforces the assumptions of the classic literature on the quality/quantity trade-off; i.e. the idea that parents can choose to invest in either the number or the quality of their children (Hanushek 1992). While the focus has shifted over time from quantity to quality across the population, it is still generally the case that highly educated people are more likely to opt for quality, whereas less educated people are more likely to opt for quantity. This *quality* argument suggests that highly educated individuals will be more likely to have a small number of children than individuals with relatively low levels of education.

A third argument is based on the New Home Economics approach championed by Becker (1981). This *incompatibility* argument suggests that individuals have problems combining family and career because of time incompatibility. Growing numbers of individuals, and especially women, are admitting that parenthood limits their educational ambitions and employment opportunities (Koropeckyj-Cox and Pendell 2007). As a result of a perceived conflict between the roles associated with motherhood and professional life, highly educated women with good career opportunities may be more reluctant to have children. The picture for men is less clear, as the opportunity costs associated with parenthood are often lower for men than for women, and men's educational ambitions may not be threatened by fatherhood, especially in countries that support a male breadwinner model (Kalmijn and Saraceno 2008). Overall, the *incompatibility* argument suggests that highly educated individuals in particular are likely to find it difficult to reconcile work and parenthood, which may lead them to have fewer children than less educated individuals. However, this pattern might be gender-specific.

The fourth argument, which is also based on insights from economics (Becker 1981), emphasises monetary rather than time restrictions. The *affordability* argument is derived from the observation that raising children is costly, and that high-income couples are better able to afford to have children than couples with lower incomes. As income is strongly linked to educational attainment, it is assumed that an increase in educational levels will lead to an increase in the number of children individuals or couples can afford to have.

Thus, three out of four of these arguments suggest that highly educated individuals will have fewer children than less educated individuals. Although this does not necessarily imply that the educational gradient will be negative, we expect to find that the affordability argument is weaker than the combined impact of the other three arguments. Thus, we hypothesise that there is a general negative association between education and completed family size. However, we also expect to find that this effect operates differently for men than for women. Specifically, we anticipate that the incompatibility argument is more relevant for women than for men, as women are often expected to take on the main responsibilities for household labour. We therefore hypothesise that the negative relationship between education and the number of children is stronger for women than for men (Hilgeman and Butts 2009; McDonald 2000). Our first two hypotheses may be summed up as follows:

H1: The completed family size of both men and women in Europe is negatively related to their level of educational attainment.
H2: This negative relationship is stronger for women than for men.

2.2 Cross-national differences in the educational gradient

In recent years, much research has been conducted on cross-national differences in the extent to which states help women combine parenthood and paid employment. Some of that research (cf., Kalwij 2010; Adsera 2011) has been conducted at the macro level, and suggests that fertility may be higher in countries where this combination is facilitated by institutional arrangements (Engelhardt et al. 2004; Myrskylä et al. 2009; Thevenon and Gauthier 2011; Luci-Greulich and Thevenon 2013). Differences between welfare regimes may also have implications for the educational gradient in completed fertility.

Starting with the work of Esping-Andersen (1990, 1996), (European) countries have been clustered into one of a small set of welfare regimes based on how they organise the interplay between income transfers and social services. However, welfare regimes are characterised not only by the rights they grant, but by how these state activities interact with the family and the market in the provision of welfare (Esping-Andersen 1990, 1996). Esping-Andersen distinguished between liberal, social-democratic, and conservative-corporatist regimes. The liberal type – which is most common in countries with an Anglo-Saxon tradition – operates on the assumption that a majority of citizens can obtain adequate welfare benefits from the market, and that the government should play only a small role in welfare redistribution. The conservative-corporatist welfare regime type is characterised by a moderate level of decommodification, whereby status differentials are preserved and rights are attached to class and status (Esping-Andersen 1990). The direct influence of the state is limited to providing income maintenance benefits related to occupational status (Fenger 2007). These corporatist regimes are also frequently shaped by Christian traditions (Esping-Andersen 1996). As many of the countries with a conservative-corporatist welfare regime type have been heavily influenced by the traditional family values advocated by Christian churches, the family benefits provided in these countries tend to encourage parenthood within a traditional male breadwinner model. France, Germany, Austria, Belgium, the Netherlands, and Italy are often classified as conservative-corporatist regimes.[1] The third cluster, the social-democratic regime type, is mainly characterised by an emphasis on equalising the living conditions of the country's citizens, independent of individual contributions. This system focuses on synchronising social and labour market policies to provide citizens with relatively equal levels of income, health care access, and social benefits (Andersson et al. 2009). The Nordic countries of Denmark, Norway, Sweden, and Finland are usually classified as social-democratic regimes.

Soon after Esping-Andersen introduced his three regime types, a discussion started about whether these categories were sufficiently comprehensive; and about whether the southern European countries had been correctly classified as belonging to the conservative-corporatist regime category, or whether they should be assigned to a separate Mediterranean regime category (e.g. Ferrera 1996; Bonoli 1997). It has been suggested that Mediterranean countries deviate from the corporatist type in several ways: i.e. they have a fragmented income maintenance system, a low degree of state penetration of the welfare sphere, and a rather selective distribution of social benefits (Ferrera 1996). Thus, the Mediterranean welfare regime type is characterised by a strong reliance on the family, traditional gender role patterns, and low levels of institutionalised child care.

In central and eastern European countries, birth rates have been low since the communist system collapsed and was replaced by a capitalist market economy

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[1] We acknowledge that a considerable degree of heterogeneity may exist within this cluster of countries, especially with regard to the timing of the introduction of policies and infrastructures that facilitate the reconciliation of labour force participation and childrearing. France and Belgium, for example, introduced reconciliation policies – such as policies that provide access to affordable day care arrangements – much earlier than the other countries. In the current study, however, we decided to retain the original theoretically grounded classification of Esping-Andersen. Changes to this classification were only introduced based on successive theoretical discussions of welfare states. In response to the general criticism of Esping-Andersen's classification by Ferrera (1996) and Bonoli (1997), Italy was grouped with other Mediterranean countries. At the same time, we decided to keep France and Belgium in the conservative-corporatist category, as this is generally done when grouping welfare states based on general policy. However, we admit that with regard to specific reconciliation policies, France and Belgium might be closer to the Nordic welfare states than to the other conservative states. Therefore, we tested the robustness of our classification in the results section, and commented on the results in the discussion section.

Table 1:
Classification of welfare states across Europe

Welfare state regimes	Countries
Conservative-corporatist	Belgium, France, Netherlands, Austria, Germany, Switzerland
Social-democratic	Denmark, Finland, Norway, Sweden
Liberal	Great Britain, Ireland
Post-Soviet	Estonia, Latvia, Russia, Ukraine
Post-communist European	Bulgaria, Hungary, Poland, Romania, Slovenia, Slovakia
Mediterranean	Cyprus, Spain, Portugal

(Sobotka 2004). Economic restructuring and the accompanying uncertainties have led to societal transformations in these former socialist countries, which have increased the costs of childbearing (Philipov et al. 2006). The issue of how the post-Soviet states and the post-communist central European countries fit into the welfare regime typology has not been fully resolved. Esping-Andersen (1996) criticised the expansion of his typology, suggesting that the differences observed between the characteristics of his welfare regime types and those of eastern European countries were transitional in nature. However, many of these differences have yet to disappear. Fenger (2007) has therefore suggested that the eastern European post-communist countries should be assigned to one of two clusters: the post-Soviet states and the other post-communist countries. These two sets of eastern European countries have developed differently since the collapse of communism. Whereas countries like Poland and Slovenia joined the European Union after engaging in extensive negotiations and reforms, many post-Soviet states like Ukraine came under the influence of the Russian Federation. Both the post-communist eastern European and the post-Soviet welfare regimes resemble the conservative-corporatist regime type to some extent, albeit mixed with several characteristics of the social-democratic regime type. However, compared to the post-Soviet states, the post-communist countries have more developed governmental programs and social services, and a more generous welfare state overall (Fenger 2007). Table 1 displays the classification of the ESS countries into these welfare regime types.

Our broad welfare state typology only allows for a general classification of countries based on how they help families combine parenthood, education, and paid employment. At the same time, the generality of this approach allows us to classify all countries, which is useful given the lack of specific policy information for several countries. In addition, we believe that this classification approach offers valuable insights into how the educational gradient in completed fertility differs across Europe. For instance, Andersson et al. (2009) pointed out that the Nordic social-democratic countries have similarly high levels of levels of fertility and female labour force participation, and thus have "a common Nordic fertility regime" (p. 313). In an analysis of two cohorts of Polish women, Brzozowska (2014) found large and persistent differences in fertility by educational level both before and after the collapse of communism. In the liberal countries, and especially in the UK, large educational gradients in fertility have been found (Berrington et al. 2015).

Based on these earlier studies, and taking the characteristics of different welfare regimes into account, we expect to find that parenthood and labour force participation are more compatible in the social-democratic welfare regimes and – albeit to a lesser extent – in the liberal and the conservative welfare regimes than in the Mediterranean, the post-communist eastern European, and the post-Soviet welfare regimes; and that the educational gradients are therefore smaller in the first than in the second group of regimes. For instance, we expect to find that the provision of both public and private parental leave and childcare services is greater in the former than in the latter group (Hilgeman and Butts 2009). We thus formulate the following hypothesis:

H3: The negative educational gradient in completed family size is stronger in welfare regime types with poor arrangements for combining parenthood and employment than in welfare regime types with better arrangements for combining parenthood and employment.

As policies that facilitate the reconciliation of family and work have been implemented only relatively recently, we can expect to find that the negative gradient is weaker among younger cohorts (who may have benefited from these policies) than among older cohorts (who were unable to benefit from these policies). However, this cohort shift will have occurred only in welfare regimes in which these policies have improved over time. In welfare regimes in which there has been little or no improvement in these policies, no such shift across cohorts is expected. We therefore compare two cohorts – those cohorts born before 1945 and those born after 1944 – and formulate the following hypothesis:

H4: The educational gradient in completed family size is weaker for younger than for older cohorts, but only in welfare regimes with policies aimed at facilitating the reconciliation of family and work.

3 Method

3.1 Procedure and participants

The data used in this study stem from the third round of the European Social Survey (ESS), which was conducted in 2005 and 2006. The ESS is a repeated cross-sectional survey that focuses on identifying cross-national differences in social attitudes and values, and on collecting high-quality data by ensuring high response rates (Stoop et al. 2010) and questionnaire equivalence across countries (Jowell et al. 2007). To achieve results with a very high degree of cross-country comparability, strict protocols are followed (Matsuo et al. 2009). To enhance comparability, the questionnaires have been translated with careful attention to the country context, and the same sampling plan is applied in all countries (cf. Billari et al. 2011). The data are collected through face-to-face interviews in the following countries: Austria, Belgium, Bulgaria, Switzerland, Cyprus, Germany, Denmark, Estonia, Spain, Finland, France, Great Britain, Hungary, Ireland, Latvia, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Sweden, Slovenia, Slovakia, and Ukraine. The ESS samples are intended to be representative of the residential population of each nation aged 15 and older, regardless of nationality, citizenship, or legal status. Any individual who has been living in the country for at least one year could be selected as respondent. Strict guidelines are used to obtain a dataset of high methodological quality. The response rates for the third round varied between 46.0% and 73.2%, with an average of 63.4%. The sample sizes varied between 995 (Cyprus) and 2,916 (Germany).

In the current study, we used information on 29,035 respondents from 25 countries. Given our focus on the total number of children born to an individual during his or her lifetime, we excluded respondents who had a fair chance of having additional children. We thus included in our sample respondents aged 40 or older, because only between 1.5% and 3.0% of births are to women over age 40 (Sobotka et al. 2010). Although men may be expected to have a higher percentage of their births after reaching age 40, the share is still likely to be relatively small. The mean age of the respondents was 59.3 (*SD* = 12.4, ranging from 40 to 101 years), and 56% were female. The characteristics of the entire sample and the key variables stratified by welfare regime are presented in Table 2.

3.2 Measures

Number of children. The ESS respondents were asked how many children they had ever given birth to/fathered. This variable is used as the dependent variable "total number of children."

Independent individual-level variables. The following characteristics were used as individual-level predictors: gender, birth cohort, partner status, and education. Education was measured as completed years of education. For partner status, we used a measure indicating whether respondents had ever lived with a partner for three months or longer. To allow for possible non-linear cohort effects, both cohort and cohort squared were included in the analyses.

Welfare state regime. Based on the theoretical discussion above, countries were identified as having one of six welfare regime types.

Table 2:
Sample characteristics broken down by welfare state regime

Welfare state regime	Age M (SD)	Gender % female	Ever partnered, % yes	Education, M (SD)	Number of children, M (SD)
Conservative-corporatist (n = 8,184)	58.33 (12.64)	53.63	89.52	12.43 (3.91)	1.90 (1.38)
Social-democratic (n = 4,495)	59.17 (12.43)	51.79	96.08	12.39 (4.50)	2.12 (1.41)
Liberal (n = 2,522)	60.04 (13.05)	54.15	88.21	12.73 (4.06)	2.25 (1.86)
Post-Soviet (n = 4,673)	59.70 (12.07)	62.74	91.18	11.47 (3.78)	1.72 (1.04)
Post-communist European (n = 5,991)	59.31 (11.87)	59.86	94.05	10.95 (3.85)	2.06 (1.28)
Mediterranean (n = 3,170)	60.37 (12.79)	58.90	94.23	7.82 (5.23)	2.23 (1.61)
Total (N = 29,035)	59.25 (12.43)	55.99	92.14	11.50 (4.38)	2.01 (1.40)

Source: ESS 2005/2006.

3.3 Analysis strategy

Descriptive analyses were performed for the whole sample, and were broken down by welfare regime. Negative binomial multilevel regression was used to investigate the statistical effects of individual and country characteristics and their interactions (both within-level and cross-level interactions) on the average number of children born to individuals in Europe. The analyses were conducted for the entire sample, and for men and women separately. The effects were then calculated for two different cohorts: respondents born before 1945 and respondents born after 1944. Using multilevel modelling, units at the first level (individual respondents) were treated as nested within units at the next (second) level of analysis (countries), and the dependency between observations within countries was accounted for. The analyses were conducted by using the negative binomial multi-level regression procedure of MLwin, with the maximum likelihood method to estimate variance components. The negative binomial distribution was used because it is more flexible than the Poisson distribution. Several multilevel models were estimated, beginning with an *intercept only* model (cf. Model 1). Such a model allowed us to examine whether there was a statistically significant amount of variation in completed fertility at the country level. This estimate is presented in the results on the random part of the model.

4 Results

4.1 Descriptive results

Table 2 presents means and standard deviations of the core variables broken down by welfare regime. Overall, across countries and cohorts and for both sexes, the average number of children was 2.01. The total number of children was higher for women than for men (m = 2.11 versus m = 2.02), and for individuals born before 1945 (m = 2.24) than for individuals born after 1945 (m = 1.97). This reduction in the total number of children was mainly due to changes in the behaviour of respondents with low educational levels. For instance, among women with 13 or more years of completed education, the mean family size was relatively stable (m = 1.91 for women born before 1945 and m = 1.90 for women born after 1944). However, among women with 12 or fewer years of completed education, the mean total number of children dropped from 2.34 among those born before 1945 to 2.13 among those born after 1944. As we can see in Table 2, there is considerable variation across welfare regimes. The average number of children per respondent was 1.72 in the post-Soviet states, but was 2.25 in the countries with a liberal welfare regime type.[2] Overall, the mean total number of children was clearly lowest in the post-Soviet countries and in the conservative-corporatist countries, and was clearly highest in the liberal and the Mediterranean countries.

On average, respondents had attained about 11.5 years of education. Men had completed more years of education on average than women ($m = 12.0$ versus $m = 11.1$). The number of years spent in education was lowest in Mediterranean countries, at an average of eight years. In all other countries, the average number of years spent in education was 11 or more. The average age of the respondents was just over 59, and 56% of the respondents were women. Over 90% had been partnered at some point during their life.

4.2 Multilevel results

To test our hypotheses, a number of multilevel models were estimated. The results are presented in Table 3. The clearly statistically significant variation in the constant in the *intercept only* model (cf. Model 1) indicates that completed fertility varied across countries.

In the second model, individual characteristics were added. Overall, women reported having higher completed fertility than men. Fertility also decreased across cohorts, with older birth cohorts having higher completed fertility than younger cohorts. Our finding that the effect of cohort squared was non-significant indicates that the drop in fertility occurred in a linear fashion. The strong positive effect of the variable "ever lived with a partner" implies that respondents who had never lived with a partner had far lower levels of completed fertility than respondents who had lived with a partner during part of their reproductive lifespan.

The most important finding in Model 2 is the negative and statistically significant effect of completed years of education ($b = -.012$). This statistical effect implies that the total number of children born to respondents across Europe was decreasing with increasing levels of education. This finding supports our first hypothesis. After the individual-level variables were included, the variance at the country level fell by almost 10% (from 0.037 to 0.034); which suggests that a small portion of the country differences in the total number of children is attributable to differences in the composition of the population in terms of levels of education and partner status.

Also in Model 2, we tested the hypothesis that the negative educational gradient was stronger for women than for men by including an interaction term between

[2] Given the nature of our data, it was hard to validate the information on the total number of children. We extracted information on completed fertility for the birth cohorts and the countries in our classification from the Human Fertility Database (www.humanfertililty.org), and compared the ranking of the welfare states with those in our data. There were no large discrepancies. In both instances, the highest completed fertility rate was recorded in the liberal and the southern European countries, and the lowest completed fertility rate was recorded in the post-Soviet and the conservative-corporatist countries.

Table 3:
Negative binomial multilevel regression models explaining the number of children across Europe (N_i = 29,035; N_j = 25)

	Model 1		Model 2		Model 3		Model 4	
	Estimate	**SE**	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**
Predictors individual level								
Constant	0.700***	0.017	–0.065*	0.027	–0.080*	0.035	–0.078*	0.035
Gender			0.038***	0.008	0.039***	0.008	0.037***	0.008
Cohort			–0.005***	0.000	–0.005***	0.000	–0.005***	0.000
Cohort squared			–0.000	0.000	–0.000	0.000	–0.000	0.000
Ever lived with partner			0.787***	0.021	0.788***	0.022	0.788***	0.022
Completed years of education			–0.012***	0.001	–0.012***	0.001	–0.011***	0.003
Gender*education			–0.009***	0.002	–0.009***	0.002	–0.008***	0.002
Predictors country level								
Conservative-corporatist (ref.)								
Social-democratic					0.075*	0.044	0.077*	0.044
Liberal					0.227***	0.055	0.226***	0.056
Post-Soviet					–0.195***	0.045	–0.193***	0.046
Post-communist European					0.008	0.039	–0.002	0.040
Mediterranean					0.058	0.048	0.016	0.050
Cross-level interaction								
Education*conservative-corporatist (ref.)								
Education*social-democratic							0.010*	0.004
Education*liberal							0.000	0.005
Education*post-Soviet							0.011**	0.004
Education*post-communist European							–0.011**	0.004
Education*Mediterranean							–0.011**	0.004

Continued

Table 3:
Continued

	Model 1		Model 2		Model 3		Model 4	
	Estimate	**SE**	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**
Random part								
Variance (education)							0.000	0.000
Variance (constant)	0.037^{***}	0.005	0.034^{***}	0.005	0.021^{***}	0.003	0.022^{***}	0.003
Covariance (education, constant)				−0.000	0.000			

Note: *Gender* and *Ever lived with partner* are dummy coded, such as 1 = female and yes. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p, .01$, $^{***}p < .001$.
Source: ESS 2005/2006.

gender and education. The analysis showed that the interaction term was statistically significant and that the educational gradient in completed fertility was stronger for women ($b = -.012 + -.009 = -.021$) than for men ($b = -.012$), thereby confirming our second hypothesis. At the same time, this finding indicates that, across Europe, higher educational attainment led to lower completed family size among men as well as among women.

In Model 3, the welfare regime typology of countries was added. Countries classified as belonging to the conservative-corporatist welfare regime type constituted the reference category. Compared to these countries, the total number of children was higher in social-democratic countries ($b = .075$) and lower in post-Soviet countries ($b = -.195$). Completed fertility was also shown to be higher in liberal countries ($b = .227$), thereby confirming the descriptive results presented in Table 2. A surprising result of Model 3 is that the total number of children in Mediterranean countries did not differ from the total number in countries classified as conservative-corporatist. This suggests that the relatively large total number of children in Mediterranean countries shown in Table 2 was mainly attributable to the relatively low levels of educational attainment in these countries. Indeed, after educational attainment was controlled for, the differences between Mediterranean countries and the other countries in the total number of children became smaller.

Including the welfare regime typology in Model 3 decreased the country-level variance by almost 40% (from 0.034 to 0.021). Although this decrease was substantial and was statistically significant, it also indicated that there was a large degree of variation in completed fertility between countries identified as having the same welfare regime. To test whether the effect of education on the total number of children varied across welfare state regimes, a cross-level interaction between education and welfare regime was added to the model (see Model 4). The results showed that the effect of educational attainment clearly differed by welfare state regime. Among women, the negative educational gradient was found to be strongest in the Mediterranean and the post-communist European countries ($b = -.011 + -.008 + -.011 = -.030$), and weakest in the social-democratic and the post-Soviet countries ($b = -.009$ and $b = -.008$, respectively). The liberal and the conservative-corporatist countries occupied a middle position ($b = -.019$). Overall, this pattern was largely in line with expectations, with one exception: i.e. the negative educational gradient in post-Soviet countries was weaker than expected.

Up to this point, the analyses were performed jointly for men and women and for both cohorts. To get a more nuanced view of the relationship between educational attainment and the total number of children, we also performed analyses for men and women, and for cohorts born before 1945 and after 1944 separately. The results of these analyses are presented in Table 4.

The first two columns of Table 4 display the results for the cohorts born before 1945 and after 1944. The women of the older cohort had finalised their reproductive careers before 1990; i.e. at a time when eastern European countries were still under communist-led governments. In most of the western European countries outside of the Nordic countries, levels of support for combining motherhood and labour force

Table 4:
Negative binomial multilevel regression models explaining the number of children for different subgroups

	Born before 1945		Born after 1944		Women		Men	
	Estimate	**SE**	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**
Predictors individual level								
Constant	0.269***	0.042	–0.325***	0.042	0.105**	0.038	–0.269***	0.045
Gender	0.022	0.013	0.048***	0.010				
Cohort					–0.003**	0.000	–0.008***	0.001
Cohort squared					–0.000	0.000	–0.000	0.000
Ever lived with partner	0.619***	0.030	0.973***	0.031	0.650***	0.027	0.967***	0.035
Completed years of education	–0.031***	0.004	–0.011**	0.004	–0.028***	0.006	–0.005	0.003
Gender*education	–0.016***	0.003	–0.004*	0.002				
Predictors country level								
Conservative-corporatist (ref.)								
Social-democratic	–0.023	0.048	0.167***	0.046	0.058	0.044	0.099*	0.047
Liberal	0.214***	0.061	0.207***	0.059	0.267***	0.056	0.172**	0.061
Post-Soviet	–0.336***	0.051	–0.077*y*	0.046	–0.185***	0.045	–0.165***	0.051
Post-communist European	–0.112***	0.044	0.062	0.041	–0.024	0.039	0.030	0.044
Mediterranean	0.004	0.056	0.035	0.052	–0.005	0.050	0.041	0.055
Cross-level interaction								
Education*conservative-corporatist (ref.)								
Education*social-democratic	0.012*	0.006	0.004	0.006	0.015**	0.005	0.006	0.004
Education*liberal	0.010	0.007	–0.008	0.009	0.004	0.007	–0.007	0.005
Education*post-Soviet	0.013*	0.006	–0.007	0.007	0.015*	0.006	0.006	0.006
Education*post-communist European	–0.010	0.006	–0.027**	0.006	–0.008†	0.005	–0.015***	0.004
Education*Mediterranean	–0.004	0.006	–0.012	0.007	–0.005	0.006	–0.016**	0.005

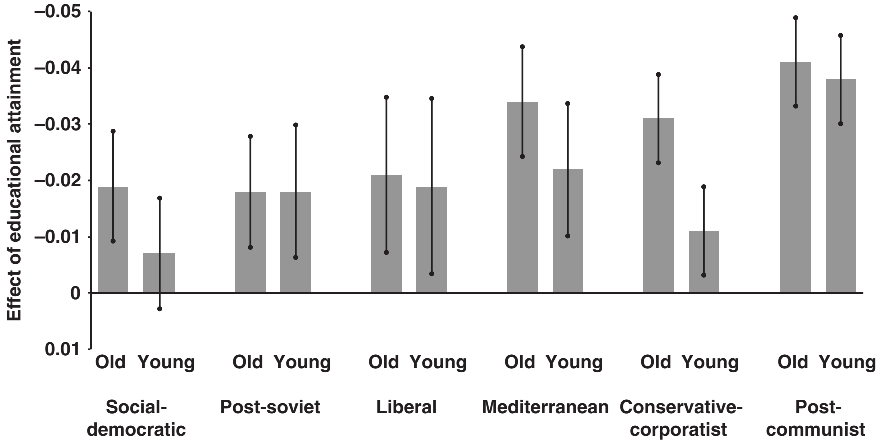
Continued

Table 4:
Continued

	Born before 1945		Born after 1944		Women		Men	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Random part								
Variance (education)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Variance (constant)	0.021***	0.004	0.020**	0.003	0.018***	0.003	0.021***	0.004
Covariance (education, constant)	−0.001	0.000	0.000	0.000	−0.001	0.000	0.000	0.000
N	11,574		17,461		16,245		12,769	

Note: *Gender* and *Ever lived with partner* are dummy coded, such as 1 = female and yes. †$p < .10$, *$p < .05$, **p, .01, ***$p < .001$.
Source: ESS 2005/2006.

Figure 1:
Estimated educational gradient in the total number of children of women born before 1945 ("old") and women born from 1945 onwards ("young"), based on Model 4 in Table 3



Source: ESS 2005/2006; n_{old} =6,733; n_{young} =9,512.

participation were still relatively low. The members of the younger cohort spent a portion of their reproductive careers after 1990; i.e. at a time when social structures were changing and uncertainty was increasing in eastern European countries. Many western European countries saw gradual increases in childcare services that made it easier for women to combine motherhood and labour force participation. The educational gradients for women of both cohorts in the different welfare state regimes were calculated, and the results are presented in Figure 1.[3]

Among women born before 1945, there was a clear negative educational gradient in all of the welfare regimes. However, this gradient was strongest in the post-communist, the conservative-corporatist, and the Mediterranean countries. The negative gradient was weaker for the post-Soviet, the liberal, and the social-democratic countries. Among women born after 1944, hardly any change was observed in the countries with communist governments before 1990, which suggests that the educational gradient changed little over time (cf. Brzozowska 2014). For all of the other welfare regime types, the negative educational gradient among women was clearly weaker among women born after 1944 than before 1945.

[3] These effects are based on Models 1 and 2 in Table 4. The easiest way to obtain these effects is by successively re-estimating Models 1 and 2 in Table 4, each time with women who were in a different welfare state category taken as the reference category. In such a model, the main effect and the standard error of "years of education" provide the effect and the standard error of educational attainment for women in the reference welfare state category.

This weakening of the educational gradient was probably related to a decline in completed fertility across cohorts among women with low levels of education. Descriptive findings show that the average number of children decreased from 2.48 to 2.35 among women with less than nine years of education and from 2.16 to 2.05 among women with between nine and 12 years of education; and remained more or less constant (from 1.91 to 1.90) among women with 13+ years of education.

In columns 3 and 4 of Table 4, the results of separate analyses for men and women are presented. Across all cohorts, the negative educational gradient was clearly weaker among women in the social-democratic and the post-Soviet welfare states than in the other welfare regimes. Among men, the strongest negative educational gradients were observed in the post-communist European and the Mediterranean countries. For most of the other welfare regime types, no educational differences between men with different levels of education were observed.

Finally, given that France and Belgium introduced reconciliation policies much earlier than other countries classified as conservative welfare states, we reran the same analyses excluding France and Belgium to examine whether the positioning of the conservative welfare states was strongly influenced by the inclusion of France and Belgium in this welfare regime category. The results indicated that, generally, the differences in the educational gradients between the country groups remained the same, but the gap between the conservative welfare states on the one hand and the social-democratic and the post-Soviet countries on the other became somewhat larger, whereas the gap between the conservative welfare states and the other three types of welfare states became somewhat smaller (results available upon request from the authors). These findings suggest that the educational gradients in France and Belgium are in between those in the social-democratic and those in the corporatist-conservative group of countries.

5 Discussion

The aim of this study was to examine whether the educational gradient in completed family size varies across Europe. A large body of research has shown that increased educational attainment among women – and possibly among men – is associated with postponed parenthood. Less is known about whether increased educational attainment is also related to below-average levels of completed fertility.

Generally, we expected to find that an individual's ultimate number of children would be negatively related to his or her level of education. Several potential explanations for these educational differences in completed fertility have been suggested, including arguments related to autonomy, quality, and incompatibility (negative gradient); and to affordability (positive gradient). Overall, we expected to find that the first three arguments would prove more influential than the last one. Indeed, we found an overall negative educational gradient among European countries that confirmed our first hypothesis. Similar results have recently been reported elsewhere: Berrington and colleagues (2015) found for Britain a persisting educational gradient in fertility quantum, while Andersson and colleagues (2009) found for the Nordic countries small differences in fertility outcomes across educational groups.

The second hypothesis stated that the negative educational gradient in completed family size would be stronger among women than among men. The main reasoning behind this assertion is that *incompatibility* may be expected to be more relevant for women than for men. Indeed, we found that across Europe the negative educational gradient in completed family size was stronger for women than for men, which confirmed our second hypothesis. Still, the gradient was shown to be negative even for men. This result could imply a number of things. First, the *autonomy* and *quality* arguments could be of considerable importance to men as well as to women, leading highly educated men to have fewer children than less educated men. Alternatively, our findings might be attributable to educational assortative mating. If highly educated men have highly educated partners and less educated men have less educated partners, the negative gradient found among men might be explained by a failure to control for the educational effect of the female partner. To test this potential explanation, couple data on educational attainment are needed. This issue is a promising avenue for future research.

We expected to find a stronger negative relationship between the ultimate number of children and educational attainment in countries with poor arrangements for combining parenthood and employment than in countries with better arrangements. Given that the survey respondents had ended their reproductive careers at very different points in historical time, and that precise data on the institutional arrangements for combining parenthood and employment were not available for many of the countries, we opted to use a relatively crude typology to classify countries. For western European countries, we used a slightly adapted version of Esping-Andersen's (1990) welfare regime typology. For eastern European countries, we distinguished between post-Soviet states and other post-communist countries. Overall, we found limited support for our hypothesis. The negative educational gradient in completed fertility was weakest in the social-democratic (cf. Andersson et al. 2009) and the post-Soviet countries, and was strongest in the Mediterranean and the post-communist countries. For women as well as for men, it might be relatively easy to combine parenthood and labour force participation in the social-democratic countries, and relatively difficult in the Mediterranean countries. The relative position of the post-Soviet states is less clear. One explanation for the weak educational gradient in the post-Soviet states is that all of the educational groups in these societies were shown to have low levels of completed fertility, which suggests that work-life reconciliation was difficult to achieve for both women and men, and *across* educational levels. In a study for Ukraine, Perelli-Harris (2008) found that women in this country display a strong preference for having children, which has led to a pattern of early and almost universal childbearing; but that Ukrainian women are reluctant to have subsequent children. Meanwhile, the conservative welfare states of western Europe were found to have an educational gradient between these other types. Additional analyses have suggested that the educational gradients in

France and Belgium are closer to the educational gradients in the social-democratic countries than to the educational gradients in the other conservative countries.

We further explored differences in the educational gradients across and within welfare regimes. The most interesting finding is that the negative gradient was weaker for younger than for older cohorts in western Europe, especially in the conservative-corporatist countries. This effect might have been driven by the relatively early introduction of reconciliation policies in conservative-corporatist countries such as France and Belgium. This finding partly confirms our fourth hypothesis. In countries where policies aimed at making it easier to combine family and career have been implemented in recent decades, the educational gradient has become weaker. Furthermore, the differences across western welfare regimes in the educational gradient among women and men born after 1944 were much smaller than among women and men born before 1945. The reduction in the educational gradient across cohorts seems to have been primarily caused by a decline in the total number of children born to individuals with low levels of educational attainment, while the total number of children born to individuals with tertiary education remained more or less constant across cohorts. These additional findings have several implications. First, the relatively small differences by educational level in the total number of children of the cohorts born after 1944 suggest that education could have a much stronger effect on the *timing* of childbearing than on the fertility *quantum*. While the highly educated clearly have a tendency to postpone entry into parenthood, at least in western Europe, they currently have almost as many children as the less educated. Second, one potential explanation for why hardly any reduction in completed fertility was observed for the highly educated, whereas a clear reduction was observed for the less educated, is that a diffusion process is operating. The trend towards a reduction in the number of children may have started relatively early among individuals with higher levels of education, and this process may have been finalised among the oldest cohort in our sample. Indeed, Skirbekk (2008) has suggested that this process occurred so early that individuals with higher education appear to have had fewer children throughout the 20th century. If a tendency to limit family size has been diffusing to the less educated with some time lag, a “catching-up” effect may be observed among the less educated born after 1944. Such an assumption would fit the pattern shown in Table 4 and Figure 1. However, another interpretation of this trend is also possible. Our finding that the total number of children stayed relatively stable for both cohorts of highly educated women could signal that these women were successful in striking a balance between parenthood and labour force participation. By contrast, the reduction in the total number of children born to less educated women across cohorts may signal that these women have yet to strike this balance. These trends could have cultural reasons, such as a reluctance among less educated women to outsource childcare; or they could have more structural reasons, such as that less educated women lack the resources to pay for professional childcare. More detailed data analyses are needed to test these potential explanations. A final interesting finding from our additional analyses is that the negative educational gradient in the eastern

European countries did not change across cohorts. The negative gradient remained particularly strong for the post-communist countries, but it also held steady for the post-Soviet countries. Given that the women in the cohorts born before 1945 had completed their reproductive careers by 1990, whereas the women in the younger cohorts experienced a portion of their reproductive careers after the fall of the communist regimes, it is possible that this sharp political and economic break affected the "childbearing context" of all of the educational groups in similar ways, and thus triggered little change in the educational gradient. However, we need to acknowledge that most of our post-1944 cohorts were relatively old at the time of the transformative events of 1990. Since women tend to have children relatively early in many eastern European countries, the collapse of communism may have had little effect on the completed fertility of the women under study.

Our results shed light on the magnitude of the negative educational gradient in completed fertility across Europe. To examine this issue, we needed micro-level data for a large number of European countries on cohorts who had completed their reproductive careers. The European Social Survey is one of the few surveys that provide such data. Still, our data and analyses suffer from a number of limitations that should be addressed in future research. First, the ESS has relatively small sample sizes. The number of respondents per country was too small to allow us to analyse the data on separate countries in a meaningful way. "Zooming in" on specific interesting countries would require larger datasets that include information on both educational attainment and the total number of children. Second, we used a relatively crude – yet theoretically grounded – typology for classifying European countries according to the degree to which they support women in combining parenthood and labour force participation. Ideally, more specific macro-level indicators of such issues, like those available in Gauthier's Comparative Family Policy Database or the OECD Family Database, should be used. However, many of the countries covered in the ESS are not covered in these databases. For the analysis of completed fertility, there was the additional challenge of deciding which period policy indicators we would refer to in seeking to understand the policy situation during an individual's reproductive career. One solution to this problem would be to focus on the impact of educational attainment on different parities, and to try to formulate an "aggregated" conclusion. However, the data requirements for such an approach are large, and meeting them may be possible for specific countries only (e.g. Kravdal and Rindfuss 2008). Third, our indicator of educational attainment was based on the completed level at the time of the survey. This can lead to a bias in the estimates of the educational gradient (Hoem and Kreyenfeld 2006; Kravdal 2007): an overestimation of the educational effect is likely, particularly in countries with patterns of early childbearing, and where people routinely extend their educational careers into their late twenties or early thirties. Having data on educational careers might be helpful here, but such information could be used only in an approach that analyses the effect of education on one parity at a time (Wood et al. 2014). Fourth, births tend to be underreported in surveys, and this is particularly likely to be the case for men. As a result, the descriptive results for men are likely biased (Joyner et al. 2012). If men with high and low levels of education have similar tendencies to underreport their fertility, this underreporting would not influence the educational gradient among men. If, however, less educated men have higher numbers of early and non-marital births than highly educated men, they may also have greater tendencies to underreport their number of children. If this is the case, the educational gradient among men might be somewhat underestimated. A final limitation is that we analysed the educational gradient for men and women separately. Given that the level of educational homogamy within couples is relatively high, it is hard to disentangle the influence of the male and the female partners' educational levels (Corijn et al. 1996).

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Conflict of interest

The authors declare that they have no conflict of interest.

References

Adsera, A. 2011. Where are the babies? Labor market conditions and fertility in Europe, *European Journal of Population* 27(1): 1–32.

Andersson, G., L. B. Knudsen, G. Neyer, K. Teschner, M. Rønsen, T. Lappegård, K. Skrede and A. Vikat 2009. Cohort fertility patterns in the Nordic countries. *Demographic Research* 20: 313–352.

Becker, G. S. 1981. *A treatise on the family*. Cambridge: Harvard University Press.

Berrington, A., J. Stone and E. Beaujouan 2015. Educational differences in timing and quantum of childbearing in Britain: A study of cohorts born 1940–1969. *Demographic Research* 33: 733–764.

Billari, F. C., A. Goisis, A. C. Liefbroer, R. A. Settersten, A. Aassve, G. Hagestad, and Z. Spéder 2011. Social age deadlines for the childbearing of women and men. *Human Reproduction* 26: 616–622.

Blossfeld, H. P., E. Klijzing, M. Mills and K. Kurz, eds. 2003. *The losers of globalization: Becoming an adult in uncertain times*. Oxford: Routledge.

Bonoli, G. 1997. Classifying welfare states: a two-dimensions approach. *Journal of Social Policy* 26(3): 351–372.

Brzozowska, Z. 2014. Fertility and education in Poland during state socialism. *Demographic Research* 31: 319–336.

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 first birth. *Journal of Marriage and the Family* 58(1): 117–126.

Craig, L. 2006. Parental education, time in paid work and time with children: An Australian time-diary analysis. *British Journal of Sociology* 57(4): 553–575.

Ekert-Jaffe, O., and H. Stier 2009. Normative or economic behavior? Fertility and women's employment in Israel. *Social Science Research* 38(3): 644–655.

Engelhardt, H., T. Kögel and A. Prskawetz 2004. Fertility and women's employment reconsidered: A macro-level time-series analysis for developed countries, 1960–2000. *Population Studies* 58(1): 109–120.

Esping-Andersen, G. 1990. *The three worlds of welfare capitalism*. Cambridge: Polity Press.

Esping-Andersen, G. 1996. Welfare states without work: The impasse of labour shedding and familialism in continental European social policy. In G. Esping-Andersen (ed.), *Welfare states in transition. National adaptations in global economies*. London: Sage, 66–87.

Esping-Andersen, G. 2009. *The incomplete revolution. Adapting to women's new roles*. Cambridge: Polity Press.

Fenger, H. J. M. 2007. Welfare regimes in central and eastern Europe: Incorporating post-communist countries in a welfare regime typology. *Contemporary Issues and Ideas in Social Sciences* 3(2): 1–30.

Ferrera, M. 1996. The Southern model of welfare in social Europe. *Journal of European Social Policy* 6(1): 17–37.

Frejka, T. 2008. Determinants of family formation and childbearing during the societal transition in Central and Eastern Europe. *Demographic Research* 19: 139–170.

Frejka, T., and T. Sobotka 2008. Fertility in Europe: Diverse, delayed and below replacement. *Demographic Research* 19: 15–46.

Giddens, A. 1991. *Modernity and self-identity: Self and society in the late modern age*. Cambridge: Polity Press.

Hanushek, E. A. 1992. The trade-off between child quantity and quality. *The Journal of Political Economy* 100(1): 84–117.

Hilgeman, C. and C. T. Butts 2009. Women's employment and fertility: A welfare regime paradox. *Social Science Research* 38(1): 103–117.

Hoem, J. M. and M. Kreyenfeld 2006. Anticipatory analysis and its alternatives in life-course research. *Demographic Research* 15: 461–484.

Joyner, K., H. E. Peters, K. Hynes, A. Sikora, J. Taber and M. Rendall 2012. The quality of male fertility data in major U.S. surveys. *Demography* 49(1): 101–124.

Jowell, R., C. Roberts, R. Fitzgerald and G. Eva 2007. *Measuring attitudes cross-nationally: Lessons from the European Social Survey*. Los Angeles: Sage.

Kalmijn, M. and C. Saraceno 2008. A comparative perspective on intergenerational support. Responsiveness to parental needs in individualistic and familialistic countries. *European Societies* 10(3): 479–508.

Kalwij, A. 2010. The impact of family policy expenditure on fertility in Western Europe. *Demography* 47(2): 503–519.

Koropeckyj-Cox, T. and G. Pendell 2007. The gender gap in attitudes about childlessness in the United States. *Journal of Marriage and Family* 69(4): 899–915.

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: 211–246.

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): 854–873.

Kreyenfeld, M. 2010. Uncertainties in female employment careers and the postponement of parenthood in Germany. *European Sociological Review* 26(3): 351–366.

Lesthaeghe, R. (1995). The Second Demographic Transition in Western countries: An interpretation. In K. O. Mason and A.-M. Jensen (eds.), *Gender and Family Change in Industrialized Countries*. Oxford: Clarendon Press, 17–62.

Lesthaeghe, R. and J. Surkyn 1988. Cultural dynamics and economic theories of fertility change. *Population and Development Review* 14(1): 1–45.

Lesthaeghe, R. and D. J. Van de Kaa 1986. Twee demografische transities? [Two demographic transitions?] In D. J. Van de Kaa and R. Lesthaeghe (eds.), *Bevolking: Groei en Krimp* [Polpulation: Growth and Decline]. Deventer: Van Loghum Slaterus, 9–24.

Liefbroer, A. C. and M. Corijn 1999. Who, what, where, and when? Specifying the impact of educational attainment and labour force participation on family formation. *European Journal of Population* 15(1): 45–75.

Luci-Greulich, A. and O. Thévenon 2013. The impact of family policies on fertility trends in developed countries. *European Journal of Population* 29(4): 387–416.

Matsuo, H., K. Symons, K. Beullens and J. Billiet 2009. *Response based quality assessment in the ESS—Round 3: An update for 23 countries*. Leuven, Belgium: K.U. Leuven Centre for Sociological Research.

Matysiak, A. and D. Vignoli 2007. Fertility and women's employment: A meta-analysis. *European Journal of Population* 24(4): 363–384.

McDonald, P. 2000. Gender equity in theories of fertility transition. *Population and Development Review* 26(3): 427–439.

Meyer, J. W. 1986. Self and the life course: Institutionalization and its effects. In A. B. Sørensen, F. E. Weinert and L. R. Sherrod (eds.), *Human development and the life course: Multidisciplinary perspectives*. Hillsdale: Lawrence Erlbaum, 199–216.

Mills, M. 2007. Individualization and the life course: Toward a theoretical model and empirical evidence. In C. Howard (ed.), *Contested Individualization*. Toronto: Palgrave McMillan, 61–79.

Muresan, C. and J. M. Hoem 2010. The negative educational gradients in Romanian fertility. *Demographic Research* 22(4): 95–114.

Myrskylä, M., H. P. Kohler and F. C. Billari 2009. Advances in development reverse fertility declines. *Nature*, 460, 741–743.

Neels, K. and D. De Wachter 2010. Postponement and recuperation of Belgian fertility: How are they related to rising female educational attainment? *Vienna Yearbook of Population Research* 8: 77–106.

Perelli-Harris, B. 2008. Family formation in Post-Soviet Ukraine: Changing effects of education in a period of rapid social change. *Social Forces* 87(2): 767–794.

Perelli-Harris, B. and T. Gerber 2011. Nonmarital childbearing in Russia: Second Demographic Transition or Pattern of Disadvantage? *Demography* 48(1): 317–342.

Perelli-Harris, B., W. Sigle-Rushton, M. Kreyenfeld, T. Lappegård, R. Keizer and C. Berghammer 2010. The educational gradient of childbearing within cohabitation in Europe. *Population and Development Review* 36(4): 775–801.

Rondinelli, C., Aassve, A. and F. C. Billari 2010. Women's wages and childbearing decisions: Evidence from Italy. *Demographic Research* 22: 549–578.

Sayer, L. C., S. M. Bianchi and J. P. Robinson 2004. Are parents investing less in children? Trends in mothers' and fathers' time with children. *American Journal of Sociology* 110(1): 1–43.

Skirbekk, V. 2008. Fertility trends by social status. *Demographic Research* 18: 145–180.

Sobotka, T. 2004. *Postponement of childbearing and low fertility in Europe*. Groningen: Dutch University Press.

Sobotka, T., F. C. Billari and H. P. Kohler 2010. *The return of late childbearing in developed countries: Causes, trends and implications*. Vienna: Vienna Institute of Demography.

Stange, K. 2011. A longitudinal analysis of the relationship between fertility timing and schooling. *Demography* 48(3): 931–956.

Stoop, I., J. Billiet, A. Koch and R. Fitzgerald 2010. *Improving survey response: Lessons learned from the European Social Survey*. Chichester, UK: Wiley.

Thévenon, O. and A. H. Gauthier 2011. Family policies in developed countries: a 'fertility-booster' with side-effects. *Community, Work & Family* 14(2): 197–216.

Van Bavel, J. 2010. Choice of study discipline and the postponement of motherhood in Europe: The impact of expected earnings, gender composition, and family attitudes. *Demography* 47(2): 439–458.

Van de Kaa, D. J. 1987. Europe's second demographic transition. *Population Bulletin* 42(1): 1–57.

Van de Kaa, D. J. 1996. Anchored narratives: The story and findings of half a century of research into the determinants of fertility. *Population Studies* 50(3): 389–432.

Waite, L. J., F. K. Goldscheider and C. Witsberger 1986. Nonfamily living and the erosion of traditional family orientations among young adults. *American Sociological Review* 51(4): 541–554.

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(46): 1365–1416.

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The role of values and of socioeconomic status in the education-fertility link among men and women

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Abstract

This paper utilizes an untapped data source containing information about completed fertility rates and many explanatory variables to elaborate the education-fertility link. Indicators of the theory of value change and rational choice theory are tested as possible explanations for this relationship. A Poisson regression is used to analyze data from the fourth wave of the European Values Study, with the number of children as the dependent variable. The association between education and fertility is found to be generally negative and stronger for women. The findings also indicate that opportunity costs and liberal values are stronger predictors of fertility among women than among men, and largely explain the more negative effect of education on women. Additional analysis of different welfare regimes reveals that the multivariate association between education and fertility remains significant only for the post-communist countries of Europe.

1 Introduction

One of the most important individual characteristics associated with fertility behavior is the level of education (Lutz 2010). Education is strongly tied to fertility behavior in both developed (James et al. 2012; Neels and De Wachter 2010; Sobotka 2004) and developing countries (Bongaarts 2010; Cleland 2002; Dreze and Murthi 2001). The shift to higher education is considered the main cause of the fertility postponement trend, the overall reduction in fertility, the higher rates of childlessness, and the greater emphasis placed on liberal values and areas of life not related to family formation (James et al. 2012; Neels and De Wachter 2010). The fertility behavior of the most educated members of society is becoming increasingly important as the number of college-educated people grows, and their impact on

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societal norms and values increases (Van Bavel and Rózańska-Putek 2010). James et al. (2012, 7) have asserted that the "education-fertility link is something which is universal in nature, irrespective of culture, context, geography, or the level of fertility transition." Is the education-fertility link really universal? James et al. (2012) argued that this link is probably not weakening in the context of low fertility: i.e. that a lower fertility rate is likely to lead to decreased variation in fertility, but not to a weaker effect of education itself.

However, the association between education and fertility has varied among countries and cohorts, as well as by sex. The education-fertility link has been diminishing in the Nordic countries in particular, probably due to their egalitarian social and gender policies (Andersson et al. 2009; Kravdal and Rindfuss 2008). Moreover, Eurostat data indicate that the contemporary total fertility rate is higher among more educated women in certain European countries, mainly in Denmark, Finland, and Norway (Lanzieri 2013). Other studies that have examined recent changes in the education-fertility link have found a positive effect of women's education on third-birth intensities in Austria (Hoem 2003), and on both second-birth and third-birth intensities in Norway (Kravdal 2007). Still, to the best of my knowledge, no study has conclusively presented a reversal of the effect of women's education on completed fertility.

The majority of the existing fertility research has been concerned with female fertility. Until recently, there were very few studies that had investigated male fertility. The more recent studies have shown that the education-fertility link is slightly positive for men, especially in the Nordic countries (Kravdal and Rindfuss 2008; Lappegård and Rønsen 2013; Nisén et al. 2014); and that it ranges from positive to negative in other western countries (Barthold et al. 2012; Toulemon et al. 2008; Zhang 2011). Two studies that followed the changes in men's fertility over time found a more positive effect of education among younger cohorts in Norway (Kravdal and Rindfuss 2008), and a less negative effect of education among younger cohorts in France (Toulemon et al. 2008).

The education-fertility link depends on the macro context, which may be conceptualized through, for instance, Esping-Andersen's (1990) division of developed countries into three types of welfare states: Social Democratic, Liberal, and Conservative. This research, which focused on both women and men, clearly asserted that the country, welfare regime, and cohort contexts all help to shape the education-fertility link; and that cross-national analysis should take these contexts into account.

I argue that the effect of education is not a universal effect or an effect of educational attainment, but is instead a combination of the effects of other characteristics connected to education. The aim of this paper is to examine the nature of the education-fertility link and to explore some of the ways in which education affects fertility behavior. Data from the European Values Study project are used to obtain a) representative samples from all over Europe, b) information about completed fertility levels, and c) measurements of some important explanatory variables that are usually not asked in surveys. Values connected to the second demographic transition (SDT) and socioeconomic status (as measured by the individual's position in the labor market) are tested as possible mediators of the education-fertility link.

2 Theoretical background

Some recently published studies have raised doubts about the universality of the education-fertility link (Andersson et al. 2009; Hoem 2003; Lanzieri 2013). It appears, however, that this association is still a strong and highly prevalent phenomenon (Aldieri and Vinci 2013; Sobotka 2004; Zhang 2011). As it is clear that education affects fertility in many different ways, the most important question to ask is how this link works.

One of the ways in which education affects fertility is through educational enrollment, or the length of the educational process (Dribe and Stanfors 2009; Sobotka 2004); as individuals who are enrolled in education tend to postpone parenthood and have less time for childbearing. While I do not address the effect of educational enrollment in this paper, I mention it here as a reminder of the complexity of the issue. Involvement in the educational process does not simply lead to a postponement childbearing; it simultaneously changes many aspects of human life, and is also a result of many aspects of human life. Education thus has many indirect effects on fertility. Highly educated individuals may be indirectly influenced in their fertility decisions by, for example, high opportunity costs associated with childbearing, increased resistance to normative pressure, liberal values (autonomy, independence, and self-realization), having effective control over their fertility, and having a strong focus on their career (Sobotka 2004).

In this paper, I employ two broad theoretical frameworks that are widely used for explaining educational differences in fertility. Rational choice theory assumes that childbearing is a fully controlled and rationally driven behavior, and that "in deciding to have a child, people make the considered calculation that the benefits of an additional child outweigh the costs" (McDonald 2002, 422). Theories based on value changes assume that developed societies have created an environment in which there has been a shift toward more liberal values that has resulted in decreased fertility, and that this shift in values has been primarily driven by people with higher education (Lesthaeghe 2010).

How do rational choice approaches explain the association between fertility and education? Parents with higher levels of education tend to put greater emphasis on the quality than on the quantity of children (Becker and Lewis 1974); this implies that parents invest more in a smaller number of offspring. Particularly for women, having higher levels of education and of potential wages means that the opportunity costs of childbearing are also high (Brand and Davis 2011; Kravdal and Rindfuss 2008). On the other hand, among men in particular, the higher level of income that tends to come with having a higher level of education could outweigh the higher opportunity costs of childbearing, and enable them to have more children (Kravdal and Rindfuss 2008; Neels and De Wachter 2010). Fertility behavior is influenced by the economic circumstances of individual women and families, as well as by macroeconomic conditions. Economic instability or recessions may depress the fertility of women with higher levels of education and increase the fertility of some groups of women with lower levels of education (Sobotka et al. 2011).

A basic assumption underlying these explanations is that people control and plan their fertility behavior, but this assumption has become valid only recently, through increased access to effective contraceptive methods (Inglehart 1990). Moreover, access to effective contraceptives and knowledge about contraceptive use remain unequally distributed, even in developed countries that have undergone the SDT. Compared to their better educated counterparts, women with lower levels of education have been shown to use modern contraception less often or less effectively in the United States (Musick et al. 2009), in Belgium (Neels and De Wachter 2010), and elsewhere around the world (James et al. 2012). Musick and her colleagues (2009) offered support for this idea by noting that the numbers of intended births in the United States are very similar among educational groups, while the numbers of unintended births are much higher among less educated mothers than among more educated mothers. They therefore concluded that the educational gradient in fertility can be primarily attributed to this gap in unintended births.

Theories based on value changes form the second most widely used group of theories explaining fertility behavior and the education-fertility link. Several interrelated theories and concepts, such as the SDT framework (Lesthaeghe 2010), and the theories that a shift toward a post-materialist (Inglehart 1971, 1990) or a post-modern value orientation is occurring (van de Kaa 2001), share one basic idea. In stable, developed societies, people now take it for granted that their basic material needs will be met, and are increasingly interested in satisfying higher-level needs, such as the desire for a higher quality of life, a cleaner environment, greater personal freedom, and opportunities for self-realization and self-expression (Inglehart 1990; Lesthaeghe 2010; van de Kaa 2001). As Lesthaeghe (2010, 213) put it, “With such a shift in needs, a shift in the values structure would also occur, with tolerance for diversity and respect for individual choices gradually taking over as prime values from solidarity and social group adherence and cohesion.”

This new value system – which has been variously called post-materialist, post-modern, post-transitory, or liberal by different theoretical approaches – is associated with lower fertility; despite indications that the fertility preferences of post-materialists or post-modernists are higher than their actual fertility (Bachrach 2001; van de Kaa 2001). A possible explanation for why people who hold more liberal values are often unable to fulfill their fertility preferences is that such people tend to be involved in many areas of life that are in conflict with family life, and generally have high expectations about their quality of life and the quality of their partnerships (Bachrach 2001; Mareš 2008; van de Kaa 2001). While sex differences in the effects of liberal values have not yet been examined, it appears that women experience greater conflicts in more areas of life than men (because motherhood is a more time- and opportunity-consuming role).

Liberal values are strongly linked to education (Inglehart 2008; van de Kaa 2001); accordingly, because their liberal value system is not primarily focused on family and childbearing, we can expect to find that highly educated people have relatively low fertility levels (Inglehart 1990). It is also likely that more educated individuals (especially women) with high fertility intentions will nonetheless have actual fertility levels similar to those of more liberal women. The main obstacles to childbearing for more educated women are high opportunity costs, while the main obstacles to childbearing for more liberal women are related to their tendencies to engage in a wide range of activities and to place a greater emphasis on quality of life (Testa 2014; van de Kaa 2001). Another potential reason why people who are more liberal and more educated have lower fertility levels is that they are more resistant to normative pressure (Kravdal and Rindfuss 2008).

Research on values has traditionally focused on the stability of value orientation, which is largely formed during the process of socialization in the pre-adult years (Inglehart 1971, 1990), and which generally remains relatively stable over time (Inglehart 1981, 1985; Rokeach 1979; Schwarz 2005). However, the evidence for the relative stability of values has been called into question, with some studies arguing that values can change following important life events, such as getting married or having children. More precisely, people may choose their life transitions in accordance with their values, but the importance people place on those values may change in response to shifts in life circumstances (Bardi and Goodwin 2011; Bardi et al. 2009, 2014; Lesthaeghe and Moors 2002; Rokeach 1985). Hence, childbearing can be guided by a person's value orientation, and can, at the same time, modify it.

There are some indications that the tendency to have a liberal or a traditional value orientation is stable over time. Thus, it appears that people have values that are "deep-lying components of collective belief systems" (Rokeach and Ball-Rokeach 1989, 777), and moral values (Goren 2005) that are part of a consistent value hierarchy (Mikołajczak and Pietrzak 2014). Still, it is not possible to estimate the extent to which the value orientation of an individual remains at least roughly the same or changes during her life course. The claim that there is an association between values and fertility therefore needs to be interpreted very carefully in terms of causality.

Rational choice theory asserts that the effect of education on fertility is mediated by the different costs and benefits of parenthood experienced by different educational groups (Brand and Davis 2011; Neels and De Wachter 2010). According to the theory of value change, the same effect is mediated by different value systems (Inglehart 1990, 2008; van de Kaa 2001). Therefore, the arguments of both theories lead us to assume that the education-fertility link is not fixed and universal, as it can be explained by other individual characteristics that vary both within and among educational groups. Like economic, technological, and cultural factors, social policy should affect the fertility behavior of different educational groups in different ways. Generally speaking, direct financial support and financial benefits for families seem to encourage childbearing among the less wealthy and the less educated groups, whereas policies aimed at reducing work-family conflicts tend to boost fertility primarily among the more educated groups (Thévenon and Gauthier 2011). Nevertheless, the effects of social policies are not entirely clear. In a complex social reality, it is always difficult to determine whether a social policy has led to changes in fertility levels, or simply in the timing of births (Gauthier 2007).

In sum, there are many ways in which education and issues related to education affect fertility behavior. In this paper, I seek to make this relationship more comprehensible by controlling for two possible mediators: socioeconomic status and the values associated with the SDT. I hypothesize that the association between education and fertility is generally negative, and is stronger among women than among men. In addition, I expect to find that this link can be explained primarily by the more liberal values of people with higher levels of education. I also hypothesize that socioeconomic status, an indicator of rational choice theory, has strong explanatory power in this association. I further argue that the effect of education is context-dependent, and that the observed link is largely explained by the characteristics connected with education (such as the values associated with the SDT and with socioeconomic status) – but also that these characteristics can be partly caused by education itself. Thus, I expect to find that the education-fertility link is diminished after controlling for selected key factors in the analysis.

3 Data and measures

3.1 Data and sample

To investigate the education-fertility link, I draw upon data from the European Values Study (EVS) project. This large-scale data collection works with national representative samples. Respondents are asked about their values, attitudes, and opinions. There have been four waves of data collection from 1981 onward. Each wave has used almost the same standardized questionnaire. As a new sample of respondents is created for each wave, the EVS is not a panel study.

My analysis uses data from the fourth wave of the EVS collected in 2008, which covered 47 countries.[1] Because I wanted to focus on the European region only, I excluded the non-European countries (Armenia, Azerbaijan, Cyprus, Georgia, and Turkey) and the countries and regions with a politically unclear or unstable status at the time of the data collection (Kosovo, Montenegro, Northern Ireland, and Northern Cyprus). My dataset thus includes 38 European countries representing all of the

[1] This wave contains 67,774 valid interviews with 30,161 men and 37,613 women between 18 and 108 years of age, and the response rate was 52.4 percent (European Values Study 2010).

broader geographical regions of Europe.[2] I restricted the original sample to men over age 50 and to women over age 40 in order to create a sample with (mostly) completed fertility;[3] respondents over age 80 were dropped due to the different context of their life course. I then kept only the respondents with some working experience, since I needed information about their current or former socioeconomic status.[4]

3.2 Measurement of variables

As my main goal is to examine fertility, the number of children is the dependent variable of the study. This information was measured by the direct question, "How many children do you have?" The dependent variable "number of children" has the properties of unimodal and positively skewed count data with relatively small values, and thus has the potential to fit the Poisson distribution[5] (Marchini 2008). Hence, I decided to use a Poisson regression to obtain the multivariate associations in the final part of the analysis.

Education is the main explanatory variable in this paper. Education was measured in the EVS according to the International Standard Classification of Education (ISCED). I divided the ISCED scale into three categories: 0–2 (primary education or lower), 3–4 (secondary education), and 5–6 (tertiary education).

Other explanatory variables expected to mediate the effect of education are the items on the current or last occupation (0–100) from the International Socio-Economic Index of Occupational Status (ISEI), and all of the items related to values

2 The countries in the dataset, organized by welfare regime category, are as follows: Denmark, Finland, Iceland, Norway, and Sweden representing the Social Democratic welfare model; Ireland, Switzerland, and the United Kingdom representing the Liberal welfare model; Austria, Belgium, France, Germany, Greece, Italy, Luxembourg, Malta, the Netherlands, Portugal, and Spain representing the Conservative welfare model; Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Hungary, Macedonia, Poland, Romania, Serbia, Slovakia, and Slovenia representing the Post-Communist model; and Belarus, Estonia, Latvia, Lithuania, Moldova, Russia, and Ukraine representing the Post-Soviet model. Countries are sorted according to the classical typology of Esping-Andersen (1990), with two additional groups of post-communist countries added by Ebbinghaus (2012) and Fenger (2007).

3 In Europe, approximately two percent of children are born to women over the age of 40 (Human Fertility Database 2015). The same information for men is available for the United States only, where less than one percent of children are born to men over the age of 50 (Center for Disease Control and Prevention 2012).

4 Four percent of men and 11 percent of women were dropped because they had never worked.

5 The data distribution has a mean of 2.09 and a variance of 1.55 for men; the respective values for women are 1.99 and 1.51. These values indicate that there is a small underdispersion of the data, which is confirmed by the dispersion ratios of 0.64 for men and 0.68 for the final model. Nevertheless, the Poisson distribution still provides the best fit to the data, and the mild underdispersion was easy to adjust for in the analysis (Dallal 2008).

and attitudes[6] from the Index of the Second Demographic Transition (hereafter, the SDT value index) constructed by Sobotka (2008a, 2008b). I use the ISEI as a proxy for opportunity costs, as the rational choice approach measures opportunity costs in terms of income lost due to childbearing (Brand and Davis 2011). The items from the SDT value index, all of which are included in the EVS questionnaire, were used to indicate whether each respondent has a liberal or a traditional value orientation. As various items from the SDT value index were measured using different scales, Sobotka (2008b) dichotomized all of the responses to create a prevalence of SDT values score for each country (i.e. how many respondents in a given country held a particular liberal value), and summed the values in a single index (0–10) measured at the country level (Sobotka 2008b).

In this study, the intended indicator of a liberal or traditional value system is the SDT value index constructed on the respondent level: the sum of the dichotomized items with the traditionally oriented responses were coded with a value of zero, and the liberally oriented responses were coded with a value of one. Validating the SDT value index at the individual level is problematic because of very low degree of internal consistency; Cronbach's alpha is 0.35 in the sample of men and 0.42 in the sample of women. There are also few if any correlations between items. I have therefore chosen to use single components rather than a single scale in the analysis. Using this technique, I was able to create a theoretically grounded set of value indicators (Lesthaeghe 2011; Sobotka 2008b; Surkyn and Lesthaeghe 2004), and to control for the predictive power of particular values in the analysis of fertility behavior. This step should not affect the results of the analysis, because the single value items work in the same way as the summed individual SDT value index. Finally, I control for some other variables, such as age group (40–49, 50–59, 60–69, and 70–79), marital status (currently or previously married, never married), and country.

In this large sample, a control for country would not create any comprehensible patterns. Moreover, social policies seem to be the decisive macro factor in the

[6] Items were:

1. . . . how important it is in your life: leisure time – very important
2. How often do you attend religious services these days? – less than every week
3. Please use the scale to indicate how much freedom of choice and control you feel you have over the way your life turns out – more control after dichotomization
4. Do you think that a woman has to have children in order to be fulfilled, or is this not necessary? – not necessary
5. Marriage is an outdated institution – agree
6. A job is alright, but what most women really want is a home and children – not strongly agree
7. One does not have the duty to respect and love parents who have not earned it by their behavior and attitudes – agree
8. Do you approve or disapprove of abortion (. . .) when a married couple does not want to have any more children? – approve.

relationship between education and fertility (Andersson et al. 2009; Bavel and Rozanska-Putek 2010; Kalwij 2010; Kravdal and Rindfuss 2008). I have therefore chosen to divide the countries into five welfare regime categories. While these welfare regimes were originally defined by Esping-Andersen (1990), Ebbinghaus (2012) and Fenger (2007) subsequently added more countries and welfare models. To achieve more context-sensitive results, I have categorized the countries according to their welfare models for some parts of the analysis. The welfare regime classifications (Social Democratic, Liberal, Conservative, Post-Communist, and Post-Soviet) of all of the countries are listed in footnote 2 above.

I excluded the respondents of reproductive age (women below age 40 and men below age 50, with an upper limit of age 80 for both sexes) and cases with missing values. After these steps, 6,822 men and 12,198 women remained in the final samples. For each country, there are between 62 and 285 respondents in the sample of men and between 156 and 486 respondents in the sample of women. The respondent numbers for all of the countries are sufficient for statistical purposes, as I am more interested in discerning a general pattern than in measuring cross-national differences. The sample for each sex is analyzed separately to test for differences between men and women in the examined relationship.

4 Results

4.1 Descriptive statistics

The basic properties of the two samples are shown in Table 1. The sample of women is larger and younger than the sample of men. Because of the difference in the age ranges of the samples, slightly more of the women than of the men had not yet married, and slightly more children had been born to the men than to the women. The other properties of the samples, including values and socioeconomic status, are similar.

4.2 Education-fertility link

The first step of the analysis is to determine how the average number of children varies across categories of education. Additionally, I seek to obtain differences in the education-fertility link across the five European welfare regimes. Figure 1 shows that men with lower levels of education have slightly more children than men with higher levels of education. While this pattern can be seen across all of the welfare regimes apart from the Social Democratic regime, these differences are not very large, especially between the categories of secondary and tertiary education. In total, the average numbers of children are 2.22 per man with primary education, 2.02 per man with secondary education, and 2.01 per man with tertiary education. Figure 2 shows that for the sample of women, education has a much more pronounced

Table 1:
Descriptive statistics of the two analyzed samples

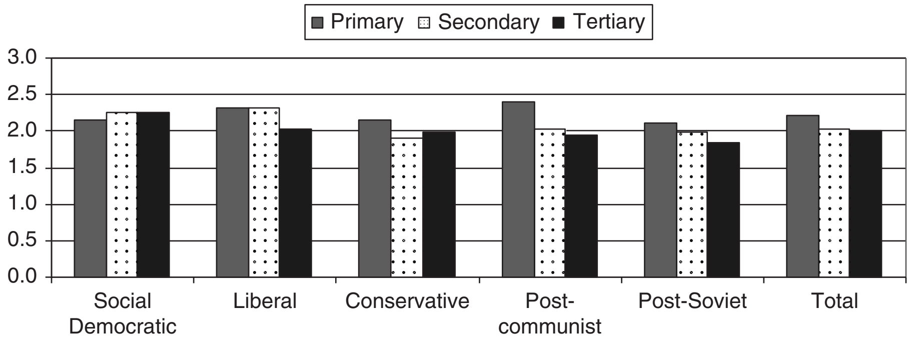
	Men	Women
Number of children (column percentages)		
0	9.9	9.9
1	16.7	20.1
2	44.8	44.6
3	18.4	17.4
4+	10.2	8.0
Education (column percentages)		
ISCED 0–2	34.5	33.6
ISCED 3–4	42.3	43.0
ISCED 5–6	23.2	23.4
Age group (column percentages)		
40–49	no	32.6
50–59	43.0	29.4
60–69	35.1	23.5
70–79	21.9	14.5
Leisure time (% of "very important")	32.9	33.5
Religious services (% of "not often")	82.6	78.5
Control over life (% of "more control")	59.4	57.0
Women need children (% of "no")	37.8	41.4
Marriage outdated institution (% of "yes")	19.0	19.8
Women really want home (% of "no")	82.0	83.0
Duty to respect parents (% of "no")	26.4	28.9
Abortion (% of "approved")	51.1	53.3
ISEI (mean)	42.9	42.1
Marital status (column percentages)		
Married currently or formerly	94.5	92.9
Never married	5.5	7.1

Source: EVS 2008.

negative effect. The respective averages for the three levels of education are 2.27, 1.90, and 1.77; and these differences are similar across the welfare regimes.

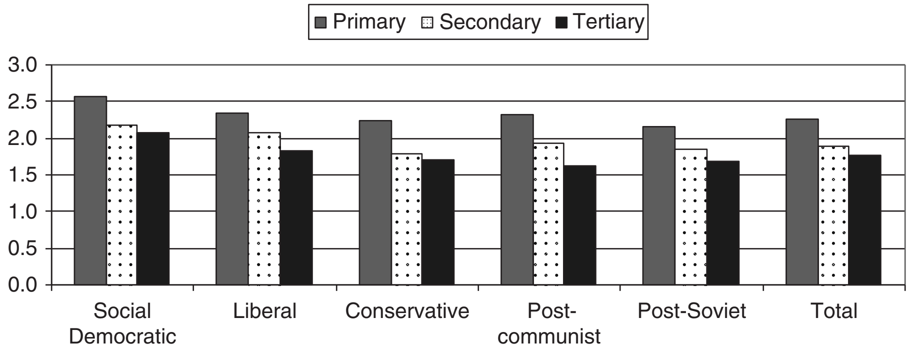
A comparison of the two figures provides a clear picture of the gender differences. The association between education and the number of children is relatively small for men and is relatively large for women; which is not surprising considering the higher opportunity costs of parenthood for women. Some distinctions between western and eastern Europe appear in the data; for example, the effect of education seems to be stronger in countries with Post-Communist welfare regimes.

Figure 1:
The average number of children by education and welfare regime (male sample)



Source: EVS 2008.

Figure 2:
The average number of children by education and welfare regime (female sample)



Source: EVS 2008.

Table 2:
Unstandardized coefficients B of the Poisson regression for the "number of children" variable (male sample)

	Model 1	Model 2	Model 3	Model 4
Intercept	0.734***	0.970***	0.743***	3.286***
Education				
ISCED 0–2	0.080***	0.073***	0.069**	0.057*
ISCED 3–4	0.006	0.011	–0.002	–0.005
ISCED 5–6 (reference category)				
Age group				
50–59	–0.126***	–0.085***	–0.128***	–0.037*
60–69	–0.053**	–0.024	0.053**	–0.012
70–79 (reference category)				
Leisure time very important		–0.029+		–0.033*
Religious services not often		–0.148***		–0.147***
Control over life – more control		0.030*		0.029*
Women need children – no		–0.098***		–0.092***
Marriage outdated institution – yes		–0.081***		–0.038*
Women really want home – no		–0.005		–0.017
Duty to respect parents – no		–0.001		0.001
Abortion approved		–0.073***		–0.075***
ISEI			0.000	–0.001*
Marital status				
Married currently or formerly				2.257***
Never married (reference category)				
Country – 37 contrasts not shown	yes	yes	yes	yes
AIC	21964	21861	21965	20834
BIC	22250	22203	22259	21189

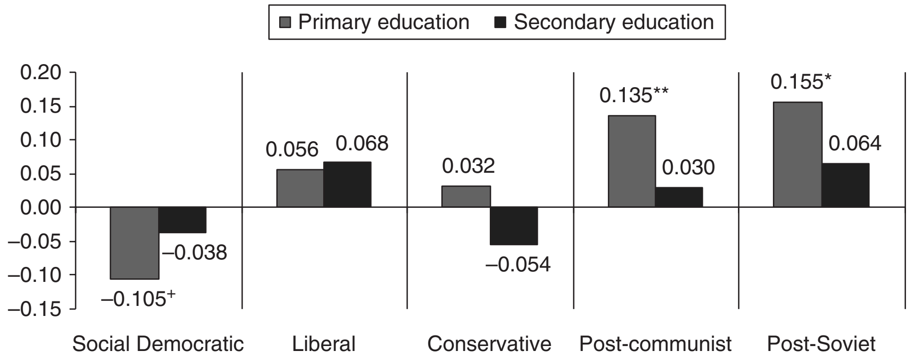
Note: $^{+}p < 0.1$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.
Source: EVS 2008.

4.3 Poisson regression analysis

The association between education and fertility is strongly negative for women, but is not consistently negative for men in the age groups with almost completed fertility. In this section, I investigate the extent to which these differences can be explained by variations in socioeconomic status and value systems across the different levels of education.

As the distribution of the dependent variable "number of children" best fits the Poisson distribution, I use a Poisson regression adjusted for underdispersion of the dependent variable. For both samples, I estimate the simple education-fertility association. I then add values connected to the SDT to the second model and

Figure 3:
Mean number of children: differences in coefficients by education and welfare regime (male sample)



Notes: Tertiary education is a reference category; the figure is based on the results of Model 4, including all control variables. $^{+}p < 0.1$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.
Source: EVS 2008.

socioeconomic status to the third model to test whether these variables improve the model, and to see how they change the effect of education. The final model containing all of the control and explanatory variables is estimated for each welfare regime group to investigate whether there are differences in the education-fertility link under various welfare conditions.[7]

Table 2 shows the results of the Poisson regression for the sample of men. In Model 1, there is a significant difference between men with tertiary and with primary education, but not between men with tertiary education and with secondary education. The exponentiation of the coefficient 0.08 means that the men with primary education have a mean number of children that is 1.083 times higher. The effect of the age group is as expected: i.e. men in the younger age groups have lower fertility levels.

The values associated with the SDT enter the analysis in Model 2. The lower AIC and BIC values indicate an improvement of the model, and the coefficient for primary education is slightly lower. In Model 3, socioeconomic status, as measured by ISEI, is not shown to be significant or to improve the first model. Surprisingly, the coefficient for primary education is lower in Model 3 than in the previous models.

The last model in Table 2 (Model 4) includes all of the control and explanatory variables. The coefficient for primary education has a p-value of 0.018, and the value

[7] An interaction between education and age group was tested as a part of this final model to reflect various educational compositions and the consequences of attained education for particular age groups. However, as this interaction was not significant and did not improve the model for either gender, it is not presented in the final version of the analysis.

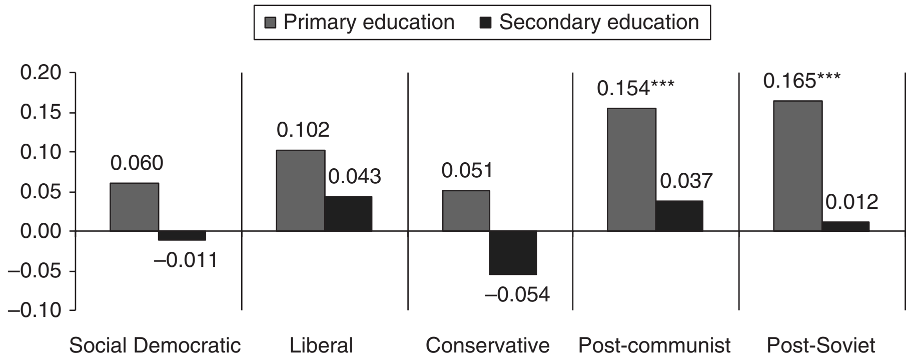
Table 3:
Unstandardized coefficients of the Poisson regression for the "number of children" variable (female sample)

	Model 5	Model 6	Model 7	Model 8
Intercept	0.596***	0.885***	0.683***	2.183***
Education				
ISCED 0–2	0.260***	0.233***	0.147***	0.104***
ISCED 3–4	0.090***	0.077***	0.025	–0.003
ISCED 5–6 (reference category)				
Age group				
40–49	–0.063***	–0.015	–0.066***	0.004
50–59	–0.039*	–0.001	–0.041*	–0.005
60–69	–0.029	–0.006	–0.026	–0.006
70–79 (reference category)				
Leisure time very important		–0.050***		–0.041***
Religious services not often		–0.072***		–0.074***
Control over life – more control		0.008		0.011
Women need children – no		–0.166***		–0.125***
Marriage outdated institution – yes		–0.051***		–0.027+
Women really want home – no		–0.029*		–0.017
Duty to respect parents – no		0.017		0.018
Abortion approved		–0.084***		–0.078***
ISEI			–0.004***	–0.003***
Marital status				
Married currently or formerly				1.193***
Never married (reference category)				
Country – 37 contrasts not shown	yes	yes	yes	yes
AIC	38493	38286	38417	37148
BIC	38811	38664	38743	37541

Note: $^{+}p < 0.1$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.
Source: EVS 2008.

of the coefficient itself is 0.057; this means that men with primary education have a mean number of children that is 1.059 times higher. In Model 4, five out of eight of the values connected with the SDT are statistically significant, and explain the relationship in the expected way. More liberal attitudes and behaviors are found to be associated with both higher education and lower fertility, including attitudes regarding attendance at religious services, women's need for children, and abortion; as well as, albeit to a lesser extent, views on the importance of leisure time and on whether marriage is an outdated institution. The more liberal values and the higher ISEI scores of highly educated men explain a portion of the negative association

Figure 4:
Mean number of children: differences in coefficients by education and welfare regime (female sample)



Notes: Tertiary education is a reference category; the figure is based on the result of Model 8, including all control variables. $^{+}p < 0.1$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.
Source: EVS 2008.

between education and number of children. However, only a small part of the effect of education is explained by the explanatory variables.

Figure 3 elaborates on the role of the macro context by presenting the coefficients of education from Model 4 for each type of welfare regime. The coefficient of primary education is negative only in countries with Post-Communist and Post-Soviet welfare models, and is slightly positive in countries with Social Democratic welfare regimes; which makes for an interesting western-eastern division.

Estimations of the same models for the sample of women are presented in Table 3. The association between education and fertility is much stronger among women, and both coefficients of education are highly significant (Model 5). Primary education increases the mean number of children by 29.7 percent, while secondary education increases the mean number of children by 9.4 percent. As expected, these effects are much larger than they are among men.

Model 6 shows that adding items of the SDT value index to the model for the sample of women reduces the education-fertility link, although the association remains very strong. Much lower coefficients of education are shown in Model 7, in which the ISEI scale is added to the estimation process: under these conditions, women with secondary education do not differ from women with tertiary education. The differences between women with primary education and with tertiary education are also much smaller than before. Hence, a lower level of education is associated with higher fertility, mainly because of lower socioeconomic status, and secondarily because of more traditional values. However, there is still a large unexplained difference between the categories of primary and tertiary education.

All of the explanatory and control variables together are controlled for in Model 8. While the coefficients for education are lower in this model, the statistical significance remains the same. Women with primary education have a mean number of children that is 1.11 times higher than that of women with tertiary education, while the category of secondary education does not differ from the reference category. The coefficients for age group are not significant. In the model, marital status is less important, and socioeconomic status is much more important for women than for men.

The number of children is predicted by the same values connected with the SDT as it is in the sample of men; some coefficients differ in their absolute value, but the substantive findings are identical. More liberal attitudes and behaviors concerning leisure time, religious services, women's need for children, and abortion are associated with both a higher level of education and lower fertility; and all of these attitudes mediate the relationship between fertility and education to some degree. Generally, women with primary education still have a higher number of children than more educated women, but the size of the coefficient is reduced, especially after controls for socioeconomic status and values are applied.

The differences across welfare regimes are tested in the same way as for the sample of men. Figure 4 shows that the effect of primary education is significant only in countries with the two types of post-communist models: namely, the Post-Communist and the Post-Soviet welfare regimes.

5 Conclusion and discussion

The main expectations hypothesized in this paper have been confirmed by the analysis. The education-fertility link was shown to be *generally negative*. The link was found to be *much weaker for men* (indeed, in the sample of men no differences were found between those with secondary education and those with tertiary education) than for women. Furthermore, a large share of the initial association between fertility and education found for women in the Poisson regression analysis could be explained by socioeconomic status and values associated with the SDT, while only a small share of the initial effect found for men in the same analysis could be explained by these factors. The only remaining effect of education found for men and women is a relatively small coefficient for primary education, if all of the selected variables are controlled for.

The education-fertility link for men was slightly reduced when values connected with the SDT and socioeconomic status entered the analysis, although the coefficient for socioeconomic status was not found to be significant or to improve the initial model. It appears that among more educated men, the high opportunity costs of having children, which might have led them to have fewer children; were largely offset by their greater financial resources, which made it easier for them to have more children. Among women, the same *association was shown to decrease considerably when values and especially socioeconomic status entered the analysis*.

Compared to highly educated men, women with higher levels of education were significantly more constrained in their childbearing by their high socioeconomic status and more liberal values, which explains the more negative effect of education found among women.

For both men and women, the characteristics connected to education were found to explain most – but not all – of the education-fertility link. Additional analysis on how the effect of education differs by welfare model showed that for both sexes, *the negative effect of primary education remained significant under the Post-Communist and Post-Soviet welfare regimes*. In contrast, this effect was found to be non-significant in countries with Social Democratic, Liberal, and Conservative welfare regimes. This finding may be partly explained by the low availability of effective contraception in many countries under communist regimes (Dudová 2009; Gjonca et al. 2008).

In addition, the results show that *the indicators of both the theory of value change and the rational choice theory could be used to explain the education-fertility link.* First, it may be assumed that women with high levels of education and high socioeconomic status have fewer children than their less educated counterparts primarily because of their higher opportunity costs and greater work-family conflicts (Neels and De Wachter 2010; Sobotka 2004). Second, it may be assumed that for both men and women, educational differences in fertility can be partly explained by differences in value systems: i.e. compared to less educated people, highly educated people tend to put greater emphasis on liberal and post-modern values, which may be less compatible with childbearing (Bachrach 2001; Inglehart 1971, 1990). Among the values shown to be closely correlated with childbearing behavior were attitudes toward abortion, women's need for children, and leisure time; as well as attendance at religious services. In sum, the effect of educational attainment on fertility was not shown to be decisive; instead, almost all of the educational differences in fertility could be explained by controlling for the other properties associated with education. It therefore appears that the observed education-fertility link is not universal, and can be mostly explained by other individual characteristics closely related to education.

While the EVS dataset has certain advantages, it also has some weaknesses. First, European populations are culturally and socially heterogeneous. It is therefore possible that some of the survey questions were understood differently in different contexts due to translation inconsistencies or differences in the cultural meaning of a question. Second, as the data are cross-sectional, it is not appropriate to interpret the relationships as causal. The relationships among the variables are thus only associations at a given time point. The education-fertility link is often interpreted as the effect of education on fertility, even in cross-sectional studies (Dreze and Murthi 2001; James et al. 2012); but the same results can also be interpreted as representing the effect of fertility behavior on education. For example, people who have more children may have completed a lower level of education because of early childbearing (De Vaus 2002; Stange 2011). It should also be noted that the respondents' characteristics were measured a long time after their childbearing had been completed, and that their values may have changed over time (Bardi et al. 2009, 2014; Lesthaeghe and Moors 2002; Rokeach 1985). Hence, the findings of this study should be further tested on panel data. Third, the results presented in this paper are for cohorts born in 1967 and earlier. The findings would likely be different for younger generations of potential or actual parents. Despite these drawbacks, using the EVS dataset to address the education-fertility link is a valuable contribution to knowledge in this area.

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References

Aldieri, L. and C. P. Vinci 2013. Education and fertility: A comparative micro-econometric analysis in Europe. *The European Journal of Comparative Economics* 10(1): 109–120.

Andersson, G., M. Rønsen, L. B. Knudsen, T. Lappegård, G. Neyer, K. Skrede, K. Teschner and A. Vikat 2009. Cohort fertility patterns in the Nordic countries. *Demographic Research* 20: 313–351.

Bachrach, Ch. 2001. Comment: The puzzling persistence of postmodern fertility preferences. *A supplement to Population and Development Review* 27: 332–338.

Bardi, A. and R. Goodwin 2011. The dual route to value change: Individual processes and cultural moderators. *Journal of Cross-Cultural Psychology* 42(2): 271–287.

Bardi, A., J. A. Lee, N. Hofmann-Towfigh and G. Soutar 2009. The structure of intra-individual value change. *The Journal of Personality and Social Psychology* 97: 913–929.

Bardi, A., K. E. Buchanan, R. Goodwin, L. Slabu and M. Robinson 2014. Value stability and change during self-chosen life transitions: Self-selection vs. socialization effects. *Journal of Personality and Social Psychology* 106(1): 131–147.

Barthold, J. A., M. Myrskylä and O. R. Jones 2012. Childlessness drives the sex difference in the association between income and reproductive success of modern Europeans. *Evolution and Human Behavior* 33(6): 628–638.

Becker, G. S. and H. G. Lewis 1974. Interaction between Quantity and Quality of children. In *Economics of the family: Marriage, children, and human capital*, ed. T. W. Schultz, 81–90. Chicago: University of Chicago Press.

Brand, J. E and D. Davis 2011. The impact of college education on fertility: Evidence for heterogeneous effects. *Demography* 48(3): 863–887.

Bongaarts, J. 2010. The causes of educational differences in fertility in Sub-Saharan Africa. *Vienna Yearbook of Population Research* 8: 31–50.

Center for Disease Control and Prevention 2012. National Vital Statistics Reports [electronics resource]. Hiatsville: National Center for Health Statistics. http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_01.pdf.

Cleland, J. 2002. Education and future fertility trends, with special reference to mid-transitional countries. In *Completing the fertility transition*, 187–202. United Nations.

Dallal, G. E. 2008. *The little handbook of statistical practice*. Washington: Amazon Digital Services LLC.

De Vaus, D. 2002. Fertility decline in Australia. *Family Matters* 63: 14–21.

Dreze, J. and M. Murthi 2001. Fertility, education, and development: Evidence from India. *Population and Development Review* 27(1): 33–63.

Dribe, M. and M. Stanfors 2009. Education, work and parenthood: Comparing the experience of young men and women in Sweden. *Journal of Family and Economic Issues* 30(1): 32–42.

Dudová, R. 2009. Interrupce v socialistickém Československu z foucaultovské perspektivy. *Gender, rovné příležitosti, výzkum* 10(1): 25–36.

Ebbinghaus, B. 2012. *Comparing welfare state regimes: Are typologies an ideal or realistic strategy?* Edinburgh: European Social Policy Analysis Network, ESPAnet Conference.

Esping-Andersen, G. 1990. *The three worlds of welfare capitalism*. Princeton: Princeton University Press.

European Values Study 2010. EVS 2008 Method Report No. 2010/17, Bonn: GESIS.

Fenger, H. J. M. 2007. Welfare regimes in Central and Eastern Europe?: Incorporating post-communist countries in a welfare regime typology. *Contemporary Issues and Ideas in Social Sciences* 3(2): 1–30.

Gauthier, A. H. 2007. The impact of family policies on fertility in industrialized countries: A review of the literature. *Population Research and Policy Review* 26(3): 323–346.

Gjonca, A., A. Aassve and L. Mencarini 2008. Albania?: Trends and patterns, proximate determinants and policies of fertility change. *Demographic Research* 19(11): 261–293.

Goren, P. 2005. Party identification and core political values. *American Journal of Political Science* 49(4): 881–896.

Hoem, J. M. 2003. Autonomy or conservative adjustment? The effect of public policies and educational attainment on third births in Austria, 1975-96. *Vienna Yearbook of Population Research* 1: 101–119.

Human Fertility Database 2015. Age-Specific Birth Counts [electronics resource]. Max Planck Institute for Demographic Research (Germany) and Vienna Institute of Demography (Austria). http://www.humanfertility.org.

Inglehart, R. 1971. The silent revolution in Europe: Intergenerational change in post-industrial societies. *The American Political Science Review* 65(4): 991–1017.

Inglehart, R. 1981. Post-materialism in an environment of insecurity. *The American Political Science Review* 75(4): 880–900.

Inglehart, R. 1985. Aggregate stability and individual level flux in mass belief systems: The level of analysis paradox. *The American Political Science Review* 79(1): 97–116.

Inglehart, R. 1990. *Culture shifts in advanced industrial society*. Princeton: Princeton University Press.

Inglehart, R. F. 2008. Changing values among western publics from 1970 to 2006. *West European Politics* 31(1–2): 130–146.

James, K. S., V. Skirbekk and J. Van Bavel 2012. Education and the global fertility transition-foreword. *Vienna Yearbook of Population Research* 10: 1–8.

Kalwij, A. 2010. The impact of family policy expenditure on fertility in Western Europe. *Demography* 47(2): 503–519.

Kravdal, O. 2007. Effect 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: 211–245.

Kravdal, O. 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): 854–873.

Lanzieri, G. 2013. Fertility statistics in relation to economy, parity, education and migration. Eurostat. Retrieved 18/2/2015 from http://ec.europa.eu/eurostat/statistics-explained/index.php/Fertility_statistics_in_relation_to_economy,_parity,_education_and_migration.

Lappegård, T. and M. Rønsen 2013. Socioeconomic differences in multipartner fertility among Norwegian men. *Demography* 50(3): 1135–1153.

Lesthaeghe, R. 2010. The unfolding story of the second demographic transition. *Population and Development Review* 36(2): 211–251.

Lesthaeghe, R. 2011. The "second demographic transition": A conceptual map for the understanding of late modern demographic developments in fertility and family formation. *Historical Social Research* 36(2): 179–218.

Lesthaeghe, R. and G. Moors 2002. Life course transitions and value orientations: Selection and adaptation. In *Meaning and choice: Value orientations and life course decisions*, ed. R. Lesthaeghe, 2–40. The Hague and Brussels: NIDI-CBGS publications No. 37.

Lutz, W. 2010. Education will be at the heart of 21st century demography. *Vienna Yearbook of Population Research* 8: 9–16.

Marchini, J. 2008. Lecture 5: The Poisson Distribution, Oxford. Retrieved 6/9/2016 from http://www.stats.ox.ac.uk/~marchini/teaching/L5/L5.notes.pdf.

Mareš, P. 2008. Hodnota dítěte v životě českých rodin. In *Rodina, děti a zaměstnání v České společnosti*, eds T. Sirovátka and O. Hora, 97–118. Boskovice: Albert.

McDonald, P. 2002. Sustaining fertility through public policy: The range of options. *Population (English Edition)* 57(3): 417–446.

Mikołajczak, M. and J. Pietrzak 2014. Ambivalent sexism and religion: Connected through values. *Sex Roles* 70: 387–399.

Musick, K., P. England, S. Edgington and N. Kangas 2009. Educational differences in intended and unintended fertility. *Social Forces* 88(2): 543–572.

Neels, K. and D. De Wachter 2010. Postponement and recuperation of Belgian fertility: How are they related to rising female educational attainment? *Vienna Yearbook of Population Research* 8: 77–106.

Nisén, J., P. Martikainen, K. Silventoinen and M. Myrskylä 2014. Age-specific fertility by educational level in the Finnish male cohort born 1940–1950. *Demographic Research* 31(5): 119–136.

Rokeach, M. 1979. *Understanding human values*. New York: The Free Press.

Rokeach, M. 1985. Inducing change and stability in belief systems and personality structures. *Journal of Social Issues* 41(1): 153–171.

Rokeach, M. and S. J. Ball-Rokeach 1989. Stability and change in American value priorities, 1968–1981. *American Psychologist* 44(5): 775–784.

Schwartz, S. H. 2005. Robustness and fruitfulness of a theory of universals in individual values. In *Valores e trabalho [Values and work]*, eds A. Tamayo and J. B. Porto, 1–46. Brasilia: Editora Universidade de Brasilia.

Sobotka, T. 2004. *Postponement of childbearing and low fertility in Europe*. Amsterdam: Dutch University Press.

Sobotka, T. 2008a. Overview Chapter 6: The diverse faces of the Second Demographic Transition in Europe. *Demographic Research* 19: 171–224.

Sobotka, T. 2008b. Does persistent low fertility threaten the future of European populations? In *Demographic challenges for the 21st Century. A state of art in demography*, eds J. Surkin, P. Deboosere and J. Van Bavel. Brussels: VUBPRESS.

Sobotka, T., V. Skirbekk and D. Philipov 2011. Economic recession and fertility in the developed world. *Population and Development Review* 37(2): 267–306.

Stange, K. 2011. A longitudinal analysis of the relationship between fertility timing and schooling. *Demography* 48(3): 931–956.

Surkyn, J. and R. Lesthaeghe 2004. Value orientations and the Second Demographic Transition (SDT) in Northern, Western and Southern Europe: An update. *Demographic Research*, Special collection 3: 45–86.

Testa, M. R. 2014. On the positive correlation between education and fertility intentions in Europe?: Individual- and country-level evidence. *Advances in Life Course Research* 21: 28–42.

Thévenon, O. and A. H. Gauthier, 2011. Family policies in developed countries: A 'fertility-booster' with side-effects. *Community, Work & Family* 14(2): 157–216.

Toulemon, L., A. Pailhé and C. Rossier 2008. France?: High and stable fertility. *Demographic Research* 19(16): 503–556.

Van Bavel, J. and J. Rózańska-Putek 2010. Second birth rates across Europe: Interactions between women's level of education and child care enrolment. *Vienna Yearbook of Population Research* 8: 107–138.

van de Kaa, D. J. 2001. Postmodern fertility preferences: From changing values orientation to new behavior. *A supplement to Population and Development Review* 27: 290–331.

Zhang, L. 2011. *Male fertility patterns and determinants*. Dordrecht: Springer.

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Pathways to marital and non-marital first birth: the role of his and her education

*Alessandra Trimarchi and Jan Van Bavel**

Abstract

A key demographic trend of the past decades has been the increasing share of first births occurring outside marriage. In analysing the factors associated with this trend, scholars have tended to focus on the characteristics of only one of the parents, typically the mother. This study examines the pathways to parenthood from a couple's perspective, focusing on the role of educational pairings; i.e. the combination of his and her education. Using a multistate approach, we examine the connection between educational pairings and the occurrence of the first birth inside or outside marriage for 12 European countries. We find that the presence of at least one highly educated partner lowers the likelihood of a non-marital first birth. Strikingly, it does not matter whether it is he or she who has the highest level of education.

1 Introduction

For many Europeans, marriage is no longer a prerequisite for childbearing. Since the 1970s, rates of childbearing within cohabitation have been increasing in Europe (Sobotka and Toulemon 2008; Perelli-Harris et al. 2012). Although changes in family behaviour have not occurred to the same extent or at the same speed in all parts of the continent, these changes have at least two common features across European countries. First, non-marital childbearing has not spread homogenously, as differences between educational subgroups have been detected (Perelli-Harris et al. 2010). It has been shown that new family forms play a key role in the

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reproduction of social inequalities, and have varying effects on children's well-being in different social strata (McLanahan and Percheski 2008). Second, within Europe, the increase in non-marital childbearing has been largely attributed to the rise of childbearing within cohabiting unions, rather than to single motherhood (Kiernan 2004; Perelli-Harris et al. 2010).

In studies about new family forms, scholars have focused mainly on the relationship between the mother's human capital and non-marital childbearing, and rarely on the link between human capital and non-marital fatherhood (Carlson et al. 2011; Perelli-Harris et al. 2010). Given that most non-marital births occur within co-residential unions, the decision to have a child usually involves two people; i.e. a couple. However, most scholars who have examined new family forms have disregarded the role of the partners' educational characteristics as determinants of non-marital childbearing, and have instead adopted an individual–female perspective. While in recent years the male partner's role has increasingly been considered in studies as a potential determinant of the transition to parenthood (see, e.g. Begall 2013; Jalovaara and Miettinen 2013; Gustafsson and Worku 2006; Nitsche et al. 2015; Vignoli et al. 2012), empirical evidence on how the male partner's characteristics are related to non-marital family formation is still scarce (Trimarchi et al. forthcoming).

The couple's perspective is important because focusing on the features of only one partner may lead to a misinterpretation of the results (Gustafsson and Worku 2006). When scholars focus solely on the characteristics of the female partner, they are failing to consider the possibility that the effects of the educational level of one partner reflect the effects of the education of the other partner. As a result, if there are gender differences in the association between education and non-marital fertility, individual-level results would be inconclusive: negative and positive effects will cancel out, leading to a flat gradient. On the other hand, if the association between education and non-marital fertility is the same for both sexes, individual-level studies will tend to overestimate or to underestimate the educational gradient. In both cases, depending on the prevalent educational mating pattern – i.e. the extent to which partners tend to sort homogamously or heterogamously according to their level of education – the bias could be more or less serious. Another reason to focus on the association between the education of both partners and non-marital childbearing is linked to the changing composition of mating markets. Individuals who face difficulties in finding a suitable partner may be inclined to settle for a less committed partnership; without, however, renouncing childbearing (Harknett 2008; Van Bavel 2012). For example, a highly educated woman may settle for a less educated partner, especially given the recent reversal of the gender gap in higher education (Van Bavel 2012).

Furthermore, considering both partners has implications at the societal level, because how partners combine their human capital – i.e. the educational pairing of his and her education – affects the reproduction of inequalities in societies. Educational assortative mating patterns reflect the degree of openness in a society, and affect the distribution of resources within it (Blossfeld 2009; Schwartz 2009).

If men and women mate assortatively according to their socio-economic status, and if both men and women with lower levels of education have relatively high rates of cohabitation and unmarried parenthood, we would expect to see a concentration of these family behaviours among couples with fewer socio-economic resources. This trend would lead to an exacerbation of social inequalities in societies driven by changes in family forms.

In this paper, we aim to fill the gap in the literature on the educational gradient of non-marital childbearing by examining the link between educational pairing and the transition to the first child, while distinguishing between couples who married before the birth of their first child, and those who did not. How is the combined education of the partners associated with pathways to the first birth? A couple may make the transition to the first child without going through the transition to marriage. Alternatively, a couple may first marry and then have their first child. To investigate which of these pathways a given couple has followed, and how both his and her education are associated with the trajectory chosen, we apply multistate modelling. This kind of model is suitable for helping us gain an understanding of how differences in life histories are associated with specific background characteristics – e.g. the educational pairing of the couple – since these models are estimated using data that track occurrences of events and the units at risk for each event of interest (Willekens 2014). We used the retrospective fertility and partnership histories for 12 European countries recorded in the Generation and Gender Surveys (GGS) and in the Italian Family and Social Subjects (FSS) survey of 2009.

2 Inequalities, new family forms, and the role of educational assortative mating

On a societal level, the diffusion of more liberal family behaviours – such as divorce, cohabitation, and non-marital childbearing – has often been interpreted as an expression of an ideational change in values and attitudes towards the family within the Second Demographic Transition (SDT) framework (Van de Kaa 1987; Surkyn and Lesthaeghe 2004). The SDT model posits that in societies in which cohabitation and non-marital childbearing are seen as antithetical to traditional family forms and life paths, these behaviours are considered, at least in an initial stage, prerogative behaviours of more secularised individuals, who are typically highly educated (Lesthaghe 2010; Surkyn and Lesthaeghe 2004).

Despite the steep increase in the level of non-marital fertility, at the individual level, marriage is still generally considered to be more conducive to childbearing than unmarried cohabitation (Baizan et al. 2003). There is evidence that partners view marriage as entailing a high level of commitment (Perelli et al. 2014). For men in particular, marriage is perceived as expressing a higher degree of commitment than unmarried cohabitation (Lehrer et al. 1996). Since married unions tend to be more stable than unmarried ones, married couples tend to have higher fertility as well (Lillard and Waite 1993; Lillard et al. 1995; Baizan et al. 2003).

In particular, scholars have been interested in analysing the educational gradient in non-marital childbearing and how it varies over time and across contexts. To understand how non-marital family formation is associated with educational differences, scholars have privileged an individual level of analysis. The focus has only recently shifted to couples' behaviour and the interaction between the partners' socio-economic characteristics, including his and her education (Van Bavel 2012; Trimarchi et al. forthcoming).

2.1 Non-marital family formation and the role of educational level

A strand of literature has emphasised the lack of socio-economic resources as a determinant in the choice of cohabiting rather than marrying when forming a new family (Perelli-Harris and Gerber 2011; Perelli-Harris et al. 2010). More specifically, many couples associate marriage with an expensive wedding ceremony, and with the requirement that they are able to secure their long-term economic independence (Kravdal 1999; Salvini and Vignoli 2014). Given these widespread perceptions, non-marital childbearing is expected to be more prevalent among the least educated. Perelli-Harris and Gerber (2011) have called this gradient the "pattern of disadvantage". If marriage is indeed becoming "a province of the most educated" (Goldstein and Kenney 2001, 506), the diffusion of cohabitation and non-marital childbearing among the less educated would exacerbate inequalities in society. If this trend continues, children born to highly educated women will enjoy a growing share of both social and economic resources, while children born to less educated women will be more likely to face the dissolution of their parents' union, and to live in poverty (McLanahan 2004; McLanahan and Percheski 2008).

Evidence supporting the "pattern of disadvantage" framework has been provided by a number of empirical studies conducted in different contexts. Perelli-Harris et al. (2010) found that among women in Austria, France, the Netherlands, Norway, Russia, the United Kingdom, and western Germany, the negative educational gradient in the transition to the first birth was steeper for non-marital births than for marital births. The analysis for Italy that compared the first non-marital birth to the first marital birth found a U-shaped educational gradient. The authors attributed these findings to the low prevalence of cohabitation, and argued that in contexts in which non-marital childbearing is just emerging, like in Italy, women with either low or high levels of education are more likely to have a child outside of marriage than their medium-educated counterparts. But in contexts in which cohabitation is common, less educated women are more likely to have a non-marital child than women with medium or high levels of education. In France, the link between education and non-marital childbearing has changed over time: while highly educated women were driving the increase in non-marital childbearing during the 1970s and 1980s, the positive educational gradient disappeared around the start of the 21st century (Perelli-Harris et al. 2010). In Hungary (Spelder and Kamaras 2008) and the Czech Republic (Sobotka et al. 2008), the diffusion of non-marital childbearing followed a bottom-up rather than a top-down pattern.

While the pattern of disadvantage framework mainly focuses on women's socio-economic conditions, Oppenheimer (2003) proposed a theoretical argument based on the relationship between men's socio-economic conditions and the rise of cohabitation. Men with poor and uncertain economic prospects may favour cohabitation as a union type because having low earnings and an unstable economic situation may undermine their ability to make a strong commitment (Oppenheimer 2003). Moreover, uncertainty on the labour market can affect the lifestyle men develop. Thus, men who experience career instability may face difficulties in finding a suitable partner, which would lead to delayed marriage. Most studies that have looked at this issue in European contexts have found that men with a relatively low socio-economic position are less likely to get married (Kalmijn 2011). Carlson et al. (2011) showed that this pattern of disadvantage is also applicable to US men. The authors found that non-marital fatherhood is negatively associated with education: the higher the man's level of education, the lower his risk of having a child outside marriage.

Given these earlier findings, and based on the economic argument that having more education provides men and women with more resources to get married, we formulate *Hypothesis 1*: There is a positive educational gradient in family formation through marriage. More specifically, *Hypothesis 1a* contends that there is a positive educational gradient in the transition from cohabitation to marriage. *Hypothesis 1b* is concerned with the transition from cohabitation to parenthood: couples with more education are expected to have lower birth rates while they are still unmarried than couples with less education. The presence of at least one highly educated partner is expected to be associated with a reduced risk of non-marital childbearing.

2.2 Non-marital family formation and the role of educational assortative mating

The theoretical arguments mentioned so far have focused on the human capital of either women or men. More generally, most studies on fertility have adopted a female perspective rather than a couple's perspective, even though we know that most children are born to couples. An argument that has been used to justify the focus on just one of the partners is that people often mate with individuals who share similar characteristics (Corijn et al. 1996).

There is indeed evidence of a tendency to form homogamous partnerships based on several characteristics, such as age, ethnicity, religion, and education (Kalmijn 1991, 1994). Our focus here is on assortative mating by education, because education may affect individual economic potential, as well as individual tastes, preferences, and lifestyles (Blossfeld 2009). While educational homogamy remains the most common mating pattern in Europe (Blossfeld and Timm 2003;

Hamplova 2009; De Hauw et al. 2017), marked changes in heterogamous couples have occurred. Recent studies have shown that unions in which the man is more educated than the woman (hypergamy) are now less common than unions in which the woman is more educated than the man (hypogamy) (Esteve et al. 2012; Grow and Van Bavel 2015; De Hauw et al. 2017).

With the reversal of the gender gap in education, there are more highly educated women than men reaching reproductive ages. Given the dearth of highly educated men, many highly educated women will not be able to mate homogamously. This implies that women who want to have children may be inclined to mate with a less educated partner in a less committed type of union, like unmarried cohabitation (Van Bavel 2012). Research from the United States has indeed argued that the type of union is associated with the type of educational match: "a different kind of relationship calls for a different kind of partner" (Schoen and Weinick 1993, 413).

Approaches that emphasise cultural aspects of educational assortative mating consider the match in lifestyles, values, and preferences (Blackwell and Lichter 2000). In the mate selection process, cohabitation is seen as the stage at which partners evaluate each other according to their "cultural matching". It appears that unmarried cohabiting couples are more likely than married couples to be in a heterogamous union, as unmarried cohabitation involves less commitment than marriage. In other words, partners who share more cultural traits will be more likely than partners who share fewer cultural traits to make the transition to marriage (Blackwell and Lichter 2000; Saarela and Finnäs 2014).

Thus, homogamous partners are expected to have more similar beliefs and lifestyles, which could lead them to strengthen their commitment by marrying (i.e. "cultural matching"). Based on this argument, we formulate *Hypothesis 2:* Homogamous partners are expected to have a higher transition rate from cohabitation to marriage than heterogamous couples.

By contrast, micro-economic theories regarding household formation emphasise the role of specialisation within the couple. According to Becker's theory of partner specialisation, spouses with dissimilar socio-economic resources gain more from marriage, because the partners increase their interdependence through the division of labour, which may be attached to gender roles (Becker 1991). Since educationally homogamous couples are less likely to specialise, these couples may be more inclined to live in a more "equal" union type such as cohabitation, whereas more specialised couples may gain more from a long-term committed union type such as marriage (Brines and Joyner 1999; Schoen and Weinick 1993). Following the specialisation argument, heterogamous couples cannot be considered homogeneous in their propensity for non-marital family formation.

We formulate three levels of comparison to highlight the differences between educational pairings with regard to the propensity for non-marital family formation. First, for the reasons explained above, educationally homogamous couples may have a higher propensity for non-marital family formation than heterogamous couples. Second, given that according to Becker's framework, the gains from marriage depend on the traditional gender division of labour, couples in which the man is more educated than the woman may be more inclined to marry because the difference in the economic potential of each of the partners increases the gains from marriage for both partners. Couples in which the woman is more educated than the man may be less inclined to marry.

Third, while both homogamous and hypogamous couples are expected to have a higher propensity for non-marital family formation than hypergamous couples, we expect to find that hypogamous couples are more likely than homogamous couples to have children outside marriage because their expected gains from marriage are smaller. This expectation is based on the assumption that couples tend to prefer a traditional gender division of labour. Thus, the gains are smaller for a woman because her male partner has a lower earning potential, and the gains are smaller for a man because his highly educated female partner may be less inclined to provide unpaid domestic work. As a result, the propensity for non-marital family formation of educationally homogamous couples is likely to be in between that of hypergamous couples, who have the lowest propensity for non-marital family formation; and of hypogamous couples, who are most likely to have children outside marriage.

Previous research that accounted for the characteristics of both partners, and of how these characteristics affect the transition to a marital or a non-marital birth, is scarce. Trimarchi et al. (forthcoming) found for Austria (cohorts 1970–1983) and for eastern Germany (cohorts 1971–1973 and 1981–1983) that when at least one of the partners in a couple is highly educated, the couple's risk of having a non-marital rather than a marital birth is lower. But for western Germany, the authors found that hypergamous couples are less likely than other educational pairings to have a non-marital rather than a marital birth. Overall, the results showed that when studying non-marital childbearing, it is important to consider the educational levels of both partners, as well as the context. However, the authors examined the transition to the first child only, while disregarding the intermediate step; i.e. whether the couple made the transition to marriage. In this paper, we investigate a wider range of countries, and we account for the association between educational assortative mating and the transition to marriage, including for couples who have not (yet) had a first child.

In their study of several family transitions in Finland, Saarela and Finnäs (2014) found that compared to the homogamous couples, heterogamous couples face a higher risk of union dissolution, a higher risk of living in an unmarried union, and a lower risk of becoming parents. Moreover, they found that family formation within marriage is more common among the highly educated, whereas unmarried family formation is more common among the less educated (Saarela and Finnäs 2014). These results strongly suggest that an interaction between homogamy and the level of education affects the family formation behaviour of couples, and thus highlight the importance of taking the couple's perspective when studying fertility.

Based on these earlier findings as well as theoretical arguments, we formulate *Hypothesis 3*, which focuses on the differences in non-marital family formation behaviour within the group of heterogamous couples. We expect to find that hypergamous couples are more inclined towards traditional family behaviours, while hypogamous couples are more prone to display less conventional family behaviours, especially in countries with traditional gender roles expectations (i.e. Italy and Poland). This expectation stems from the Beckerian assumption that an education imbalance in favour of the male partner leads to a gendered division of labour, which in turn implies that both partners gain more from marriage. This hypothesis may be reinforced by socio-economic arguments that assert that if the partners in a couple have the same level of education, the man may have a higher earning potential than the woman. In particular, *Hypothesis 3a* concerns the transition from cohabitation to marriage: we expect to find that hypergamous couples have a higher rate of marriage than hypogamous couples. As a complement, *Hypothesis 3b* contends that hypergamous couples are more inclined than hypogamous couples to have their first child within marriage.

3 Data

We used the first wave of Generation and Gender Survey (GGS) data for 11 European countries (Austria, Belgium, Bulgaria, the Czech Republic, Estonia, France, Hungary, Lithuania, Poland, Norway, Romania) and the Family and Social Subjects (FSS) 2009 for Italy. Since the FSS is the Italian version of GGS, we preferred to use the most recent survey instead of the Italian GGS conducted in 2003. To acquire information on both partners' characteristics, we selected only individuals who were in a union at the time of the interview. For the GGS countries, the information is derived from both male and female respondents. For Italy, we could use female respondents only, since in the Italian GGS the male respondents are either the partners of the female respondents, or single men with no information about their previous partners' educational levels. We focused on the respondents and their partners who were born after 1950, because the changes in family behaviours that motivate our study occurred from the 1970s onwards. Thus, the affected cohorts were born in the 1950s or later. Considering the respondents born after 1950 also has methodological advantages, since according to Vergauwen et al. (2015), GGS data are suitable for studying fertility, especially for cohorts born after the mid-1940s and for periods after the mid-1970s. As our focus is on the transition to parenthood, we selected couples in which the woman was 15–45 years old at the beginning of the co-residential union, and we excluded cases in which one of the partners already had a child from another relationship (overall, we have 48,344 couples). Appendix A provides details on the number of cases that were and were not selected in our analytical sample for various reasons.

3.1 The main explanatory variable: educational pairings

Given the importance of the concept of assortative mating, social scientists have invested considerable effort in its measurement. At the macro level, scholars have been interested in measuring the propensity to marry partners with given characteristics using measures of attraction, which also account for the pool of potential mates (Schoen 1981). For studies that focus on the micro level, and on education in particular, the main concern has been how to include the indicator that would best account for both the effect of education and the effect of the educational differences between partners (Eeckhout et al. 2012).

Since the focus of this paper is on the micro level, we have defined our main explanatory variable as the combined educational attainment of the partners, in line with previous studies on the effect of educational assortative mating on demographic behaviour (see, e.g. Mäenpää and Jalovaara 2014). Collapsing the categories from the international standard classification of education (ISCED 1997), we grouped the individuals into three levels of attainment: low, medium, and high. The first group includes those individuals who completed primary plus lower secondary school (at least eight years of schooling, ISCED 0, 1, 2). The medium category consists of individuals who reached the upper-secondary or post-secondary level (ISCED 3, 4). Finally, the highly educated category is made up of individuals who earned a bachelor's/master's/PhD degree (ISCED 5, 6).

In our model, we used a compound measure of educational assortative mating that consists of three categories for homogamous couples in which the man and the woman have the same level of educational attainment ("both low" (1); "both medium" (2), "both high" (3)); two categories for hypergamous couples in which the man is highly educated and the woman has a medium or low level of education (4), and in which the man has a medium and the woman has a low level of education (5); and two categories for hypogamy in which the woman has a high and the man has a medium or low level of education (6), and in which the woman has a medium and the man has a low level of education (7). A separate category is assigned if the educational information for one of the partners is missing.

It should be noted that the educational pairing variable is not time-varying because we only had information about the graduation date of each respondent, and not about the partners' educational trajectories. Thus, our results may suffer of anticipatory bias, since the partners may have acquired their highest educational level after the event of interest occurred. This is a concern, especially with regard to the transition to parenthood: if individuals have a child before attaining their desired educational degree, being a parent may reduce their likelihood of achieving their educational goals (Kravdal and Rindfuss 2008). In Table 1, we show the proportions of respondents who acquired the level of education reported at the interview after co-residence and after each of our events of interest; i.e. marriage and first birth. In the majority of countries, between 11% and 29% of the respondents attained their current level of education after moving in with their partner. Italy and Norway are outliers: just 3% of respondents in Italy and almost 40% of respondents in Norway had not reached their current level of education before starting to cohabit. The shares of respondents who had obtained their current level of education after marrying were higher than 20% in Norway and in two Baltic countries; between 10%–20% in the Central Eastern European countries; and lower than 10% in Austria, Belgium,

Table 1:
Proportions of respondents who attained their current educational level before marriage or before the birth of their first child

	Respondents attaining education after co-residence (%)	*N* respondents	Respondents attaining education after marriage (%)	N respondents who got married	Respondents attaining education after 1st birth (%)	*N* respondents who had a 1st child
Austria	23.4	2366	9.6	1706	7.4	1747
Belgium	11.1	2642	8.1	2117	5.3	2158
Bulgaria	21.0	5031	19.4	4473	13.7	4590
Czech Republic	11.7	2577	11.8	2184	6.9	1989
Estonia	29.1	2364	24.7	1742	16.1	1995
France	17.3	3097	8.4	2350	5.6	2525
Hungary	17.3	3994	15.7	3407	9.7	3099
Italy	2.9	6213	2.6	5866	1.8	5382
Lithuania	28.0	3256	25.9	2892	16.8	2727
Norway	39.9	4819	29.5	3484	22.3	3981
Poland	20.3	7402	18.2	6980	13.1	6534
Romania	11.9	4583	11.0	4399	6.8	4001

Source: Authors' calculations on Generations and Gender Surveys and the Italian Family and Social Subjects (2009) samples.

France, and Italy. These figures were even lower when we looked at the birth of the first child. In the majority of countries, less than 10% respondents who were parents had attained their highest level of education after the birth of their first child. The share of respondents who had a child before attaining their current level of education exceeded 20% only in Norway, where the educational system is highly flexible.

Table 2 shows the distribution of the educational assortative mating variable, as it has been employed in the models. Homogamous couples make up more than half of the couples in all of the countries studied. In the majority of homogamous couples, the partners are medium educated, except in Belgium and Italy. In Belgium, the largest share of the homogamous couples are highly educated (32%); whereas in Italy, the largest share of the homogamous couples are less educated (30%). While the most typical mating pattern is homogamy, it is interesting to look at the distribution of heterogamous couples. As we can see in Table 2, in the majority of countries, couples in which the woman is more educated than the man are more common than couples in which the man is more educated than his partner. This result is in line with recent trends in educational assortative mating that have been found across European and non-European countries (Esteve et al. 2012; Grow and Van Bavel 2015).

3.2 Control variables

We included the age difference between the partners in our models because it is an important determinant of a couple's fertility (Bhrolchain 1992; Bozon 1991). The age gap is operationalised in five categories: the age difference is zero or one year (which is considered age homogamy); the woman is older than the man; the man is two to four years older than the woman; the man is five or more years older than the woman; and a missing category if the age difference between the partners is not available. We also control for the respondent's sex, the woman's age at union formation and its square (in order to control for non-linearities), and the union's cohort (in four categories: 1967–1979 (1); 1980–1989 (2); 1990–1999 (3); 2000–2010 (4)). We added a control for the union order of the respondent only, since the union order of the partner is unavailable. Finally, we added a variable that specifies whether a conception occurred before marriage.

Table 3 shows the distribution of couples by country, according to their marital status at the time they started their co-residential union. The differences in the institutionalisation of cohabitation and its diffusion across Europe show up in a very simple way in Table 3. In countries where cohabitation has spread relatively slowly and/or is not yet legally recognised, the majority of couples marry before they start co-residing. This pattern is found in the Central and Eastern European countries (i.e. Poland, Lithuania, Hungary, Romania, and, to a lesser extent, the Czech Republic) and Italy. In Austria, Belgium, Bulgaria, Estonia, France, and Norway, the majority of couples start co-residing while they are unmarried, and eventually marry.

Table 2:
Descriptive statistics by country

	Austria 2008–09	Belgium 2008–10	Bulgaria 2004–05	CzechRep 2005	Estonia 2004–05	France 2005	Hungary 2004–05	Italy 2009	Lithuania 2006	Norway 2007–08	Poland 2010–11	Romania 2005
Sex (%)												
Male	38.0	48.0	41.4	48.0	38.7	44.0	44.7		55.6	49.5	45.4	52.8
Female	62.0	52.0	58.6	52.0	61.3	56.0	55.3	100.0	44.4	50.5	54.6	47.2
Union's cohort (%)												
1967–1979	0.1	16.1	13.5	16.0	17.8	16.5	22.1	13.2	13.8	13.8	18.7	19.3
1980–1989	18.5	26.4	36.4	29.0	31.5	27.6	29.3	28.7	31.6	26.9	24.6	33.5
1990–1999	41.3	28.4	37.1	30.5	33.1	35.8	30.7	30.1	29.9	33.8	24.9	34.7
2000–2010	40.2	29.1	13.1	24.6	17.6	20.2	17.9	28.0	24.7	25.5	31.8	12.4
Educational pairings (%)												
Low homogamous	3.5	11.1	13.6	2.9	2.7	8.2	6.0	30.2	2.8	2.6	3.1	13.3
Med homogamous	52.6	17.1	44.4	62.2	42.3	28.5	53.4	25.1	49.4	22.0	54.5	50.9
High homogamous	11.0	32.3	14.1	7.9	14.9	23.3	11.1	6.8	16.2	26.0	14.9	8.7
He high She lower	13.5	8.3	3.6	9.7	7.8	7.6	5.7	4.5	8.6	8.3	4.8	4.4
He medium She low	8.3	7.2	5.5	4.8	4.2	9.9	9.5	10.6	2.8	7.5	4.7	16.1
He lower She high	7.8	14.5	13.0	5.2	21.0	13.9	10.1	8.5	14.0	16.8	12.6	3.0
He low She medium	3.3	8.0	5.6	5.1	7.1	8.2	4.1	14.3	6.1	5.5	4.7	3.7
Not available		1.7	0.2	2.2	0.0	0.6	0.0	0.0	0.1	11.4	0.7	0.0
Respondent union's order (%)												
First union	84.4	70.2	98.8	94.7	92.9	88.5	88.6	93.6	97.9	82.7	98.2	98.5
Higher order	15.6	29.8	1.3	5.3	7.1	11.5	11.4	2.1	2.2	17.4	1.8	1.5
Not available								4.4				
Age difference (%)												
Age homogamy (or ≤ 1 year)	22.2	28.1	20.1	23.3	27.2	26.5	20.3	25.2	25.6	25.4	25.8	19.8
Woman older 2+	12.4	12.2	6.8	7.2	12.7	13.7	10.1	7.2	10.6	11.8	10.6	8.2
Man older 2–4	37.7	36.9	38.8	42.2	34.8	37.0	39.4	36.6	44.0	38.5	39.6	36.7
Man older 5+	27.7	22.4	33.8	27.1	25.3	22.8	30.0	31.0	19.8	24.2	24.0	35.2
Not available	0.0	0.5	0.4	0.2	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0
Median woman age at union (years)	22	23	20	22	21	22	21	24	22	23	22	21
Median time in union before interview (years)	11.08	16.33	14.91	13.83	14.91	14.33	15.33	17.25	15.54	14.91	18.08	16.05
N events by transition												
Cohabitation to marriage	974	740	2615	671	787	1238	564	536	580	1570	1141	654
Cohabitation to childbirth	608	399	553	175	561	764	251	323	145	1633	390	270
Marriage to childbirth	1139	1759	4037	1814	1434	1761	2848	5069	2582	2348	6144	3731
N respondents	2,366	2,642	5,031	2,577	2,364	3,097	3,994	6,213	3,256	4,819	7,402	4,583

Source: Authors' calculations on Generations and Gender Surveys, survey years are specified for each country, and the Italian Family and Social Subjects (2009) samples.

Table 3:
Distribution of couples by country and marital status at the time of union formation

	Cohabitation first		Direct marriage		Total	
Country	(*N*)	(%)	(*N*)	(%)	(*N*)	(%)
Austria	1988	84.0	378	16.0	2366	100
Belgium	1383	52.4	1259	47.7	2642	100
Bulgaria	3363	66.9	1668	33.2	5031	100
Czech Republic	1139	44.2	1438	55.8	2577	100
Estonia	1610	68.1	754	31.9	2364	100
France	2354	76.0	743	24.0	3097	100
Hungary	1224	30.7	2770	69.4	3994	100
Italy	1034	16.6	5179	83.4	6213	100
Lithuania	996	30.6	2260	69.4	3256	100
Norway	3808	79.0	1011	21.0	4819	100
Poland	1796	24.3	5606	75.7	7402	100
Romania	1008	22.0	3575	78.0	4583	100
Total	21703	44.9	26641	55.1	48344	100

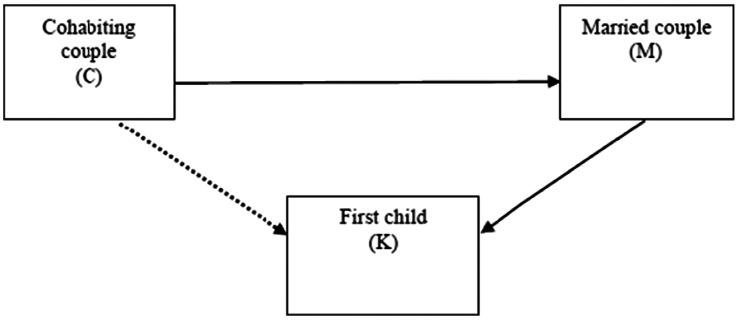
Source: Authors' calculations on Generations and Gender Surveys and the Italian Family and Social Subjects (2009) samples.

4 Method

We applied multistate models to test our hypotheses regarding the effect of educational pairings on the chosen pathway to the first birth. The multistate approach can account for possible changes in the union status of each couple between the time they started to cohabit and the interview date. As we need information about both his and her education, we focus on respondents who were in a union at the time of the interview, since for most countries we know the education of the current partner only, not of earlier partners. This approach has advantages in terms of the quality of the reported fertility and partnership information (cf. Vergauwen et al. 2015), since people tend to better recall – and thus to report more accurately – events related to the present than to the past. It is, however, also a limitation, because couples who split up before the interview are left-censored. This implies that we may underestimate non-marital childbearing because cohabiting couples are more likely to split up (Kiernan 2004), and that hypogamous couples may be underrepresented in our study if they are less stable (as indicated by Blossfeld 2014; Jalovaara 2013; and Mäenpää and Jalovaara 2014; but not by Schwartz and Han 2014; Theunis et al. 2015).

We selected couples who were together at the time of the interview, and looked retrospectively at the changes in their union status leading up to their first shared birth, if it occurred. Unions that survived until the time of the interview may have been more stable on average than the total population of couples ever formed.

Figure 1:
State-space considered and possible transitions



Obviously, unions formed in the years immediately before the interview may have been much more heterogeneous with regard to their stability (as they were not yet at risk of splitting up). To check how strongly this affected our results, we ran analyses for the recently formed unions (2000–2010) only, and found that our conclusions remained the same.

In this setup, our main event of interest is the birth of the first child, which represents the absorbing state in multistate terminology (Putter et al. 2007; Willekens 2014). Figure 1 shows all the possible transitions within our analytical state-space. At the start of the co-residential union, the partners may have been cohabiting (top left in Figure 1) or married (top right). After marriage, couples were at risk of only one transition; i.e. the transition to parenthood. Couples who started co-residence as an unmarried couple were at risk of two possible pathways. First, they may have married and had a child after marrying (Figure 1 – solid line). Second, they may have had a child within cohabitation (Figure 1 – dashed line). In the second case, a separate analysis is carried out to check which kinds of couples eventually married after having a non-marital birth. This model assumes a Markov process, which implies that the pathway of a couple and its timing depend on the present state only, and not on the event history of the couple.

Once we have all the transition dates, we expand the dataset for each possible transition that the couple may experience, defining the entry into and the exit from that state (or the end of the observational period), and a status variable that indicates whether the transition has occurred. As in Putter et al. (2007), we estimate the model by applying a Cox's proportional hazard model for each transition (i.e. stratified hazard model), separately country by country. Formally, the hazard for transition i to j for a couple with a covariate vector Z will be:

$$\lambda_{ij}(t|\mathbf{Z}) = \lambda_{ij,0(t)} \exp(\beta_{ij}^{T}\mathbf{Z})$$

Where $\lambda_{ij,0(t)}$ is the baseline hazard of transition i to j that is not parametrically specified, and β_{ij} are the regression coefficients that describe the effect of the covariate profile of each couple. We have fitted the model by using the *mstate* package implemented in the R software (De Wreede et al. 2011). The regression coefficients are estimated via the maximum likelihood method, and we apply a stepwise modelling procedure to fit the best model. In order to evaluate the goodness of fit of the models, we used the likelihood-ratio test. The likelihood-ratio test shown in Table B.3 of Appendix B indicates the increase in the model fit after the educational pairing variable is included. We selected 12 countries that mirror the main family regimes in Europe, and rather than just pooling all countries, we replicated the analyses country by country to check how sensitive our main results are to the context. Given the small number of countries that could be included, we were not able to address the role played by contextual factors.

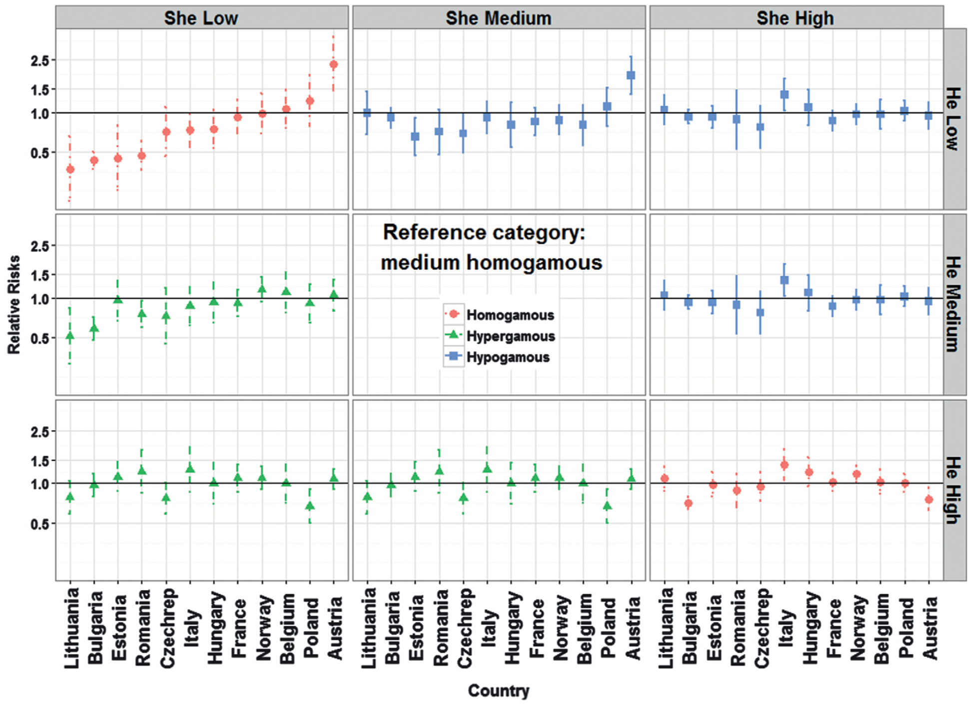
5 Results

Figures 2, 3, and 4 show the main results relative to the effect of educational pairing for all of the transitions considered (Appendix B gives all the model estimates). Each of these figures consists of a grid of panels, with the columns representing her educational attainment, the rows representing his educational attainment, and the lines representing 95% confidence intervals of the point estimate. Each panel shows a specific combination of her and his educational levels to be compared with the reference category. The reference category is made up of the medium educated homogamous couples, and is represented by the horizontal line in each panel. On the diagonal of each figure are panels comparing the homogamous couples to the reference category (the panel in the middle of each figure does not give estimates, as this is the medium educated reference category). The panels above the diagonal show the results for the hypogamous couples, whereas the panels below the diagonal display the results for the hypergamous couples.

Figure 2 displays the hazard ratios for the transition from cohabitation to marriage. When we look at the diagonal, we see that in countries where the difference is significant, the less educated homogamous couples have lower rates of transition from cohabitation to marriage than the reference category of medium educated homogamous couples. Austria is a striking exception: the less educated homogamous couples are found to have a transition rate to marriage that is almost 2.5 times higher than that of the medium educated homogamous couples. Additional inspection of the data revealed that this finding is related to the low educational levels of migrant populations, who are much more likely to marry than cohabit. This result is also in line with previous research on Austria by Berghammer et al. (2014).

The findings for the heterogamous couples, which are shown above and below the diagonal, are not statistically different from those for the medium educated homogamous couples. However, when we switch the reference category to the less educated homogamous couples, we notice that the heterogamous couples with at least one highly educated partner tend to have higher rates of marriage than the less

Figure 2:
Hazard ratios for the transition from cohabitation to marriage



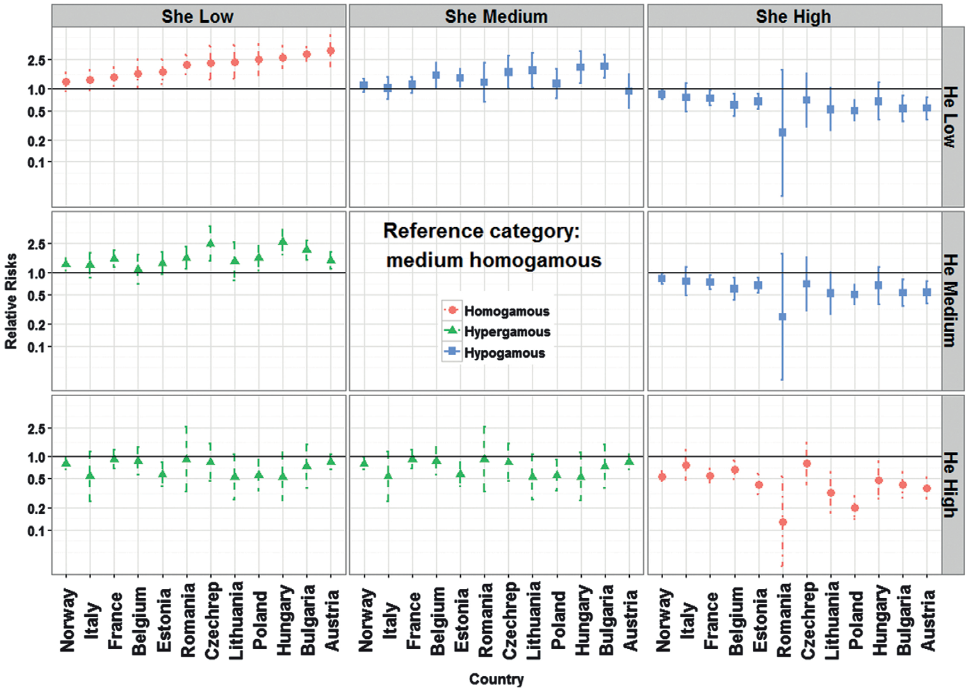
Source: Models' estimates (see Appendix B, Table B.1), GGS, and Italian FSS 2009.

educated homogamous couples (see Appendix C – Table C.1 for all the pairwise comparisons). This pattern is observed for Bulgaria, Estonia, Italy, Lithuania, and Romania; and it is in line with our expectations derived from the socio-economic *Hypothesis 1a*, which stated that there is a positive educational gradient in the transition from cohabitation to marriage.

Moreover, there is no evidence in support of the second hypothesis, which is concerned with the differences between homogamy and heterogamy. According to *Hypothesis 2*, we should find that homogamous partners have a higher transition rate from cohabitation to marriage than heterogamous couples. After comparing homogamous couples and heterogamous couples with all levels of education (see Figure 2 and Appendix C – Table C.1), we observed no significant differences in the transition rates from cohabitation to marriage. Thus, we found no empirical evidence for an effect of homogamy (or heterogamy) as such, separate from the role of the absolute level of education of the partners.

In general, the results for the transition from cohabitation to marriage support the socio-economic argument of the first hypothesis (*1a*); but not of hypothesis *3a*,

Figure 3:
Hazard ratios for the transition from cohabitation to the first birth

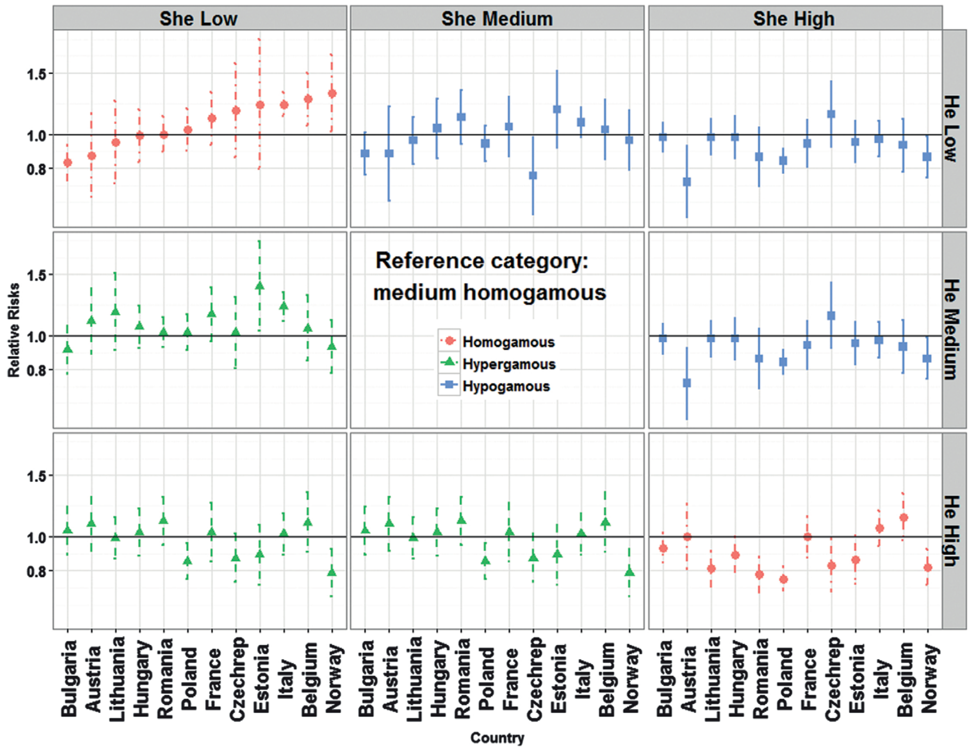


Source: Models' estimates (see Appendix B, Table B.2), GGS, and Italian FSS 2009.

which states that hypergamous couples have a higher rate of marriage than hypogamous couples. Still, we should highlight that in addition to Austria, two more countries deviate from this general pattern. First, in Bulgaria, highly educated homogamous couples have a lower transition rate to marriage than medium educated homogamous and heterogamous couples. It remains unclear why the presence of only one highly educated partner enhances the transition to marriage more than if the couple was composed of two highly educated partners.

Second, Poland also represents a puzzling exception. Here, couples in which the man is highly educated and the woman is less educated are found to have a lower transition rate to marriage than all the homogamous and the hypogamous educational pairings. Compared to the other countries considered, traditional values are more prevalent in Poland. Thus, the diffusion of cohabitation has been relatively slow in Poland, and the male breadwinner model continues to be the main family model, especially after the birth of the first child (Kotowska et al. 2008; Matysiak 2005). Nonetheless, this result contradicts our expectations that in traditional

Figure 4:
Hazard ratios for the transition from marriage to the first birth



Source: Models' estimates (see Appendix B, Table B.3), GGS, and Italian FSS 2009.

contexts, hypergamous couples would be more prone to marriage than hypogamous couples (Hypothesis *3a*).

Next, Figure 3 shows the hazard ratios for the transition from cohabitation to the first birth. In all countries, less educated homogamous couples have higher non-marital birth rates than medium educated couples, whereas highly educated unmarried couples exhibit lower non-marital birth rates (diagonal Figure 3). In general, there are no statistically significant differences between heterogamous couples and the reference category (medium educated homogamous couples). When we change our reference category to highly or less educated homogamous couples, the results strongly support the socio-economic resource argument; i.e. Hypothesis *1b*, according to which the presence of at least one highly educated partner should reduce the risk of a non-marital birth (see Appendix C – Table C.2 for all the pairwise comparisons). Across all countries, we find that the risk of non-marital family formation decreases as the overall human capital of the couple increases. This result is striking, because it implies that family formation behaviour does not differ depending on whether it is the male or the female partner who has more education. In both cases, the estimates point in the same direction.

Figure 4 shows the hazard ratios for the transition to parenthood after marriage. The pattern we see here is not as clear as the pattern we observed for the transition to a non-marital birth. The only exception is Norway, where we see a negative educational gradient in the transition to both a marital and a non-marital first birth; although the gradient is less pronounced in the latter case. Moreover, we find that in Italy, as in Norway, less educated homogamous couples have higher marital birth rates than all of the other educational pairings. In Italy, this gradient is much steeper than the gradient found for non-marital births. These results are in line with previous findings for Italy showing that compared to medium educated women, highly educated women have higher relative first birth risks in cohabitation than in marriage (Perelli-Harris et al. 2010). In Bulgaria, by contrast, less educated homogamous couples tend to have lower marital birth rates than medium educated homogamous couples and heterogamous couples with at least one highly educated partner (see Appendix C – Table C.3 for all the pairwise comparisons). In Austria and Romania, hypergamous couples in which the man is highly educated have higher marital childbearing rates than hypogamous couples in which the woman is highly educated. These results provide evidence in support of Hypothesis *3b*, which states that couples in which the man is more educated than the woman are more prone to marital childbearing than couples in which the woman is more educated than the man. We also find no statistically significant difference between hypergamous and hypogamous couples in which the partner with the highest level of education is *medium* rather than highly educated. Moreover, when we compare the patterns in the transition to parenthood of married and unmarried cohabitating couples, we notice that in Austria, hypogamous couples in which the woman is highly educated have significantly lower birth rates overall than hypergamous couples in which the man is highly educated. This finding implies that at least in Austria, where the male breadwinner model has remained relatively strong (Prskawetz et al. 2008), hypogamous pairings are not conducive to childbearing, irrespective of whether the partners are married.

We briefly discuss the effects of two additional couple level variables: namely, the effect of the union's cohort and the age difference between the partners. As expected, we find that across European countries, the unions formed between 2000–2010 had lower transition rates to marriage than the unions formed in the 1990s (our reference category). On the other hand, the unions formed in the 1970s and the 1980s had higher transition rates from cohabitation to marriage than the reference category. This cohort effect probably emerged because, *ceteris paribus*, unmarried cohabitation became more socially accepted over time, and individuals who had spent more time as an unmarried couple were feeling less pressure to get married. We ran the same models by censoring the observation time after five or 10 years since the co-residential union was formed, and the results were robust. We also failed to find a strong effect for the age difference between partners. In other contexts as well, the age difference between the partners in a cohabiting union was not found to have a significant effect on fertility (cf. Wu 1996). The age difference between the partners appears to matter most for the transition from cohabitation to marriage, as couples in which the man is older than the woman are found to have higher transition rates to marriage than couples in which the partners are similar in age. This finding is in line with *Hypothesis 3a*, which states that more traditional couples are more prone to marriage than other pairings. However, this pattern applies only to the transition from cohabitation to marriage, as the effect of the age difference is not found to be significant for childbearing.

6 Discussion: The beaten path to parenthood

In recent decades, an important focus of family demographic studies has been the determinants of non-marital childbearing. However, scholars have tended to emphasise the association between socio-economic resources and the risk of having a non-marital birth for *women*, while largely neglecting the characteristics of men. The results of analyses that considered the characteristics of one partner only, even though marital and non-marital births typically occur within a union, could therefore be misleading.

In this study, we examined for 12 European countries whether and how the type of educational pairing – i.e. how his and her education combine – affects the likelihood of having a first birth within marriage and within cohabitation. We investigated whether there is an effect of educational assortative mating that goes beyond the role of the absolute level of education, which has been previously studied. We observed couples who are in a co-residential union, and examined their pathways to parenthood using multistate modelling.

Overall, we found the most support for our general first hypothesis, which states that a higher level of human capital is associated with a lower likelihood of non-marital family formation. This hypothesis is based on the argument that educational resources, which are seen as an indicator of an individual's long-term economic prospects, may be perceived as prerequisites for marriage. Our results show that couples with lower levels of human capital tend to stay in an unmarried relationship longer than their counterparts with higher levels of human capital (Hypothesis *1a*). Couples with lower levels of human capital also tend to have higher transition rates to a non-marital first birth in most of the countries considered. The presence of at least one highly educated partner – regardless of whether the partner is male or female – is associated with a lower rate of non-marital first childbearing (Hypothesis *1b*). Moreover, the results of additional analyses suggest that having more education is positively associated with marriage even after the birth of a first non-marital child (results not shown).

In line with previous findings, we found no support for our second hypothesis, which states that in addition to each partner's level of education, the degree of homogamy affects the transition to marriage. According to this hypothesis, homogamous couples are more inclined to marry than heterogamous couples (cf. Blackwell and Lichter 2000). We found that the behaviour of educationally homogamous couples is not statistically different from that of educationally heterogamous couples, and that the transition to marriage instead depends primarily on the overall human capital of the couple. Bulgaria is an interesting exception to this pattern: there, we found that couples in which the partners have different levels of education have higher marriage rates than highly educated homogamous couples, who are less likely to marry. This result contradicts both our first and second hypotheses. It contradicts Hypothesis *1a* because we expected to find that a higher level of human capital enhances the transition to marriage; and this was not shown to be the case in Bulgaria. Furthermore, it contradicts our second hypothesis regarding the role of homogamy in marriage. Our findings indicate that in Bulgaria, heterogamous couples with at least one highly educated partner are more inclined to marry than homogamous couples. We can speculate that this pattern is attributable to the advantages derived from a specialisation model à la Becker, which is characterised by unequal but complementary socio-economic resources within couples, but which in this case is not attached to traditional gender roles (Becker 1991; Schoen and Weinick 1993; Brines and Joyner 1999).

We also found no evidence supporting our third general hypothesis, which focuses on the differences in the effects of his versus her education. Based on the Beckerian specialisation model, we hypothesised that for at least two reasons, hypergamous couples are more inclined towards marital family formation than hypogamous couples. First, couples in which the man has more education than the woman may reinforce traditional behaviours driven by the imbalance of socio-economic resources in favour of the man. Second, such couples may be more economically advantaged because, *ceteris paribus*, men earn more on average than women. Our results show that in most countries, there is no statistically significant difference in the pathways to the first birth among hypergamous and hypogamous couples. Poland represents an exception: hypergamous couples in which the man is highly educated have lower transition rates to marriage than hypogamous couples and all the other homogamous educational pairings. These results contradict Hypothesis *3a*. Other studies on Poland have shown that unmarried cohabiting couples are most likely to be unemployed people or young people still enrolled in education who are supported economically by their parents (Kotowska et al. 2008; Matysiak 2009). This may help to explain our findings, as an additional data inspection revealed that most of these couples consist of young people who had not completed their education before starting to co-reside.

We should mention a number of limitations of this study. First, it is worth recalling that in order to answer our research question, we limited our study to individuals who were in a union at the time of the interview. By applying a multi-state framework, we could account for the selective exit from cohabitation via marriage of the "surviving" unions, but we could not empirically test the role of divorce or separation. We could not disentangle whether the commitment is manifested via marriage or via childbearing, because in our sample, the more stable couples, among whom childbearing is more likely, are overrepresented. In the future, it would be interesting to examine how educational assortative mating varies across union type, and its interactions with union dissolution and childbearing. It may be the case that we underestimated the differential role of the partners' education in our study, which has been cancelled out by our focus on couples for whom childbearing is more likely. Moreover, the extent to which the selectivity of the sample may have altered the results also depends on the country. In particular, the results may be especially biased for those countries where there is a strong association between educational pairing and union dissolution rates. For instance, a previous study that looked at *cohabiting* unions formed between 1995–2002 in Finland found that unions in which the woman is more educated than the man were more likely to dissolve (Mäenpää and Jalovaara 2014). However, other studies have shown that this pattern may not hold for *marital* unions formed after the 1990s (cf. Schwartz and Han 2014 for the United States; Theunis et al. 2015 for Belgium). In order to check the sensitivity of our results to this selection, we ran analyses only for unions formed between 2000–2010, and found that our conclusions remain the same. Moreover, since we have information about the previous partners' education for five countries (Austria, Bulgaria, the Czech Republic, Estonia, and Poland), we checked how different the samples are for these countries when dissolved unions are also considered. We found that the distribution of educational pairings remained very similar in the two samples; and that despite the selection, the smaller sample included a substantial proportion of the events that were also present in the bigger sample (results available upon request).

Our results further indicate that in the more stable unions, the difference in the partners' educational levels has little effect on whether they have a marital or a non-marital birth; and that it is the partners' absolute levels of education that matter instead. Still, future studies should test whether accounting for the selective exit from cohabitation or marriage via union dissolution affects the role of educational pairings on fertility behaviour. This could be achieved by using longitudinal country-specific data, which have detailed information on the timing of the formation and dissolution of partnerships.

It is also possible that we were unable to grasp the role of educational heterogamy because of measurement issues. Since heterogamy is less common than homogamy, we could not consider all of the possible pairings of partners' educational levels because some of the categories were small. By using a compound measure of educational pairing that does not consider all of the possible combinations, we may have overlooked the role of heterogamy. The absence of a statistically significant effect of heterogamy could be due to large standard errors. An obvious solution to this problem is to use larger datasets. Alternatively, it may be possible to use a diagonal reference model, which offers an approach to analysing dyads that is more parsimonious and easier to interpret (cf. Eeckhout et al. 2012). However, diagonal reference models have not yet been implemented in combination with survival analysis. We should mention another potential measurement issue as well, namely, that we were unable to include a time-varying covariate of educational pairing because of lack of information. Our results may suffer from anticipatory bias, since the partners may have reached their highest level of education after they started to co-reside. The use of more detailed data that include the full educational histories of both partners could help to avoid anticipatory bias when applying event-history analysis (Hoem and Kreyenfeld 2006).

Finally, it is worth remembering that the estimates of the multistate model for the transition to the first birth within each union context may still reflect the overall educational gradient in childbearing of the country and cohorts considered. An overall negative educational gradient in the transition to parenthood is usually linked to the tendency among the more educated to postpone the birth of their first child. Our results show that the negative educational gradient in the transition to the first birth tends to be steeper within cohabitation than within marriage. It will be interesting to see whether this pattern continues in the future, given that in some countries (e.g. Belgium, France, Norway) changes over time have been detected: especially for the cohorts born in the 1960s or later, the overall negative educational gradient is weakening or even turning positive (Kravdal and Rindfuss 2008; Goldscheider et al. 2015).

Despite these limitations, our study yields insights into how educational pairings are associated with pathways to parenthood. We showed that it is important to also consider the effect of the male partner's education, as it can counterbalance the effect of the woman's education. In our study, we find support for the "pattern of disadvantage" framework, which usually refers to non-marital childbearing. More educated couples do not necessarily avoid cohabitation altogether, but they are more likely to get married if they are planning to have or expecting a child, or if they have had a child. Our results highlight that like in the United States, the diffusion of non-marital childbearing among the lower social strata in Europe may lead a widening of social inequalities. Future studies could focus on children's well-being to assess whether and to what extent a lack of human capital among unmarried parents translates into disadvantages for the children. It is plausible to expect that in more "open" societies, where individuals face fewer constraints in partnering with people of a different socio-economic status, the consequences for children born to unmarried parents will be offset in the longer term.

As we mentioned above, we found that the effects of homogamy did not differ from the effects of heterogamy. This could be because in contexts where the majority of people have a high level of education, homogamy in lifestyles and values may not necessarily be linked to the level of education. It is possible that educational assortative mating patterns linked to a specific field of study or occupation are more informative about how lifestyles affect the propensity for non-marital formation.

Interestingly, the evidence in support of hypotheses based on socio-economic arguments was more consistent across the different countries. By contrast, hypotheses based on the role of educational assortative mating lacked strong empirical support, as no clear patterns were found across countries. To uncover the mechanisms that link the mate selection processes to fertility, micro- and macro-level studies should be integrated. It would be interesting to investigate the question of whether a higher degree of heterogamy within a country – i.e. whether a society is more "open" – is associated with higher levels of non-marital childbearing. A higher degree of heterogamy implies that the more educated people increasingly mate with less educated partners. The partners of less educated individuals who may be considered less attractive on the mating market could be inclined to settle for a less committed partnership without renouncing childbearing. In particular, as some authors have pointed out, this may be the case for highly educated women, given the recent changes in the education-specific mating markets (Harknett 2008; Van Bavel 2012). Thus, the distribution of non-marital childbearing among different social strata may be affected by the changing composition of mating markets.

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References

Becker, G. S. 1991. *A treatise on the family*. Cambridge, MA: Harvard University Press.

Begall, K. 2013. How do educational and occupational resources relate to the timing of family formation? A couple analysis of the Netherlands. *Demographic Research* 29(October): 907–936.

Berghammer, C., K. Fliegenschnee and E.-M. Schmidt 2014. Cohabitation and marriage in Austria. *Demographic Research* 31(November): 1137–1166.

Blackwell, D. L. and D. T. Lichter 2000. Mate selection among married and cohabiting couples. *Journal of Family Issues* 21: 275–302.

Blossfeld, H. and A. Timm 2003. Assortative mating in cross-national comparison: A summary of results and conclusions. *Who Marries Whom?* 1981: 331–342.

Blossfeld, H.-P. 2009. Educational assortative marriage in comparative perspective. *Annual Review of Sociology* 35(1): 513–530.

Blossfeld, G. J. 2014. Educational assortative mating and divorce: A longitudinal analysis of the influences of education on the divorce rate for different educational matches. Paper presented at the Annual Meeting of the Population Association of America, Boston, 2014.

Brines, J., and K. Joyner 1999. The ties that bind: Principles of cohesion in cohabitation and marriage. *American Sociological Review* 64: 333–355.

Carlson, M. J., A. G. VanOrman and N. V. Pilkauskas 2013. Examining the antecedents of U.S. nonmarital fatherhood. *Demography* 50(4): 1421–1447.

Corijn, M., A. Liefbroer and J. de J. 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): 117–126.

De Hauw, Y., A. Grow and J. Van Bavel 2017. The reversed gender gap in education and assortative mating in Europe. *European Journal of Population* 33: 445–474.

De Wreede, L. C., M. Fiocco and H. Putter 2011. mstate: An R package for the analysis of competing risks and multi-state models. *Journal of statistical software* 38(7): 1–30.

Eeckhaut, M. C. W., B. Van de Putte, J. R. M. Gerris and A. A. Vermulst 2011. Analysing the effect of educational differences between partners: A methodological/theoretical comparison. *European Sociological Review* 29(1): 60–73.

Esteve, A., J. García-Román and I. Permanyer 2012. The gender-gap reversal in education and its effect on union formation: The end of hypergamy? *Population and Development Review* 38: 535–546.

Goldscheider, F., E. Bernhardt and T. Lappegård 2015. The gender revolution: A framework for understanding changing family and demographic behavior. *Population and Development Review* 41(2): 207–239.

Grow, A. and J. Van Bavel 2015. Assortative mating and the reversal of gender inequality in education in Europe – An agent-based model. *PLoS ONE* 106: e01.

Gustafsson, S. and S. Worku 2006. Assortative mating by education and postponement of couple formation and first birth in Britain and Sweden. In *Education and postponement of maternity. Economic analysis for industrialized countries*, eds S. Gustafsson and A. Kalwij, 259–284. Dordrecht: Kluwer.

Hamplova, D. 2008. Educational homogamy among married and unmarried couples in Europe: Does context matter? *Journal of Family Issues* 30(1): 28–52.

Harknett, K. 2008. Mate availability and unmarried parent relationships. *Demography* 453: 555–571.

Jalovaara, M. 2013. Socioeconomic resources and the dissolution of cohabitations and marriages. *European Journal of Population* 29: 167–193.

Jalovaara, M. and A. Miettinen 2013. Does his paycheck also matter? *Demographic Research* 28(April): 881–916.

Kalmijn, M. 1991. Shifting boundaries: Trends in religious and educational homogamy. *American Sociological Review* 56(6): 786–800.

Kalmijn, M. 1994. Assortative mating by cultural and economic occupational status. *American Journal of Sociology* 100(2): 422–452.

Kalmijn, M. 2011. The influence of men's income and employment on marriage and cohabitation: Testing Oppenheimer's theory in Europe. *European Journal of Population* 27(3): 269–293.

Kiernan, K. 2004. Unmarried cohabitation and parenthood in Britain and Europe. *Law and Policy* 26(1): 33–55.

Kravdal, Ø. 1999. Does marriage require a stronger economic underpinning than informal cohabitation? *Population Studies* 53(1): 63–80.

Kravdal, Ø. and R. Rindfuss 2008. Changing relationships between education and fertility: A study of women and men born 1940 to 1964. *American Sociological Review* 73(5): 854–873.

Lehrer, E. L., S. Grossbard-Shechtman and J. W. Leasure 1996. Comment on "a theory of the value of children". *Demography* 33(1): 133–139.

Lillard, L. a and L. J. Waite 1993. A joint model of marital childbearing and marital disruption. *Demography* 30(4): 653–681.

Lillard, L. a, M. J. Brien and L. J. Waite 1995. Premarital cohabitation and subsequent marital dissolution: A matter of self-selection? *Demography* 32(3): 437–457.

Mäenpää, E. and M. Jalovaara 2014. Homogamy in socio-economic background and education, and the dissolution of cohabiting unions. *Demographic Research* 30(June): 1769–1792.

Matysiak, A. 2005. The sharing of professional and household duties between Polish couples: Preferences and actual choices. *Studia Demograficzne* 1: 122–154.

Matysiak, A. 2009. Is Poland really 'immune' to the spread of cohabitation? *Demographic Research* 218: 216–234.

McLanahan, S. 2004. Diverging destinies: How children are faring under the second demographic transition. *Demography* 41(4): 607–627.

McLanahan, S. and C. Percheski 2008. Family structure and the reproduction of inequalities. *Annual Review of Sociology* 34(1): 257–276.

Nitsche, N., A. Matysiak, J. Van Bavel and D. Vignoli 2015. Partners' educational pairings and fertility across Europe. FamiliesAndSocieties Working Paper Series 382015. Stockholm/Brussels: FamiliesAndSocieties/EU.

Oppenheimer, V. K. 2003. Cohabiting and marriage during young men's career-development process. *Demography* 40(1): 127–149.

Perelli-Harris, B. and T. P. Gerber 2011. Nonmarital childbearing in Russia: Second demographic transition or pattern of disadvantage? *Demography* 48(1): 317–342.

Perelli-Harris, B., W. Sigle-Rushton, M. Kreyenfeld, T. Lappegård, R. Keizer and C. Berghammer 2010. The educational gradient of childbearing within cohabitation in Europe. *Population and Development Review* 36(4): 775–801.

Perelli-Harris, B., A. Berrington, C. Berghammer, R. Keizer, T. Lappegård, M. Mynarska and D. Vignoli 2014. Towards a new understanding of cohabitation. *Demographic Research* 31(November): 1043–1078.

Perelli-Harris, B., M. Kreyenfeld, W. Sigle-Rushton, R. Keizer, T. Lappegård, A. Jasilioniene and P. Di Giulio 2012. Changes in union status during the transition to parenthood in eleven European countries, 1970s to early 2000s. *Population Studies* 66(2): 167–182.

Putter, H., M. Fiocco and R. B. Geskus 2007. Tutorial in biostatistics: Competing risks and multi-state models. 2389–2430.

Saarela, J. and F. Finnäs 2014. Transitions within and from first unions: Educational effects in an extended winnowing model. *Marriage and Family Review* 50(1): 35–54.

Schoen, R. 1981. The harmonic mean as the basis of a realistic two-sex marriage model. *Demography* 18(2): 201–216.

Schoen, R. and R. M. Weinick 1993. Partner choice in marriages and cohabitations. *Journal of Marriage and the Family* 55: 408–414.

Schwartz, C. R. 2009. Assortative mating. In *Encyclopedia of human relationships*, 123–125. Thousand Oaks, CA: Sage.

Schwartz, C. R. 2010. Pathways to educational homogamy in marital and cohabiting unions. *Demography* 47: 735–753.

Sobotka, T. and L. Toulemon 2008. Overview Chapter 4: Changing family and partnership behaviour. *Demographic Research* 19: 85–138.

Sobotka, T., A. Šťastná, K. Zeman, D. Hamplová and V. Kantorová 2008. Czech Republic: A rapid transformation of fertility and family behaviour after the collapse of state socialism. *Demographic Research* 19: 403–454.

Spéder, Z. and F. Kamarás 2008. Hungary: Secular fertility decline with distinct period fluctuations. *Demographic Research* 19: 599–664.

Surkyn, J. and R. Lesthaeghe 2004. Value orientations and the second demographic transition SDT in Northern, Western and Southern Europe: An update. *Demographic Research, Special* 3(April): 45–86.

Theunis, L., C. Schnor, D. Willaert and J. Van Bavel 2015. Educational assortative mating and marital stability: Adding a contextual dimension. Paper presented at the Annual Meeting of the Population Association of America, San Diego (CA).

Thomson, E. 1997. Couple childbearing desires, intentions, and births. *Demography* 34(3): 343–354.

Trimarchi, A., C. Schnor and J. Van Bavel forthcoming. Educational assortative mating and nonmarital childbearing within cohabitation-Evidence from four European contexts. In *Partnership relations from adolescence to adulthood. Psychological and sociological perspectives*, eds S. Walper, E.-V. Wendt and F. Schmahl. Springer.

Van Bavel, Jan. 2012. The reversal of gender inequality in education, union formation, and fertility in Europe. *Vienna Yearbook of Population Research* 10: 127–154.

Van De Kaa, D. J. 1987. Europe's second demographic transition. *Population Bulletin* 42(1): 1–59.

Vergauwen, J., J. Wood, D. De Wachter and K. Neels 2015. Quality of demographic data in GGS Wave 1. *Demographic Research* 32(March): 723–774.

Vignoli, D., S. Drefahl and G. De Santis 2012. Whose job instability affects the likelihood of becoming a parent in Italy? A tale of two partners. *Demographic Research* 26: 41–62.

Willekens, F. 2014. *Multistate analysis of life histories with R*. Switzerland: Springer International Publishing.

Appendix A

Table A.1:
Sample selection for each GGS country and the Italian-FSS 2009

	GGS countries												FSS
	Austria 2008–09	Belgium 2008–10	Bulgaria 2004–05	CzechRep 2005	Estonia 2004–05	France 2005	Hungary 2004–05	Lithuania 2006	Norway 2007–08	Poland 2010–11	Romania 2005	Total	Italy 2009
Initial sample size	5000	7163	12858	10006	7855	10079	13540	10036	14880	19987	11986	123390	43850
Not in a union time of interview	1924	2281	4306	4490	2839	3991	4658	4305	4885	7709	3486	44874	22341
Same-sex couples	7	60	9	29	0	59	4	0	56	8	0	232	//
Not born > 1950 (and for Italy being younger than 18 at time of interview) for the respondent	0	1295	2404	1735	1632	1995	3037	1632	2931	3082	2923	22666	7623
Not born > 1950 (and for Italy being younger than 18 at time of interview) for the respondent's partner	18	176	284	179	200	234	394	132	347	494	374	2832	1017
Children from previous relationships	476	573	421	544	791	599	534	417	1361	726	419	6861	264
Date of union missing	15	16	18	98	0	5	652	34	78	7	5	928	//
Date of birth missing	0	22	11	17	0	1	1	7	8	0	1	67	//
Date of birth ≤ 0	177	65	185	292	18	86	174	232	288	503	150	2170	281
Woman's age missing or not in interval 15–45	17	31	184	25	11	12	69	10	35	16	45	455	82
Man's age union formation < 15	0	3	0	0	0	0	0	0	0	0	0	3	//
Date of marriage missing	1	0	3	20	0	1	24	9	73	39	0	170	//
Respondent's age missing	0	0	1	0	0	0	0	0	0	0	0	1	//
Reported date of events after interview date	0	0	0	0	0	0	0	1	0	0	0	1	1
Male respondent (only Italy)	//	//	//	//	//	//	//	//	//	//	//	//	6028
Final *N*	2365	2641	5032	2577	2364	3097	3993	3257	4818	7403	4583	42130	6213
Previous sample selection (Final *N*)	2366	2642	5031	2577	2364	3097	3994	3256	4819	7402	4583	42131	6213

Note: Originally, the sample selection was done for all the GGS countries together. For this country-specific table, we had to re-run the sample selection. Since we have used random imputation when information about the month of events was missing, the variables related to the dates of events may have varied little between the two runs of the sample selection. This is why the country-specific sample sizes reported here do not exactly add up to the total pooled sample size.

Appendix B

Table B.1:
Cox regressions by transitions: beta-coefficient estimates for the transition from cohabitation to marriage

Transition from cohabitation to marriage	AT	BE	BG	CZ	EE	FR	HU	IT	LT	NO	PL	RO
Sex (ref. Male)												
Female	−0.03	−0.11	0.05	0.03	−0.09	−0.11	−0.17		0.05	0.04	−0.004	0.01
	(0.07)	(0.07)	(0.04)	(0.08)	(0.08)	(0.06)	(0.09)		(0.08)	(0.05)	(0.06)	(0.08)
Woman's age at union	0.30***	0.05	0.32***	0.23**	0.33***	0.44***	0.24**	0.09	0.40***	0.36***	0.46***	0.20**
	(0.06)	(0.07)	(0.05)	(0.08)	(0.09)	(0.07)	(0.08)	(0.07)	(0.10)	(0.06)	(0.07)	(0.08)
Woman's age at union (squared)	−0.004***	−0.001	−0.01***	−0.004**	−0.01***	−0.01***	−0.005**	−0.002	−0.01***	−0.01***	−0.01***	−0.004*
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Union's cohort (ref. 1990–1999)												
1967–1979	0.88	0.92***	0.63***	0.74***	1.12***	1.03***	0.89***	0.58**	0.37*	1.12***	0.45***	0.23
	(1.02)	(0.16)	(0.06)	(0.14)	(0.11)	(0.10)	(0.19)	(0.22)	(0.16)	(0.08)	(0.13)	(0.13)
1980–1989	0.46***	0.27**	0.56***	0.56***	0.84***	0.38***	0.51***	−0.04	0.39***	0.49***	0.19	0.15
	(0.09)	(0.10)	(0.05)	(0.10)	(0.09)	(0.07)	(0.10)	(0.15)	(0.11)	(0.06)	(0.11)	(0.10)
2000–2010	−0.24**	−0.58***	−0.64***	−0.55***	−0.32*	−0.31**	−0.61***	−0.01	−0.84***	−0.30***	−0.45***	−0.43***
	(0.08)	(0.09)	(0.07)	(0.11)	(0.13)	(0.10)	(0.13)	(0.10)	(0.11)	(0.09)	(0.08)	(0.12)
Respondent's union order (ref. 1st union)												
Higher order unions	−0.40***	−0.42***	−1.08***	−0.43*	−0.05	−0.35***	−0.22*	−0.11	−0.79***	−0.11	−0.56***	−0.80**
	(0.10)	(0.08)	(0.27)	(0.17)	(0.16)	(0.10)	(0.10)	(0.16)	(0.24)	(0.07)	(0.17)	(0.27)
Age difference (ref. Age homogamy or 1-year difference)												
Woman older (2+)	−0.24	−0.05	−0.30**	−0.19	−0.08	−0.21*	−0.31*	−0.03	−0.16	−0.20*	−0.13	−0.34*
	(0.12)	(0.13)	(0.09)	(0.17)	(0.13)	(0.10)	(0.15)	(0.16)	(0.15)	(0.09)	(0.10)	(0.17)
Man older (2–4 years)	0.15	0.25*	0.19***	0.08	0.09	0.02	0.02	0.04	0.07	0.08	0.03	0.17
	(0.08)	(0.10)	(0.06)	(0.10)	(0.09)	(0.07)	(0.12)	(0.12)	(0.11)	(0.06)	(0.08)	(0.12)
Man older (5+)	0.26**	0.35**	0.25***	0.10	0.19	0.05	−0.19	−0.17	0.14	0.12	0.07	−0.08
	(0.09)	(0.11)	(0.06)	(0.11)	(0.10)	(0.08)	(0.12)	(0.12)	(0.13)	(0.07)	(0.09)	(0.12)
NA		−0.38	0.26	−0.07								
		(0.72)	(0.29)	(1.03)								

Continued

Table B.1: Continued

Transition from cohabitation to marriage	AT	BE	BG	CZ	EE	FR	HU	IT	LT	NO	PL	RO
Conception (ref. No conceived)												
Conceived	0.98***	0.92***	0.35***	0.93***	1.39***	0.80***	1.18***	1.01***	0.77***	0.97***	0.95***	0.70***
	(0.08)	(0.12)	(0.04)	(0.09)	(0.08)	(0.09)	(0.10)	(0.12)	(0.09)	(0.07)	(0.07)	(0.09)
Educational assortative mating (ref. Medium homogamous)												
Low homogamous	0.85***	0.06	−0.85***	−0.35	−0.79**	−0.08	−0.29	−0.32*	−1.00***	−0.02	0.21	−0.76***
	(0.24)	(0.17)	(0.08)	(0.22)	(0.29)	(0.15)	(0.17)	(0.15)	(0.29)	(0.18)	(0.23)	(0.13)
High homogamous	−0.28**	0.03	−0.34***	−0.06	−0.02	0.02	0.20	0.32*	0.08	0.17*	0.01	−0.12
	(0.10)	(0.11)	(0.06)	(0.13)	(0.11)	(0.08)	(0.13)	(0.14)	(0.11)	(0.07)	(0.08)	(0.15)
He high & She medium-low (Hypergamous)	0.07	−0.01	−0.03	−0.26	0.12	0.09	−0.0001	0.24	−0.24	0.09	−0.40**	0.20
	(0.09)	(0.17)	(0.10)	(0.14)	(0.13)	(0.12)	(0.18)	(0.20)	(0.15)	(0.10)	(0.15)	(0.19)
He medium & She low (Hypogamous)	0.04	0.09	−0.54***	−0.31	−0.05	−0.10	−0.08	−0.15	−0.68**	0.14	−0.11	−0.28*
	(0.14)	(0.18)	(0.10)	(0.25)	(0.18)	(0.12)	(0.18)	(0.17)	(0.25)	(0.11)	(0.17)	(0.12)
He medium-low & She high (Hypogamous)	−0.06	−0.04	−0.09	−0.26	−0.08	−0.15	0.09	0.30*	0.04	−0.04	0.02	−0.12
	(0.12)	(0.13)	(0.06)	(0.19)	(0.10)	(0.09)	(0.16)	(0.14)	(0.13)	(0.09)	(0.09)	(0.26)
He low & She medium (Hypogamous)	0.64***	−0.22	−0.09	−0.38*	−0.43**	−0.16	−0.23	−0.09	−0.01	−0.14	0.09	−0.35
	(0.17)	(0.18)	(0.09)	(0.17)	(0.17)	(0.12)	(0.20)	(0.14)	(0.19)	(0.13)	(0.17)	(0.20)
NA		0.01	0.11	−0.10		−0.13				−0.94***	−0.07	
		(0.30)	(0.50)	(0.26)		(0.41)				(0.13)	(0.32)	

Note: Standard errors in parentheses; *p < .05; **p < .01; ***p < .001.

Table B.2:
Cox regressions by transitions: beta-coefficient estimates for the transition from cohabitation to the first child

Transition from cohabitation to the first child	AT	BE	BG	CZ	EE	FR	HU	IT	LT	NO	PL	RO
Sex (ref. Male)												
Female	0.14	0.12	0.09	0.09	−0.13	0.04	−0.10		0.24	0.03	0.15	0.05
	(0.09)	(0.10)	(0.09)	(0.16)	(0.09)	(0.07)	(0.13)		(0.17)	(0.05)	(0.10)	(0.12)
Woman's age at union	0.31***	0.12	0.14	−0.04	0.55***	0.20**	0.08	−0.13	0.19	0.20***	0.10	0.09
	(0.08)	(0.09)	(0.09)	(0.12)	(0.10)	(0.06)	(0.10)	(0.07)	(0.13)	(0.05)	(0.08)	(0.12)
Woman's age at union (squared)	−0.01***	−0.002	−0.004	0.0001	−0.01***	−0.004**	−0.002	0.002	−0.004	−0.003***	−0.003	−0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)	(0.002)
Union's cohort (ref. 1990–1999)												
1967–1979	0.71	0.14	−0.25	−0.15	−0.62**	−0.29	−0.89*	−0.02	0.41	−0.47***	−0.27	0.33
	(1.02)	(0.35)	(0.16)	(0.35)	(0.21)	(0.19)	(0.38)	(0.40)	(0.42)	(0.12)	(0.27)	(0.19)
1980–1989	0.27*	−0.55**	−0.23	0.33	0.03	−0.23*	−0.34	0.13	0.17	−0.27***	0.09	0.31*
	(0.12)	(0.19)	(0.12)	(0.23)	(0.12)	(0.09)	(0.19)	(0.20)	(0.28)	(0.06)	(0.19)	(0.15)
2000–2010	0.07	0.52***	−0.08	−0.06	−0.57***	0.20	0.11	0.30*	−0.13	0.04	−0.003	−0.09
	(0.09)	(0.12)	(0.11)	(0.18)	(0.12)	(0.10)	(0.17)	(0.14)	(0.20)	(0.07)	(0.13)	(0.18)
Respondent's union order (ref. 1st union)												
Higher order union	−0.12	0.02	−0.26	−0.07	−0.03	0.12	−0.25	0.32	0.09	0.19**	0.25	0.46
	(0.12)	(0.11)	(0.27)	(0.30)	(0.15)	(0.11)	(0.15)	(0.20)	(0.33)	(0.06)	(0.20)	(0.26)
NA								0.36**				
								(0.13)				
Age difference (ref. Age homogamy or 1-year difference)												
Woman older (2+)	0.18	−0.001	−0.42*	0.85**	0.06	0.13	0.30	0.14	0.38	0.01	0.25	−0.16
	(0.14)	(0.17)	(0.18)	(0.27)	(0.15)	(0.13)	(0.23)	(0.22)	(0.32)	(0.09)	(0.18)	(0.30)
Man older (2–4 years)	0.13	0.08	−0.25*	0.25	0.05	0.23*	−0.03	0.25	0.40	0.07	0.16	−0.08
	(0.11)	(0.13)	(0.12)	(0.23)	(0.12)	(0.10)	(0.20)	(0.16)	(0.25)	(0.07)	(0.14)	(0.21)
Man older (5+)	0.15	0.19	−0.01	0.60**	0.19	0.30**	0.15	0.11	0.25	0.16*	0.15	0.07
	(0.12)	(0.15)	(0.12)	(0.23)	(0.12)	(0.11)	(0.19)	(0.16)	(0.27)	(0.07)	(0.15)	(0.20)
NA		−1.62	−0.70				−0.33					
		(1.02)	(0.72)				(0.75)					

Continued

Table B.2: Continued

Transition from cohabitation to the first child	AT	BE	BG	CZ	EE	FR	HU	IT	LT	NO	PL	RO
Educational assortative mating (ref. Medium homogamous)												
Low homogamous	1.20***	0.47*	1.09***	0.82**	0.54**	0.37*	0.99***	0.27	0.85**	0.22	0.91***	0.75***
	(0.25)	(0.23)	(0.12)	(0.27)	(0.20)	(0.15)	(0.18)	(0.16)	(0.27)	(0.15)	(0.25)	(0.16)
High homogamous	−1.00***	−0.42**	−0.88***	−0.22	−0.87***	−0.59***	−0.74*	−0.27	−1.13***	−0.61***	−1.61***	−2.04**
	(0.17)	(0.15)	(0.21)	(0.33)	(0.16)	(0.11)	(0.30)	(0.24)	(0.33)	(0.08)	(0.19)	(0.72)
He high & She medium-low	−0.17	−0.15	−0.31	−0.19	−0.56**	−0.08	−0.64	−0.62	−0.66	−0.22*	−0.60*	−0.09
(Hypergamous)	(0.12)	(0.22)	(0.35)	(0.30)	(0.19)	(0.15)	(0.39)	(0.40)	(0.36)	(0.10)	(0.25)	(0.52)
He medium & She low	0.38**	0.11	0.70***	0.92**	0.31	0.44***	0.96***	0.23	0.35	0.25*	0.45*	0.47**
(Hypergamous)	(0.14)	(0.24)	(0.16)	(0.28)	(0.18)	(0.13)	(0.20)	(0.20)	(0.31)	(0.10)	(0.20)	(0.18)
He medium-low & She high	−0.61***	−0.51**	−0.64**	−0.36	−0.41***	−0.30**	−0.40	−0.27	−0.65	−0.19*	−0.69***	−1.40
(Hypogamous)	(0.18)	(0.18)	(0.21)	(0.43)	(0.12)	(0.12)	(0.30)	(0.23)	(0.34)	(0.08)	(0.16)	(1.01)
He low & She medium	−0.09	0.42*	0.70***	0.51	0.33*	0.12	0.67**	0.01	0.58*	0.10	0.15	0.20
(Hypogamous)	(0.27)	(0.20)	(0.19)	(0.26)	(0.14)	(0.13)	(0.25)	(0.18)	(0.28)	(0.11)	(0.23)	(0.31)
NA		−1.17		−0.44		−0.06				−1.46***	0.24	
		(0.72)		(0.72)		(0.45)				(0.11)	(0.39)	

Note: Standard errors in parentheses; *p < .05; **p < .01; ***p < .001.

Table B.3:
Cox regressions by transitions: beta-coefficient estimates for the transition from marriage to the first child

Transition from marriage to the first child	AT	BE	BG	CZ	EE	FR	HU	IT	LT	NO	PL	RO
Sex (ref. Male)												
Female	0.09	0.01	0.09**	0.04	0.06	0.06	−0.004		0.07	−0.04	0.12***	0.05
	(0.06)	(0.05)	(0.03)	(0.05)	(0.06)	(0.05)	(0.04)		(0.04)	(0.04)	(0.03)	(0.03)
Woman's age at union	−0.03	0.12*	0.06	0.11	0.04	0.05	0.13**	0.05	−0.004	0.17***	−0.11***	−0.04
	(0.06)	(0.06)	(0.04)	(0.06)	(0.07)	(0.06)	(0.05)	(0.03)	(0.05)	(0.05)	(0.03)	(0.04)
Woman's age at union (squared)	−0.0001	−0.003*	−0.002*	−0.003*	−0.002	−0.002	−0.003***	−0.002**	−0.001	−0.003***	0.001	0.0001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Union's cohort (ref. 1990–1999)												
1967–1979	1.15	−0.34***	−0.14**	−0.30***	−0.03	−0.04	−0.97***	0.005	−0.22***	0.09	−0.05	−0.02
	(1.02)	(0.07)	(0.05)	(0.07)	(0.08)	(0.07)	(0.05)	(0.05)	(0.06)	(0.06)	(0.04)	(0.05)
1980–1989	−0.15*	−0.06	−0.01	−0.07	0.11	−0.17**	0.03	0.04	−0.12*	−0.02	0.003	0.06
	(0.08)	(0.06)	(0.04)	(0.06)	(0.07)	(0.06)	(0.05)	(0.04)	(0.05)	(0.05)	(0.03)	(0.04)
2000–2010	−0.20*	0.11	0.07	−0.34***	−0.33*	−0.12	−0.09	0.004	−0.10	−0.16*	0.02	−0.24***
	(0.08)	(0.08)	(0.07)	(0.09)	(0.13)	(0.12)	(0.08)	(0.04)	(0.07)	(0.08)	(0.04)	(0.07)
Respondent's union order (ref. 1st union)												
Higher order unions	0.05	0.14*	−0.19	0.13	−0.17	−0.06	0.19*	0.15	0.19	0.14*	0.06	−0.02
	(0.11)	(0.06)	(0.22)	(0.13)	(0.15)	(0.10)	(0.08)	(0.14)	(0.20)	(0.07)	(0.16)	(0.19)
Age difference (ref. Age homogamy or 1-year difference)												
Woman older (2+)	0.15	0.06	0.02	0.08	0.04	−0.03	0.10	0.03	0.18*	−0.14	0.18***	0.02
	(0.12)	(0.09)	(0.08)	(0.12)	(0.10)	(0.09)	(0.08)	(0.07)	(0.08)	(0.08)	(0.05)	(0.07)
Man older (2–4 years)	0.002	−0.09	−0.04	0.02	−0.01	0.02	−0.01	−0.03	0.003	−0.02	−0.04	−0.003
	(0.08)	(0.06)	(0.04)	(0.06)	(0.07)	(0.06)	(0.05)	(0.04)	(0.05)	(0.05)	(0.03)	(0.05)
Man older (5+)	−0.05	0.01	−0.09	−0.14*	−0.10	0.01	0.05	−0.01	−0.03	−0.07	−0.11**	0.05
	(0.09)	(0.07)	(0.05)	(0.07)	(0.08)	(0.07)	(0.06)	(0.04)	(0.06)	(0.06)	(0.04)	(0.05)
NA		−0.26	−0.13	−0.48			0.40		−0.21			
		(0.36)	(0.24)	(0.51)			(0.58)		(1.00)			

Continued

Table B3:
Continued

Transition from marriage to the first child	AT	BE	BG	CZ	EE	FR	HU	IT	LT	NO	PL	RO
Educational assortative mating (ref. Medium homogamous)												
Low homogamous	−0.14	0.23*	−0.19**	0.15	0.20	0.10	−0.01	0.20***	−0.06	0.27*	0.03	−0.003
	(0.14)	(0.09)	(0.06)	(0.16)	(0.22)	(0.09)	(0.09)	(0.04)	(0.14)	(0.13)	(0.07)	(0.06)
High homogamous	0.001	0.13	−0.07	−0.19*	−0.15	0.005	−0.12	0.06	−0.21***	−0.20***	−0.27***	−0.25***
	(0.11)	(0.08)	(0.05)	(0.09)	(0.08)	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)	(0.04)	(0.06)
He high &She medium-low (Hypergamous)	0.09	0.10	0.04	−0.14	−0.11	0.03	0.03	0.02	−0.01	−0.24**	−0.16*	0.10
	(0.09)	(0.10)	(0.08)	(0.08)	(0.10)	(0.10)	(0.08)	(0.07)	(0.07)	(0.08)	(0.06)	(0.08)
He medium & She low (Hypergamous)	0.10	0.05	−0.09	0.02	0.33*	0.14	0.06	0.19***	0.16	−0.07	0.02	0.02
	(0.11)	(0.11)	(0.08)	(0.12)	(0.15)	(0.09)	(0.07)	(0.05)	(0.13)	(0.09)	(0.06)	(0.05)
He medium-low & She high (Hypogamous)	−0.32**	−0.07	−0.02	0.13	−0.05	−0.07	−0.02	−0.03	−0.02	−0.15*	−0.17***	−0.16
	(0.12)	(0.09)	(0.05)	(0.11)	(0.07)	(0.08)	(0.07)	(0.06)	(0.06)	(0.07)	(0.04)	(0.10)
He low & She medium (Hypogamous)	−0.13	0.03	−0.12	−0.27*	0.17	0.05	0.04	0.07	−0.04	−0.04	−0.06	0.11
	(0.16)	(0.10)	(0.07)	(0.13)	(0.13)	(0.10)	(0.10)	(0.05)	(0.08)	(0.10)	(0.06)	(0.09)
NA		0.57**	−0.69	−0.50**		−0.06			0.26	−0.18	−0.05	
		(0.18)	(0.36)	(0.16)		(0.34)			(0.71)	(0.12)	(0.16)	
N-episodes	5,328	4,765	11,009	4,387	4,761	6,689	5,782	7,783	4,832	10,197	10,339	6,245
Log Likelihood	−16,792	−18,651	−51,937	−17,173	−17,172	−24,508	−25,269	−44,330	−22,351	−38,065	−57,873	−33,413
LR Test	463.57***	381.59***	1,276.04***	454.14***	943.29***	444.88***	888.29***	336.02***	440.22***	1,312.17***	934.51***	492.53***

Note: Standard errors in parentheses; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Appendix C

Table C.1:
Pairwise comparisons between the levels of the educational pairing variable for the transition from cohabitation to marriage. Beta-coefficients, reference category in bold

	AT	BE	BG	CZ	EE	FR	HU	IT	LT	NO	PL	RO
Low vs **High homogamous**	1.13***	0.03	−0.51***	−0.29	−0.77**	−0.11	−0.49*	−0.64***	−1.08***	−0.19	0.20	−0.64***
	(0.25)	(0.16)	(0.09)	(0.25)	(0.30)	(0.15)	(0.20)	(0.17)	(0.20)	(0.18)	(0.24)	(0.18)
He high She low (Hypergamous)	0.35**	−0.04	0.31**	−0.20	0.13	0.06	−0.20	−0.09	−0.33*	−0.07	−0.41**	0.33
vs **High homogamous**	(0.12)	(0.15)	(0.11)	(0.18)	(0.15)	(0.12)	(0.20)	(0.21)	(0.17)	(0.09)	(0.16)	(0.23)
He medium She low (Hypergamous)	0.32*	0.06	−0.20	−0.25	−0.04	−0.12	−0.28	−0.48*	−0.77**	−0.03	−0.16	−0.16
vs **High homogamous**	(0.16)	(0.17)	(0.11)	(0.28)	(0.19)	(0.12)	(0.20)	(0.19)	(0.26)	(0.11)	(0.18)	(0.18)
He low She high (Hypogamous)	0.22	−0.07	0.25***	−0.21	−0.07	−0.17	−0.11	−0.02	−0.04	−0.21**	0.01	0.00
vs **High homogamous**	(0.15)	(0.11)	(0.07)	(0.22)	(0.12)	(0.09)	(0.18)	(0.16)	(0.15)	(0.08)	(0.09)	(0.28)
He low She medium (Hypogamous)	0.92***	−0.26	0.25*	−0.32	−0.41*	−0.19	−0.43	−0.41*	−0.09	−0.31*	0.09	−0.22
vs **High homogamous**	(0.19)	(0.17)	(0.10)	(0.20)	(0.18)	(0.12)	(0.23)	(0.16)	(0.20)	(0.13)	(0.18)	(0.24)
He high She low (Hypergamous)	−0.77**	−0.07	0.82***	0.09	0.91**	0.17	0.29	0.55*	0.75*	0.12	−0.61*	0.97***
vs **Low homogamous**	(0.25)	(0.20)	(0.12)	(0.25)	(0.31)	(0.17)	(0.24)	(0.22)	(0.31)	(0.19)	(0.27)	(0.22)
He medium She low (Hypergamous)	−0.81**	0.03	0.32**	0.03	0.74*	−0.02	0.21	0.16	0.31	0.16	−0.32	0.48**
vs **Low homogamous**	(0.27)	(0.21)	(0.12)	(0.32)	(0.33)	(0.18)	(0.23)	(0.19)	(0.37)	(0.19)	(0.28)	(0.15)
He low She high (Hypogamous)	−0.90***	−0.10	0.77***	0.08	0.71*	−0.07	0.38	0.62***	1.04***	−0.02	−0.19	0.64*
vs **Low homogamous**	(0.26)	(0.17)	(0.09)	(0.28)	(0.30)	(0.16)	(0.22)	(0.17)	(0.31)	(0.18)	(0.25)	(0.28)
He low She medium (Hypogamous)	−0.21	−0.28	0.76***	−0.03	0.36	−0.08	0.06	0.23	0.99**	−0.12	−0.12	0.42
vs **Low homogamous**	(0.28)	(0.21)	(0.11)	(0.27)	(0.32)	(0.18)	(0.25)	(0.16)	(0.33)	(0.21)	(0.28)	(0.22)
He low She high (Hypogamous) vs	−0.13	−0.03	−0.06	−0.00	−0.20	−0.24	0.09	0.07	0.28	−0.13	0.42**	−0.33
He high She low(Hypergamous)	(0.14)	(0.17)	(0.11)	(0.22)	(0.15)	(0.13)	(0.23)	(0.21)	(0.18)	(0.10)	(0.16)	(0.31)
He low She medium vs **He medium**	0.61**	−0.32	0.45***	−0.06	−0.38	−0.06	−0.15	0.07	0.68*	−0.28	0.20	−0.07
She low (Hypergamous)	(0.21)	(0.22)	(0.13)	(0.30)	(0.23)	(0.16)	(0.26)	(0.19)	(0.30)	(0.15)	(0.23)	(0.22)

Note: Standard errors in parentheses; $^{*}p < .05$; $^{***}p < .01$; $^{***}p < .001$.

Table C.2:
Pairwise comparisons between the levels of the educational pairing variable for the transition from cohabitation to the first child. Beta coefficients, reference category in bold

	AT	BE	BG	CZ	EE	FR	HU	IT	LT	NO	PL	RO
Low vs **High homogamous**	2.21^{***}	0.88^{***}	1.97^{***}	1.04^{*}	1.41^{***}	0.96^{***}	1.73^{***}	0.54^{*}	1.98^{***}	0.84^{***}	2.52^{***}	2.79^{***}
	(0.30)	(0.21)	(0.21)	(0.41)	(0.24)	(0.17)	(0.33)	(0.24)	(0.40)	(0.15)	(0.31)	(0.72)
He high She low (Hypergamous) vs **High homogamous**	0.83^{***}	0.27	0.58	0.03	0.31	0.51^{**}	0.10	−0.35	0.48	0.40^{***}	1.01^{***}	1.94^{*}
	(0.19)	(0.20)	(0.38)	(0.41)	(0.23)	(0.16)	(0.47)	(0.43)	(0.46)	(0.11)	(0.29)	(0.87)
He medium She low (Hypergamous) vs **High homogamous**	1.38^{***}	0.52^{*}	1.59^{***}	1.14^{**}	1.17^{***}	1.03^{***}	1.71^{***}	0.50	1.48^{***}	0.87^{***}	2.07^{***}	2.51^{***}
	(0.21)	(0.22)	(0.24)	(0.42)	(0.23)	(0.14)	(0.33)	(0.26)	(0.42)	(0.10)	(0.26)	(0.73)
He low She high (Hypogamous) vs **High homogamous**	0.39	−0.09	0.24	−0.14	0.46^{**}	0.30^{*}	0.34	−0.01	0.48	0.43^{***}	0.93^{***}	0.64
	(0.23)	(0.16)	(0.27)	(0.52)	(0.18)	(0.13)	(0.40)	(0.29)	(0.44)	(0.08)	(0.22)	(1.23)
He low She medium (Hypogamous) vs **High homogamous**	0.92^{**}	0.83^{***}	1.59^{***}	0.74	1.20^{***}	0.72^{***}	1.41^{***}	0.28	1.71^{***}	0.71^{***}	1.76^{***}	2.24^{**}
	(0.31)	(0.19)	(0.26)	(0.39)	(0.19)	(0.14)	(0.37)	(0.25)	(0.40)	(0.11)	(0.29)	(0.77)
He high She low (Hypergamous) vs**Low homogamous**	$−1.38^{***}$	$−0.62^{*}$	$−1.39^{***}$	$−1.01^{**}$	$−1.10^{***}$	$−0.45^{*}$	$−1.63^{***}$	$−0.89^{*}$	$−1.51^{***}$	$−0.44^{**}$	$−1.51^{***}$	−0.85
	(0.27)	(0.26)	(0.34)	(0.38)	(0.26)	(0.20)	(0.42)	(0.40)	(0.41)	(0.17)	(0.34)	(0.52)
He medium She low (Hypergamous) vs **Low homogamous**	$−0.83^{**}$	−0.36	$−0.38^{*}$	0.10	−0.24	0.07	−0.03	−0.04	−0.50	0.03	−0.46	−0.28
	(0.28)	(0.28)	(0.15)	(0.35)	(0.25)	(0.18)	(0.23)	(0.20)	(0.36)	(0.17)	(0.30)	(0.16)
He low She high (Hypogamous) vs **Low homogamous**	$−1.81^{***}$	$−0.98^{***}$	$−1.72^{***}$	$−1.18^{*}$	$−0.95^{***}$	$−0.67^{***}$	$−1.39^{***}$	$−0.55^{*}$	$−1.50^{***}$	$−0.41^{**}$	$−1.59^{***}$	$−2.15^{*}$
	(0.30)	(0.23)	(0.22)	(0.49)	(0.22)	(0.17)	(0.33)	(0.24)	(0.40)	(0.15)	(0.29)	(1.01)
He low She medium (Hypogamous) vs **Low homogamous**	$−1.29^{***}$	−0.05	$−0.38^{*}$	−0.31	−0.21	−0.25	−0.32	−0.26	−0.27	−0.13	$−0.76^{*}$	−0.55
	(0.36)	(0.25)	(0.18)	(0.35)	(0.22)	(0.18)	(0.27)	(0.18)	(0.34)	(0.17)	(0.33)	(0.30)
He low She high (Hypogamous) vs **He high She low (Hypergamous)**	$−0.44^{*}$	−0.36	−0.31	−0.18	0.16	−0.21	0.24	0.35	0.00	0.03	−0.09	−1.30
	(0.21)	(0.22)	(0.39)	(0.50)	(0.21)	(0.17)	(0.47)	(0.43)	(0.47)	(0.11)	(0.28)	(1.12)
He low She medium vs **He medium She low (Hypergamous)**	−0.46	0.31	0.01	−0.40	0.02	$−0.32^{*}$	−0.30	−0.22	0.23	−0.15	−0.31	−0.27
	(0.29)	(0.26)	(0.22)	(0.36)	(0.21)	(0.16)	(0.28)	(0.22)	(0.37)	(0.13)	(0.28)	(0.31)

Note: Standard errors in parentheses; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Table C.3:
Pairwise comparisons between the levels of the educational pairing variable for the transition from marriage to first child. Beta coefficients, reference category in bold

	AT	BE	BG	CZ	EE	FR	HU	IT	LT	NO	PL	RO
Low vs **High homogamous**	−0.14	0.10	−0.11	0.34	0.35	0.10	0.11	0.14*	0.16	0.47***	0.30***	0.25**
	(0.17)	(0.09)	(0.07)	(0.18)	(0.23)	(0.10)	(0.10)	(0.07)	(0.15)	(0.13)	(0.08)	(0.08)
He high She low (Hypergamous)	0.09	−0.03	0.12	0.05	0.04	0.03	0.15	−0.04	0.21*	−0.04	0.11	0.35***
vs **High homogamous**	(0.12)	(0.10)	(0.09)	(0.11)	(0.12)	(0.10)	(0.10)	(0.09)	(0.09)	(0.08)	(0.07)	(0.10)
He medium She low (Hypergamous)	0.09	−0.08	−0.02	0.20	0.48**	0.14	0.18*	0.13	0.37**	0.13	0.29***	0.27***
vs **High homogamous**	(0.14)	(0.10)	(0.09)	(0.14)	(0.16)	(0.09)	(0.09)	(0.07)	(0.14)	(0.09)	(0.07)	(0.08)
He low She high (Hypogamous)	−0.32*	−0.20*	0.06	0.31*	0.10	−0.07	0.11	−0.09	0.19**	0.05	0.10*	0.09
vs **High homogamous**	(0.15)	(0.08)	(0.06)	(0.13)	(0.09)	(0.09)	(0.08)	(0.08)	(0.07)	(0.06)	(0.05)	(0.12)
He low She medium (Hypogamous)	−0.13	−0.10	−0.05	−0.08	0.31*	0.04	0.16	0.02	0.17	0.16	0.22**	0.36***
vs **High homogamous**	(0.19)	(0.10)	(0.08)	(0.15)	(0.14)	(0.10)	(0.11)	(0.07)	(0.10)	(0.10)	(0.07)	(0.11)
He high She low (Hypergamous)	0.23	−0.14	0.23*	−0.30	−0.31	−0.07	0.04	−0.18*	0.05	−0.51***	−0.19	0.10
vs **Low homogamous**	(0.16)	(0.11)	(0.10)	(0.18)	(0.24)	(0.11)	(0.12)	(0.07)	(0.15)	(0.14)	(0.10)	(0.09)
He medium She low (Hypergamous)	0.23	−0.19	0.09	−0.14	0.13	0.04	0.07	−0.00	0.22	−0.34*	−0.01	0.02
vs **Low homogamous**	(0.17)	(0.11)	(0.09)	(0.19)	(0.26)	(0.10)	(0.10)	(0.05)	(0.19)	(0.14)	(0.09)	(0.06)
He low She high (Hypogamous)	−0.18	−0.30**	0.17*	−0.03	−0.25	−0.17	−0.00	−0.23***	0.04	−0.42**	−0.20*	−0.15
vs **Low homogamous**	(0.18)	(0.10)	(0.07)	(0.19)	(0.23)	(0.11)	(0.10)	(0.06)	(0.15)	(0.14)	(0.08)	(0.11)
He low She medium (Hypogamous)	0.00	−0.20	0.06	−0.43*	−0.04	−0.06	0.05	−0.12**	0.02	−0.32*	−0.08	0.12
vs **Low homogamous**	(0.21)	(0.11)	(0.09)	(0.20)	(0.25)	(0.12)	(0.13)	(0.05)	(0.16)	(0.16)	(0.09)	(0.10)
He low She high (Hypogamous) vs	−0.41**	−0.17	−0.06	0.27*	0.06	−0.10	−0.04	−0.05	−0.01	0.09	−0.01	−0.26*
He high She low (Hypergamous)	(0.14)	(0.11)	(0.09)	(0.13)	(0.11)	(0.11)	(0.10)	(0.08)	(0.09)	(0.09)	(0.07)	(0.13)
He low She medium vs **He medium**	−0.23	−0.02	−0.03	−0.29	−0.16	−0.10	−0.02	−0.12*	−0.20	0.02	−0.07	0.09
She low (Hypergamous)	(0.19)	(0.12)	(0.10)	(0.17)	(0.19)	(0.11)	(0.11)	(0.06)	(0.15)	(0.12)	(0.08)	(0.10)

Note: Standard errors in parentheses; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

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Differences in partnership and marital status at first birth by women's and their partners' education: evidence from Britain 1991–2012

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Abstract

Non-marital childbearing, especially within cohabitation, has become increasingly common in Britain, as in other Western countries. Nonetheless, births outside of marriage occur more frequently among individuals who are relatively disadvantaged in terms of income potential. Building upon previous research in family formation patterns, we examine differences by education and employment status in the proportion of marital and non-marital first births among British women and couples over the past two decades. In particular, we explore trends in educational differences in non-marital first births among women, and the relationship between the partners' joint educational attainment and childbearing within cohabitation or within marriage. We find that there has been a steady increase in the share of first births to cohabiting couples of all educational groups, but that there has been no significant change in the share of births to unpartnered women. Overall, our results show that the differences by educational attainment in the likelihood of having a non-marital first birth did not increase significantly during the observed period. The findings also indicate that among cohabiting couples, the male partner's education was negatively associated with childbearing, but that this relationship varied according to the woman's educational attainment.

1 Introduction

In recent decades, the proportion of children born outside of marriage has increased substantially across Western countries. This trend has largely been the result of an

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increase in childbearing within cohabitation (Perelli-Harris et al. 2010; Wu et al. 2001). While Britain has tended to have lower levels of non-marital births than the Nordic countries, this share has increased rapidly in recent years, from 12% in 1980 to nearly half of all births currently (ONS 2015). The majority of these births are to cohabiting couples. Indeed, in recent years, just under one-third of all births in England and Wales have been to cohabiting couples (Berrington and Stone 2015).

The partnership context of childbearing in Britain is of particular interest, as the profile of non-marital childbirth in the UK is closer to the pattern observed in the United States than in the rest of Europe. Like the US, Britain has a relatively high rate of teenage pregnancy as well as a high proportion of births to single women not in a live-in partnership (Perelli-Harris et al. 2012; Sigle-Rushton 2008). Thus, at the beginning of the 2000s, 16% of first births in the UK – but only 5% of first births in Norway and France and 3% of first births in the Netherlands – were to a mother without a co-resident partner (Perelli-Harris et al. 2010, 786–787).

In the UK, rates of non-marital childbearing – whether to an unpartnered woman or a cohabitating couple – are disproportionately high among individuals with lower levels of educational attainment; perhaps because they have relatively poor marriage market prospects (Ermisch 2001, 2008). Moreover, these educational differences are more pronounced in the UK than in other European countries, as a comparative study on women's educational gradient of childbearing within cohabitation has shown (Perelli-Harris et al. 2010). In addition, cohabiting couples with children have been found to have lower levels of union stability in the UK than in many other European countries (Kiernan 2004; Perelli-Harris et al. 2012).

It should be noted that in the UK, the negative educational gradient of childbearing within cohabitation (unlike of unpartnered births) was less marked before the early 2000s, as the overall rates of births to cohabiting couples were relatively low (Perelli-Harris et al. 2010). Whether these differences have increased since this time remains unclear. Moreover, we know surprisingly little about the extent to which the male partner's or both partners' educational and employment characteristics are predictors of non-marital childbirth. While the vast majority of births still occur within a co-residential union, be it marriage or cohabitation; most studies on the marital context of childbearing have focused exclusively on women (Perelli-Harris and Gerber 2011; Perelli-Harris et al. 2010). Ignoring the role of men in these processes could obscure the full picture of the relationship between non-marital childbearing and the partners' educational and employment prospects for two main reasons: first, the characteristics of each partner may affect the reproductive decision-making process independently; and, second, these characteristics may interact to yield different fertility behaviours (Nitsche et al. 2015). Education in particular is likely to play an important role in childbearing within and outside of marriage, as it is linked to delayed fertility, and is a strong predictor of long-term earning capacity (Ní Bhrolcháin and Beaujouan 2012).

In the first part of this paper, we explore trends over the past two decades in the relationship between women's partnership status and educational and employment characteristics at the time of the first birth. In this analysis, we distinguish between married, cohabiting, and unpartnered women. In the second part of this paper, we analyse couples in a co-residential union in order to examine how both partners' educational and employment characteristics are associated with their marital status at first birth, with a particular focus on couples' joint educational characteristics.

Because of the link between unmarried parenthood and negative consequences both for mothers and children, policy-makers tend to devote considerable attention to the partnership context at birth. Not surprisingly, studies from Britain (Ermisch 2001) and the US (Wu et al. 2001) have shown that children born to cohabiting parents, and especially those born outside of a live-in partnership, are likely to spend more of their childhood in a single-parent family. Furthermore, there is a large body of evidence, mainly from the US, showing that compared to children born within marriage, children born outside of marriage are at higher risk of living in poverty, and are disadvantaged in terms of health, education, and other measures of social development (Brown 2010; Harkness et al. 2012; Kiernan and Smith 2003; McLanahan 2011).

It should be noted that there is a debate about whether a mother's partnership status at birth has a causal effect on her future social and economic outcomes, or whether these outcomes are consequences of the woman's selection into marriage or cohabitation (Goodman and Greaves 2010; Harkness et al. 2012). Previous studies have shown that in the UK, cohabiting mothers are considerably younger, are less educated, and are less likely to be in paid employment than married mothers (Berrington and Stone 2015; Kiernan et al. 2011). In addition, cohabiting couple families are more likely than married families to consist of two parents who are non-employed or in education, and to live in rented housing (Berrington and Stone 2015).

Regardless of whether the relationship between the mother's partnership status at birth and her children's outcomes is causal or is the result of selection, it is important to understand how the partners' educational and employment characteristics can shape whether the birth is to married or cohabiting parents or to a single mother, and how these trends have changed over time. In this study, we focus on first births. Because a larger share of first than of higher order births occur outside of marriage (Kiernan 2004), first births are more relevant than subsequent births for analysing educational differences in non-marital childbearing. Parental marital status at the time of childbirth matters, as it is a particularly strong indicator of future outcomes for mothers and children (Brown 2010; McLanahan 2011) – even though marital status can, of course, change from conception to birth, or after the child is born. However, previous research for the UK on marital transitions around the time of the first birth has shown that during the 1990s and the early 2000s, more than 80% of women who had their first birth within cohabitation were still cohabiting one year after the birth (Perelli-Harris et al. 2009).

In the following, we review the theoretical background for the increase in non-marital childbearing in Western countries, and describe the family formation trends by educational status in Britain. Based on this review, we formulate the study hypotheses. We then present a description of the data and methods used in this study, followed by a summary of the findings. Finally, we discuss our results, comparing them to the findings of previous literature.

2 Background: the social context of non-marital childbearing

Historically, childbearing outside of wedlock occurred mainly among the less advantaged segments of society, including among landless and unskilled labourers who could not afford to marry (Kiernan 2004; Laslett et al. 1980). However, the sharp increase in childbearing within cohabitation in the latter half of the 20th century has been attributed to additional social forces, including shifts in family attitudes and the increasing economic independence of women (Bumpass 1990; Lesthaeghe 2010). According to the second demographic transition (SDT) theory, a combination of economic and social developments, including increases in education and accelerating secularisation and individualisation, have laid the groundwork for the rise in non-traditional family behaviours, such as cohabitation and extramarital births (Lesthaeghe 2010; Lesthaeghe and Surkyn 1988). Since education is one of the engines that drive normative change, the better educated are expected to be at the vanguard of these new family behaviours (Lesthaeghe and Surkyn 1988).

There is, however, little empirical support for this assumption made by proponents of the SDT. Although in some countries, such as in France, highly educated women have initiated the increase in childbearing within cohabitation; in many European countries and in the US, less educated women are more likely than their better educated peers to have a child within cohabitation (Lundberg and Pollak 2013; Perelli-Harris et al. 2010; Perelli-Harris and Gerber 2011). It has therefore been argued that the liberalisation of family norms is not sufficient for explaining the rapid increase in childbirth within cohabitation (Perelli-Harris et al. 2010), and that processes of globalisation and increasing economic uncertainty have also contributed substantially to this trend. Thus, when levels of job insecurity and of uncertainty about the future are high, cohabitation provides a reversible and less constraining alternative to marriage, especially for individuals with fewer skills and resources (Mills and Blossfeld 2005; Perelli-Harris et al. 2010).

The increased fragility of men's economic position in particular may explain the delay or the retreat from marriage and the increase in non-marital births. Oppenheimer and colleagues (Oppenheimer 2003; Oppenheimer et al. 1997) have observed that because men continue to play an important economic role in the family from both a normative and a behavioural perspective, a man with a low or unstable income would likely be seen as a less desirable marriage partner. On the other hand, uncertainty about a man's employment prospects is more tolerable in the context of cohabitation, since cohabitation is often seen as a trial stage before marriage, and the costs of breaking up a cohabiting union are lower than the costs associated with divorce (Ermisch and Francesconi 2000; Oppenheimer 2003). Empirical studies have indicated that a man's ability to fulfil the role of provider remains an important prerequisite for marriage in the United States (Gibson-Davis et al. 2005; Sassler et al. 2014), as well as in European countries with relatively high levels of gender egalitarianism, such as Norway and Sweden (Wiik et al. 2010). Provided the public benefits available to lone mothers (and/or the father's contributions) are sufficient, a woman might view childbearing outside of marriage as preferential to remaining single and childless (Ermisch 2008). Thus, according to Ermisch's theory of the marriage market search, childbearing outside of marriage can be seen as a rational choice that is based on the perceived costs of and gains from unmarried parenthood relative to other alternatives. For example, if a less educated woman's marriage market prospects are poor because she is likely to partner with a similarly disadvantaged man, she may prefer to have a child before marriage, rather than delaying childbearing until she can find a suitable marriage partner (Ermisch 2003, 2008).

Studies for the US have pointed to an increasing divide in family formation patterns based on education and social class. McLanahan (2004) has argued that the changes associated with the second demographic transition – such as the rise in cohabitation and divorce and the decoupling of marriage and childbearing – have followed diverging routes among the advantaged and the disadvantaged populations. Thus, while women with better opportunities typically follow a trajectory of later motherhood, or of waiting to have children until they have accumulated more resources and established a stable union; women with relatively poor prospects tend to have their first child at an earlier age, and while in a less stable union. Although cohabitation has become a socially acceptable living arrangement among all social groups, less educated women are more likely than their better educated counterparts to bear and raise children within cohabitation; whereas college educated women tend to cohabit before marriage, but to marry before having children. Thus, marriage and parenthood remain closely linked among the better educated (Lundberg and Pollak 2013). Similarly, qualitative studies from the UK have shown that the norms and the expectations of family formation differ by social group. For example, Berrington et al. (2015a) found that while levels of acceptance of non-marital childbearing have been increasing in the UK, highly educated individuals continue to prefer the more traditional sequence of getting married before having children. By contrast, less educated individuals are more likely to opt for non-marital expressions of commitment, such as buying a house and having children together. However, whether the UK is following the pattern of the increasing divergence in family formation trends observed in the US remains unclear.

3 Education and family formation patterns in Britain

In Britain, the relationship between education and union formation patterns has varied by birth cohort and over time. While better educated women pioneered cohabitation in Britain during the 1970s and the 1980s, less educated women eventually caught up (Ermisch 2008; Ní Bhrolcháin and Beaujouan 2013). Nonetheless, marriage rates have been continuously higher among less educated than better educated women, although this gap is partly due to the tendency of better educated women to delay marriage (ibid). It should, however, be noted that while highly educated women initially had higher cohabitation rates, levels of childbearing within cohabitation were lower before the 1990s than in the 2000s, with no clear educational gradient (Perelli-Harris et al. 2010).

In recent decades, the proportion of women with higher education has increased substantially; a trend that has led to a reversal of the educational gender gap among recent cohorts in the UK, as well as in many other countries (Vincent-Lancrin 2008). This change could lead to a mating squeeze; i.e. to a shortage of potential partners for highly educated women, since women tend to marry men who are at least as educated as they are (while men tend to marry women who are at most as educated as they are) (Van Bavel 2012). Alternatively, it has been suggested that an increase in gender symmetry in education and earning capacity would raise the desirability of highly educated women as marriage partners, since their contribution to the household income may be expected to be greater than in the past (Blossfeld and Müller 2002). Indeed, recent studies from Europe and other developed countries have suggested that there has been a decline in traditional marriage unions in which the man is better educated than the woman, and an increase in married couples in which the woman is better educated than the man (Esteve et al. 2012; Grow and Van Bavel 2015).

While studies from the US have suggested that highly educated women are now marrying at a higher rate than their less educated peers (Goldstein and Kenney 2001), there is so far little evidence of a reversal of the negative educational gradient of marriage in Britain; although the gap has narrowed slightly among recent cohorts (Ní Bhrolcháin and Beaujouan 2013).

In Britain, highly educated women tend to marry and have children significantly later in life than less educated women. Previous studies have shown the timing of the first birth is becoming increasingly polarised by education across birth cohorts in Britain (Berrington et al. 2015b; Ratcliffe and Smith 2006). This trend may be the result of the differential opportunity costs of early childbearing by level of education. Less educated women have fewer incentives to delay childbearing, as they are likely to remain in low-paid employment. By contrast, highly educated women, who tend to spend long periods of time in training and have increasing returns to education (Smith and Ratcliffe 2009), may be highly motivated to delay childbearing until after they have established their career.

The means-tested welfare system in the UK may have also contributed to the widening educational divide in the timing of first birth. Since family subsidies are more generous for lower than for higher earners, a highly educated woman may choose to delay childbearing until she is established in her career and can afford private child care (Rendall et al. 2009). Moreover, the provision of income-tested benefits for single mothers may affect the opportunity costs of non-marital childbearing (Inanc 2015). On the other hand, in 1999, the UK government launched the Teenage Pregnancy Strategy, which aimed to reduce the conception rates of girls under age 18 (Sigle-Rushton 2008). This initiative may have contributed to the stabilisation in the proportion of births to non-cohabiting women around the 2000s (Berrington 2014), although rates of childbearing among cohabiting women have continued to rise (Berrington and Stone 2015).

Against this background, we wish to examine the question of whether in Britain patterns of childbearing outside of marriage have become increasingly polarised by education over the past 20 years. We also intend to investigate the relationship between both partners' educational and employment status and the likelihood of entering parenthood within cohabitation or marriage.

Differences between highly and less educated women in their martial priorities, and in their views about the acceptability of childbearing outside of marriage, may be expected to lead to a steeper increase in non-marital births among women with low or moderate levels of education. Therefore, *our first hypothesis is that the likelihood of having a first birth outside of marriage has increased the most among women with low and moderate levels of education*. Since the proportion of non-cohabiting women who are entering motherhood has levelled off in recent years (Berrington 2014), we expect to observe an increasing divergence in births to cohabiting women by level of education.

Theoretical explanations for the rise in the share of first births within cohabitation have assigned a particularly high degree of importance to the male partner's economic prospects, based on the assumption that less educated men are seen as less attractive marriage partners (Oppenheimer 2003; Oppenheimer et al. 1997). Thus, *the second hypothesis postulates a negative relationship between the male partner's education and having a first birth within cohabitation.* Men's unemployment or inactivity in the labour force is a proxy for economic uncertainty, and is expected to have a detrimental effect on the transition to marriage. Hence, *our third hypothesis asserts that a woman is more likely to have a first birth while cohabiting if her male partner is not in paid employment.*

Since both partners' expectations and resources are likely to influence couples' decisions about the timing of marriage and the first birth (Ermisch 2008), we expect to find that the link between male education and family formation is more pronounced in couples in which the woman has neither the highest (a college degree or higher) nor the lowest educational attainment level (less than a high school diploma). Thus, we expect to find that the role of the male partner's education is more pronounced among moderately educated women than among women with a high or a low educational level. This is because we assume that a highly educated woman is less influenced by her partner's education in making decisions about the timing of first birth, since the opportunity costs of early childbirth for such a woman remain high even when she is partnered with a less educated man. Conversely, we also assume that for a less educated woman, the opportunity costs of early childbearing are low, regardless of her partner's education. Thus, *our fourth hypothesis contends that the negative relationship between the man's education and having a first birth within cohabitation (rather than within marriage) will be strongest among couples in which the woman is moderately educated.*

4 Data and methods

4.1 Data

The data for this study are drawn from the British Household Panel Survey (BHPS), which was conducted from 1991 to 2009 (University of Essex, Institute for Social and Economic Research 2010); and from the UK Longitudinal Household Survey "Understanding Society" (UKHLS, 2010–2014) (University of Essex, Institute for Social and Economic Research 2015), which has been following the original sample of the BHPS starting with its second wave in 2010. Thus, the survey covers the years 1991 through 2013.[1] The BHPS is designed as an annual survey of each member (aged 16 or older) of a nationally representative sample of over 5000 households, and thus includes a total of more than 10,000 individual interviews. The same individuals are interviewed in successive waves, and if these individuals split off from one of the original households, all adult members of these new households are also interviewed. The children in each household are added to the pool of original sample members (OSMs) when they turn 16. Other entrants to the sample occur when an OSM moves into a household with one or more new people, or when a person moves in with an OSM. These new entrants, known as temporary sample members (TSMs), are interviewed in subsequent years as long as they continue to live in the same household as the OSM (Taylor et al. 2010).

The following rules mimic the demographic processes by which the population is reproduced, including birth and deaths, partnership formations and dissolutions, and emigration (Buck and McFall 2011). The one exception is immigration, as migrants who entered the UK subsequent to BHPS Wave 1 are not represented in our sample. This issue could bias population estimates for fertility (Lynn 2011). Another issue is attrition, which is of particular concern given the relatively high drop-out rates among the younger members of the BHPS sample as they were followed up in UKHLS study (Lynn et al. 2012).

In the current study, we analyse a subsample of women (either original or temporary sample members) at their main reproductive ages of 17–45 and, where applicable, their male partners. In order to examine the extent to which our sample of women are representative of the population of women aged 17–45 in Britain, we compared our sample to corresponding population estimates from the Office of National Statistics for the entire period of the survey (ONS 2016).[2] Figure A.1 in the appendix shows that the age structure of the women aged 17–45 from the BHPS sample resembles the age structure of all British women in the same age groups

[1] Since the data collection for the most recent (fifth) wave of the UKHLS was carried out throughout 2013 (and part of 2014), the number of births reported for that year is relatively low. Thus, the main analysis includes only the years 1991–2012.

[2] Since our analysis is of retrospective childbearing events, we did not use the BHPS weights that are calculated for the prospective survey.

across the different periods of the surveys. The differences between the BHPS data and the population estimates in the proportion of women in each age group do not exceed two percentage points, and there is no systematic over- or underestimation of the groups' sizes. Therefore, in terms of age distribution (17–45), our sample is broadly representative of the British population of women.

The BHPS and UKHLS surveys include rich information on socioeconomic variables, including various educational attainment and employment indicators. In addition, the data include both historical and subsequent panel records of the time of each childbirth (year and month), as well as of the year and the month of the start and the end of each cohabitation or marriage.[3] The exact date of marriage was missing for a small proportion (about 4%) of the sample in the UKHLS, which includes TSMs and those who had not been interviewed in the last wave of the BHPS. For these cases, we assumed that the marriage took place at the date of the survey wave at which the respondent's status changed to married in the UKHLS. Since there are relatively few of these cases in our sample, we do not expect this issue to cause any serious bias.

In order to test the validity of the data on the relationship status at birth, we compared our survey data to the birth registration data for England and Wales in 1991–2012. Although our study includes all British women (i.e. those living in England, Wales, and Scotland) aged 17–45 and refers to first births only, in order to maximise the comparability of our data with the birth register data, we used all birth orders for women aged 20–45 in England and Wales.[4] The comparison of trends in births to married, cohabiting, and unpartnered women in England and Wales is presented in Figure A.2 in the appendix. The overall trends (1991–2012) in the relationship status at birth are similar in the BHPS estimates and in the ONS birth register data: i.e. both datasets show a decline in the proportion of births within marriage and an increase in the share of births within cohabitation and, to a lesser extent, outside of a live-in partnership. The largest deviation is observed in the years 2008–2009. This is likely due to a temporary interruption in the follow-up during the transition from the original BHPS to the UKHLS (Lynn et al. 2012). As the length of time between interviews varied from 16 to 27 months (instead of the normal 12 months) during this transition period, the estimates for partnership status at the time of birth may have been less accurate. However, apart from this deviation, the overall trends in births by partnership status in our sample fit the data from the birth register quite well.

The longitudinal design of the survey is particularly useful for the purposes of the current study, as it allows us to use lagged employment status (including educational enrolment), thereby minimising the risk of reverse causality. In addition,

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[3] Civil partnerships are treated as marriages. However, same-sex partnerships are not included in our study due to the small sample size.

[4] Since the data for all women under the age of 20 are compiled together in the birth register, we only compared the data for women aged 20 and above.

information on the timing of union formation and births is collected annually, which reduces potential memory bias. However, this survey also has some disadvantages, with the main one being the lack of information on partners who do not live in the same house as the respondent. Therefore, our analyses of couples' socioeconomic profiles and the partnership context at first birth are limited to co-residential partners.[5]

4.2 Analytic strategy

Since the partnership context at first birth is closely related to marriage probabilities, we first analyse the trends in the proportion of men and women aged 35–44 who have ever been in a union (either cohabitation or marriage), and the proportion who have ever been married by education and time period. Next, we create an event history file of women aged 17–45 during the years 1991 to 2012 based on records of the timing of their first birth and their partnership histories. We distinguish between three types of partnership statuses: married, cohabiting, and unpartnered. This third category includes women who have never been married, as well as women who are separated, divorced, or widowed. This approach allows us to track changes in the proportion of first births occurring in each of these contexts by level of education among women who had their first birth during this period.

Following the analytical approach in Perelli-Harris and Gerber (2011), we estimate monthly rates of first births within marriage, cohabitation, or outside of a live-in partnership (unpartnered). The monthly birth rate is defined as the number of first births of each type divided by the number of women at risk of having a first birth at the beginning of the month. We analyse these three types of birth rates as competing risks in a discrete-time hazard model. This model is estimated using a multinomial logistic regression (MLR), and is formulated as follows:

$$h_{it}(m) = \frac{\exp(\sum x_{ijt}\beta_{jm})}{\sum_{m=1}^{M} \exp(\sum x_{ijt}\beta_{jm})},$$

where $h_{it}(m)$ denotes the hazard that respondent i will experience event m in month t. Overall, there are four possible events ($M = 4$): an unpartnered birth, a cohabiting birth, a marital birth, and no birth in month t. The x_{ijt} represents the respondent's values on a set of j time-varying covariates in month t. The β_{jm} are parameters that are estimated from the data using maximum likelihood, whereby a separate parameter vector is estimated for each type of event m. The model is identified by setting all the elements in one such vector (the reference category) to zero. The MLR model is first estimated with "no birth" as the reference category in order to estimate the educational differences in the likelihood of having a first birth in each of the

[5] For similar reasons, the analysis does not include married couples who were not living in the same household (living apart together).

three partnership types. However, since this model may reflect differences by level of education in the likelihood of having a first birth in general, we run an additional model in which we use marital birth as the reference category, which allows us to assess differences by level of education in the likelihood of having a birth while unpartnered or cohabiting rather than while married. In addition, we test for an interaction between education and time period in order to examine the changes over time in the relationship between educational attainment and the partnership context in which the first birth occurs. We use a similar competing risks model to estimate the differences by level of education in couples' marital status at the first birth. However, since this model is restricted to cohabiting and married partners, there are only three possible outcomes: a birth while cohabiting, a marital birth, and no birth.

The parameter estimates of the competing risks models can only refer to the relative odds of having a first birth within a specific partnership status in relation to the baseline category (e.g., within cohabitation versus within marriage). Therefore, after fitting each of the models, we calculated the average predicted probabilities of having a first birth within marriage and within cohabitation (as well as outside of a live-in partnership in the model for women) for each educational group in our sample. This approach enables us to compare the actual probabilities of having a first birth in a given partnership status by level of education.

4.3 Measures

Education – This is a time-varying covariate measured by the highest level of education achieved in a given year. We identified three categories of educational attainment: low (lower secondary qualifications or less), medium (upper secondary qualifications), and high (see the appendix for a more detailed description of the educational categories and the comparability of the educational measures in the BHPS and the UKHLS). For the couples' model, we decided to use a combined education variable for both partners that initially included nine categories (3×3). However, since there were only a few couples in which one of the partners was highly educated while the other partner had a low educational level, some categories were collapsed, resulting in a variable with seven categories: "both low", "woman low–man higher" (medium or high), "woman medium-man low", "both medium", "woman medium-man high", "woman high-man lower" (medium or low), and "both high".

Employment status – This variable represents the employment status in the year prior to the interview. For the vast majority of the respondents, the gap between each subsequent interview was 12 months.[6] However, for some respondents, the lagged employment gap was shorter. To ensure that the status represented the economic

[6] In the BHPS, the mean gap is 12 months (SD = 1.3), which is the same as the mean gap in the UKHLS (SD = 1.2).

activity prior to the time of conception, we checked for robustness using a two-wave lagged employment status. The employment status variable has four categories: employed, unemployed, inactive, and in full-time education. The employed category includes all individuals who were in paid employment or were self-employed. We also distinguish between people who were unemployed and those who were economically inactive for other reasons (including being a homemaker), since these statuses might have had different implications for childbearing. In addition, it is likely that being in full-time education reduced the risk of having a first birth for both men and women.

Age – This variable refers to the current age in a given month. We included the respondents' age and age-squared to identify non-linear relationships between age and fertility risks.

Period – We included four time periods of roughly equal length (1991–1995, 1996–2000, 2001–2005, and 2006–2012) and a sufficient number of person-months in each period in order to capture trends in the partnership context at first birth.

5 Results

5.1 Bivariate associations

Table 1 presents the sample characteristics and the first birth rates for women aged 17 to 45 who were childless at the time they were first observed in the sample in 1991–2012. These characteristics include the distribution of educational attainment, employment status, and partnership status at the time of first observation; and the total number of women-months for the period during which women were at risk of having a first birth. In addition, the monthly rate of first birth has been calculated for each variable.

The results indicate that the first birth rate was highest for low educated women (0.80), while women in the middle and the high educational groups had lower birth rates that were similar in size (0.51 and 0.53, respectively). Unemployed and economically inactive women had higher first birth rates than women who had been in paid employment in the preceding year (rates of 0.81 and 0.69 compared to 0.64, respectively). The probability of having a first birth was lowest among women in full-time education (0.1). When we compare first birth rates by partnership status, we see that married women had the highest birth rate (1.4), while cohabiting women had a lower birth rate (0.7), and unpartnered women had the lowest birth rate (0.13). No major differences are found in the first birth rates across the different time periods.

The sample characteristics and the first birth rates for couples are presented in Table 2. In general, the monthly birth rate decreased with the educational attainment of both partners, although there were some interactions in this relationship. For example, couples in which the woman was highly educated had the lowest birth

Table 1:
Sample characteristics and monthly first birth rates for women aged 17–45 (childless at first observation), 1991–2012

		At first observation		Woman-months		First births	Monthly birth rate
		N	%	*N*	%	*N*	%
Education:	Low	529	14	20, 789	10	166	0.80
	Medium	2,587	67	121,046	59	621	0.51
	High	741	19	62,340	31	330	0.53
Last year employment status	Employed	1,850	48	150,981	74	963	0.64
	Unemployed	165	4	8,624	4	70	0.81
	Inactive	171	5	6,682	3	46	0.69
	In education	1,671	43	37,888	19	38	0.10
Partnership status:	Unpartnered	2,642	68	112,502	55	148	0.13
	Cohabiting	792	21	45,168	22	318	0.70
	Married	423	11	46,505	23	651	1.40
Period:	1991–95	1,839	48	45,484	22	254	0.56
	1996–00	878	23	57,520	28	304	0.53
	2001–05	655	17	50,074	25	274	0.55
	2006–12	485	12	51,097	25	285	0.56
	Total	**3,857**	**100**	**204,175**	**100**	**1117**	**0.55**

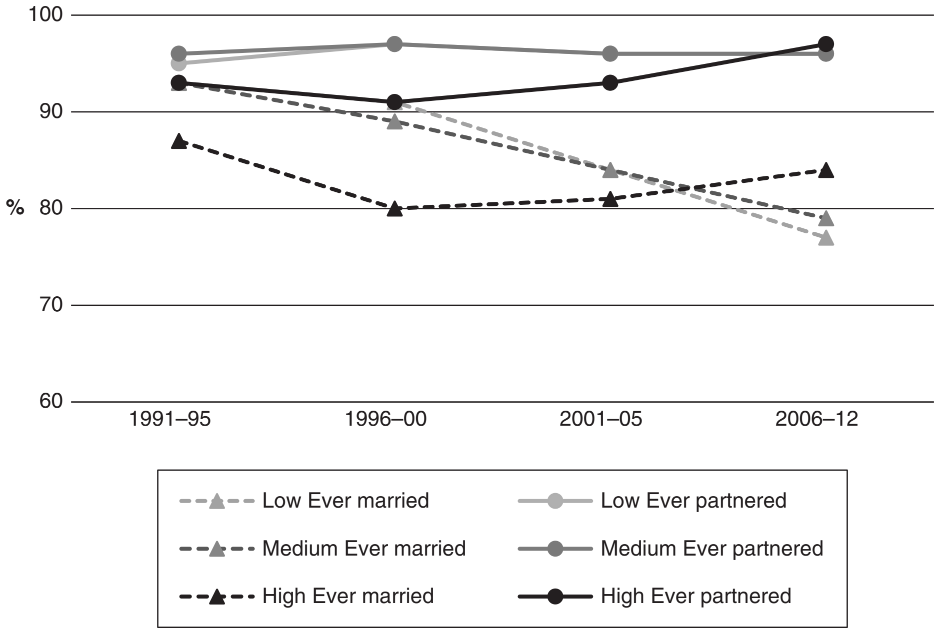
Sources: BHPS (1991–2009), UKHLS (2009–2014).

Table 2:
Sample characteristics and monthly first birth rates for couples in which the woman was aged 17–45 (childless at first observation), 1991–2012

		At first observation		Woman-months		First births	Monthly birth rate
		N	%	*N*	%	*N*	%
Education (woman-man)	Both low	83	5	2, 683	4	31	1.16
	W low-M higher	140	8	5,661	7	73	1.29
	W med-M low	185	11	6,001	8	81	1.35
	Both medium	556	33	24,758	32	270	1.09
	W med-M high	179	11	9,456	12	102	1.08
	W high-M lower	243	15	12,644	16	121	0.96
	Both high	291	17	16,473	21	153	0.93
Woman's last year employment status	Employed	1,367	82	70,465	91	745	1.06
	Unemployed	84	5	2,484	3	39	1.57
	Inactive	57	3	2,119	3	32	1.51
	In education	169	10	2, 608	3	15	0.58
Man's last year employment status	Employed	1,458	87	72,194	93	774	1.07
	Unemployed	104	6	2,762	3	36	1.30
	Inactive	41	3	1,431	2	15	1.05
	In education	74	4	1,289	2	6	0.47
Partnership status	Cohabiting	1,149	69	35,610	46	241	0.68
	Married	528	31	42,066	54	590	1.40
Period	1991–95	772	46	17,783	23	197	1.11
	1996–00	427	26	23,333	30	246	1.05
	2001–05	307	18	19,450	25	195	1.00
	2006–12	171	10	17,110	22	193	1.13
	Total	**1,677**	**100**	**77,676**	**100**	**831**	**1.07**

Sources: BHPS (1991–2009), UKHLS (2009–2014).

Figure 1:
Percentage of ever married/ever partnered women aged 35–44 by education and period



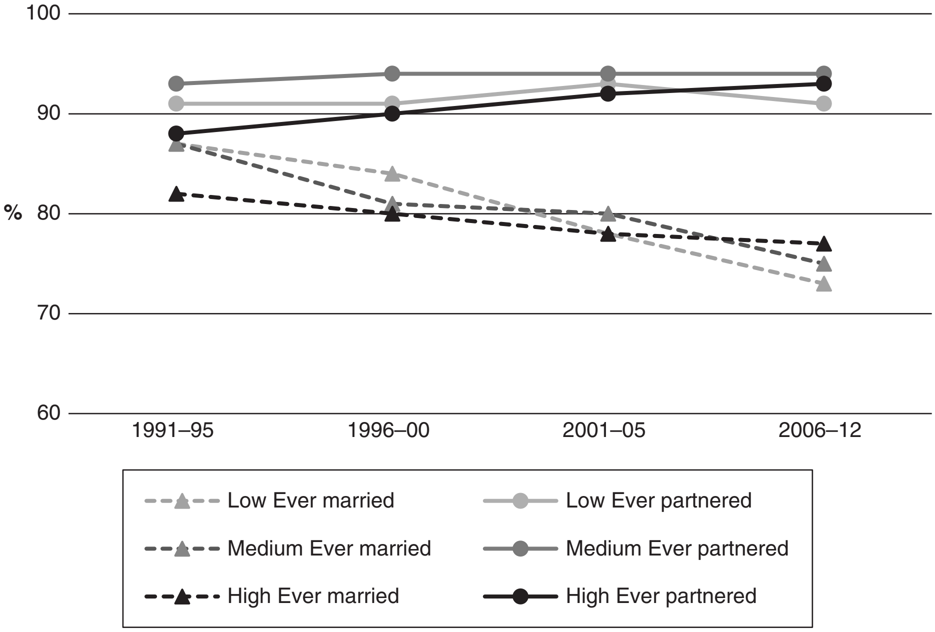
Sources: BHPS (1991–2009), UKHLS (2010–2014).

rates, regardless of the male partner's educational attainment. Among the other couples, the birth rates were higher when at least one of the partners had a low level of education.

The variation in birth rates by the woman's employment status was greater when only partnered women were included; the first birth rate was highest among unemployed (1.57) and inactive women (1.51), and was lowest among employed women (1.06). The first birth rate was also markedly lower among both women (0.58) and men (0.47) who had been enrolled in education over the preceding year. Like unemployed women, unemployed men had the highest birth rate (1.30), although no significant differences are observed between employed (1.07) and inactive (1.05) men. These rates are, however, estimated for both cohabiting and married couples, and may differ for each partnership status.

In the next section, we present the changes over time in partnership and marriage probabilities by level of education among women and men from 1991 to 2012. Figures 1 and 2 show the trends in the proportion of women and men aged 35–44 in each period who had ever been in a union (either marriage or cohabitation), and the proportion who had ever been married by level of education.

Figure 2:
Percentage of ever married/ever partnered men aged 35–44 by education and period



Sources: BHPS (1991–2009), UKHLS (2010–2014).

The findings on partnership probabilities among women (Figure 1) show a reversal of the previously observed educational differences in the proportion of women who had ever been married for the most recent period of 2006–12. In earlier periods, women with low or moderate levels of education had higher marriage probabilities than highly educated women. But the share of this group who had ever been married declined sharply in recent decades, from more than 90% in 1991–95 to less than 80% in 2006–12. Over the same period, highly educated women became more likely to marry than in the past, and more likely to marry than their less educated peers. A similar increase is also found in the proportion of highly educated women who had ever entered any union. These trends are consistent with findings from the US indicating that the negative relationship between women's education and marriage has reversed (Goldstein and Kenney 2001). Thus, these findings fail to confirm the prediction that highly educated women would experience a "mating squeeze".

Among men (Figure 2), the educational differences in marriage and partnership probabilities were less pronounced than they were among women. However, as was the case for women, the differences by level of education in the proportion of men who had ever been married reversed in the 2006–12 period.

In the following, we examine the trends in the partnership context at the first birth by women's education. Figure 3 presents the distribution of first births by partnership status and education across time periods. When we look at the overall trend in births by partnership type (Figure 3a), we see that until recently, the majority of first births to women in Britain were within marriage. However, in the most recent period of 2006–12, only half (49%) of first births were to married women, while 38% of first births were to cohabiting women, and 13% of first births were to unpartnered women. While the proportion of first births within marriage declined among all women, the extent of this decline and the patterns of non-marital childbearing varied greatly across educational groups. Among the least educated women, the proportion of first births within cohabitation increased from 28% in the early 1990s to more than one-half in the most recent period. A substantial increase in births to cohabiting women is also found among the moderately educated group, from 21% to 43% of the first births in the respective time periods. The proportion of first births to cohabiting women grew markedly over this period among highly educated women as well, from 7% to 26%. However, this share was still considerably lower than it was among less educated women.

The proportion of women with a low level of education who had their first birth while unpartnered was much higher than it was among better educated women, although the share changed relatively little over the two decades studied (from 28% to 29%). The share of women with a moderate level of education who had their first birth while unpartnered grew slightly over the study period, from 10%–12% in the 1990s to 16%–18% after 2001. By contrast, the proportion of highly educated women who had their first birth while unpartnered remained low over the study period, at 6%–7%.

It therefore appears that between the early 1990s and 2012, the proportion of non-marital first births increased more among low (27%) and moderately educated (26%) women than among highly educated women (18%). Thus, in the most recent period, the share of women who had their first birth while married was far higher among the women who were highly educated (68%) than among the women with a moderate (41%) or a low (20%) level of education. While these estimates do not control for age and employment status, they are generally in line with the first hypothesis that the educational divide in non-marital childbearing has been increasing. Furthermore, while it appears that a relatively large proportion of highly educated women continue to wait until they are married before having their first child, it is also clear that there has been a marked increase in the share of highly educated women who have their first child while cohabiting.

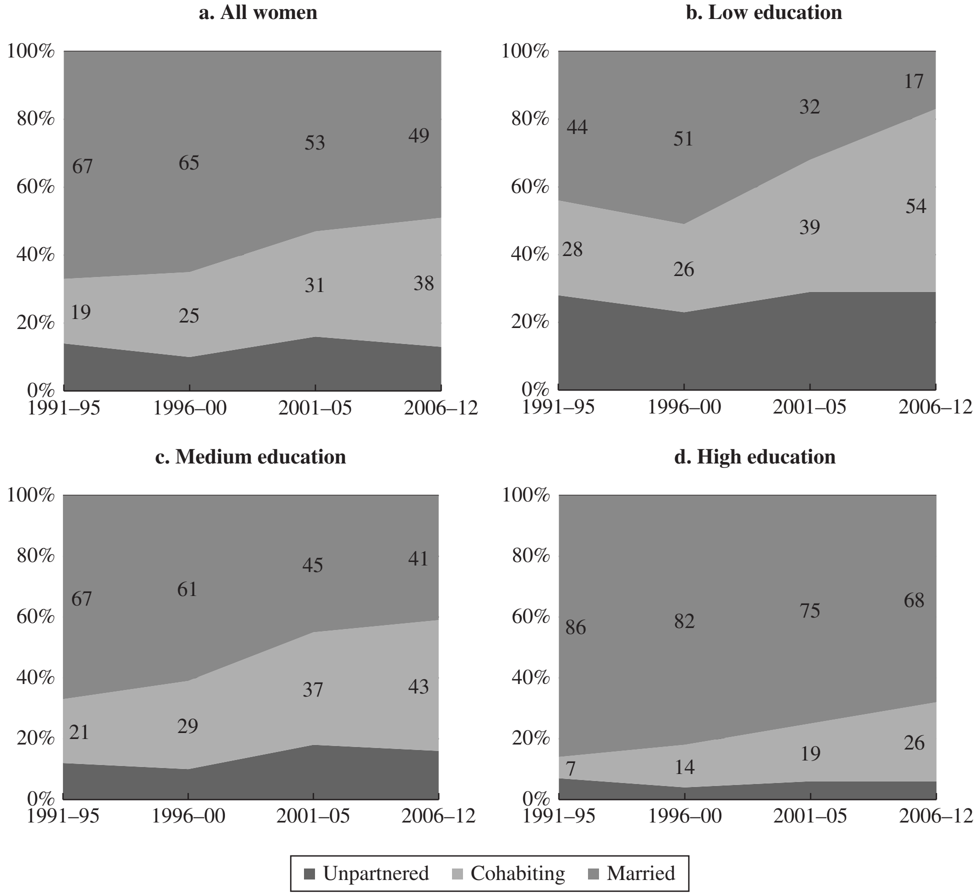
The relationship between educational characteristics and the partnership context at first birth is further explored in the next section, in which we introduce a multivariate analysis of the transition to the first birth among women and couples. Table 3 presents the results of the multinomial logistic regression for the first birth by partnership status. The first three columns display the relative risk ratios for each type of birth (unpartnered, cohabiting, and marital birth) in relation to no birth,

Table 3:
Relative risk ratios of having a first birth among women aged 17–45, 1991–2012

	Unpartnered birth vs. no birth	Cohabiting birth vs. no birth	Marital birth vs. no birth	Unpartnered birth vs. marital birth	Cohabiting birth vs. marital birth
Age	0.658***	1.364***	3.700***	0.178***	0.369***
Age squared	1.005**	0.994***	0.979***	1.027***	1.015***
Education:					
Low	2.446***	1.607**	1.111	2.202**	1.446†
Medium	1.000	1.000	1.000	1.000	1.000
High	0.670	0.504***	0.963	0.696	0.523***
Employment status last year:					
Employed	1.000	1.000	1.000	1.000	1.000
Unemployed	2.288***	1.443†	0.812	2.819**	1.778†
Inactive	0.819	1.009	1.670**	0.490	0.604
In education	0.241***	0.203***	0.200***	1.202	1.011
Period:					
1991–1995	1.000	1.000	1.000	1.000	1.000
1996–2000	0.835	1.336	0.928	0.900	1.440†
2001–2005	1.326	1.822**	0.776*	1.708*	2.348***
2006–2012	1.108	2.346***	0.770*	1.440	3.047***
N births	148	318	651	148	318
Woman-months	204,175	204,175	204,175	204,175	204,175

†p<.1, *p< .05, **p< .01, ***p<.001.

Figure 3:
First births by partnership status, education, and period for women aged 17–45



Sources: BHPS (1991–2009), UKHLS (2010–2014).

and the fourth and fifth columns show the relative risk ratios for unpartnered and cohabiting births in relation to marital births.

To test explicitly for whether there was an interaction between women's education and the period, we repeated the models in Table 3 while including the education-period interactions (not shown here). Contrary to our first hypothesis that the likelihood of having a first birth outside of marriage increased the most among women with low or moderate levels of education, the results show that the differences by educational level in the likelihood of having a marital or a non-marital first birth did not significantly increase (or decrease) over time, but instead remained roughly the same. Since no interaction was found between education and period, the non-interactive model in Table 3 was considered the best fit for the data, and was therefore used for calculating the average predicted probabilities of having a first birth in each partnership status by level of education for the observed period (Figure 4).

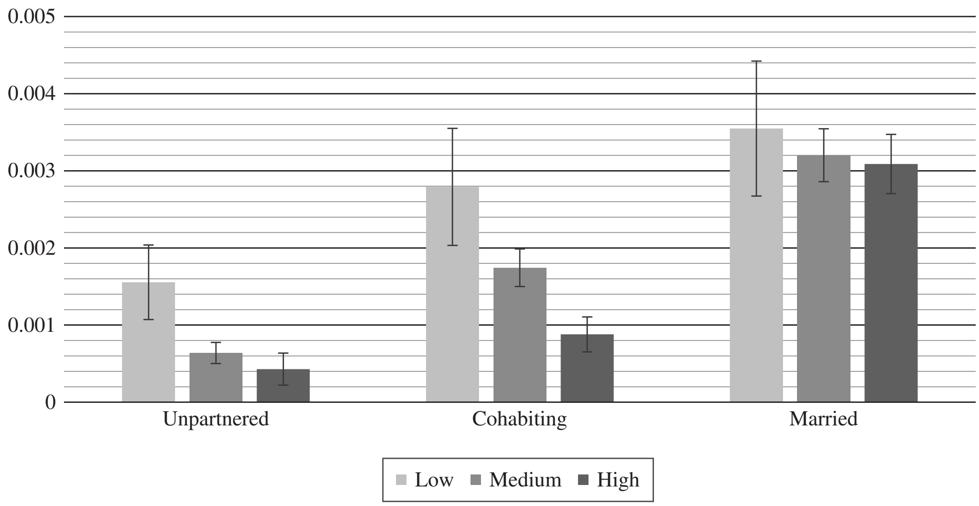
In accordance with the descriptive findings, Table 3 and Figure 4 show that having a first birth while unpartnered was most common among women with a low level of education, and was almost equally common among highly and moderately educated women. Table 3 shows that the relative risk ratio of having an unpartnered birth as opposed to having no birth was significantly higher among women with a low than with a moderate level of education (column 1). The relative risk ratio of having an unpartnered first birth rather than a marital first birth was also higher among women with a low than with a moderate level of education (column 4).

Among cohabiting women, a strong negative educational gradient is found for first births, as less educated women were significantly more likely to have had a first birth within cohabitation than moderately educated women, while highly educated women were the least likely to have had a first birth within cohabitation (see Table 3, column 2 and Figure 4). This gradient also appears when estimating the relative risk ratios of having a birth while cohabiting and having a marital birth (Table 3, column 5), although the differences between women with low and moderate levels of education were of marginal significance. No significant differences by education are found in the likelihood of entering motherhood within marriage (Table 3, column 3 and Figure 4). These findings imply that the negative relationship between education and the transition to a first birth was mainly the result of higher rates of non-marital births among less educated women.

A noteworthy finding is that of the change over time in the partnership context at first birth, as shown by the period dummies. No significant change over time is found in the relative risk ratios of having an unpartnered first birth and of having no birth. This result is in line with the descriptive findings displayed in Figure 3a, which show that there was no particular trend in the proportion of unpartnered births over time. On the other hand, the relative risk ratios of having a cohabiting birth increased over time in relation to both having no birth and having a marital first birth (see Table 3, columns 2 and 5).

The employment status variable in Table 3 is derived from the previous year. We chose this approach because when we included employment from the two previous waves, the number of cases was markedly reduced due to missing employment information (analysis not shown). Unsurprisingly, this robustness check confirmed our assumption that educational enrolment, rather than being in paid employment, was strongly and negatively correlated with the transition to a first birth in relation to having no birth among women in all relationship contexts (Table 3, columns 1–3). The results also show that being unemployed rather than being in paid work increased the relative odds of having a first birth outside of a live-in partnership in relation to having no birth or a marital birth (columns 1 and 4). This outcome makes sense given that public support for unemployed mothers is based on their partnership status and total household income (Rendall et al. 2009). Thus, it is

Figure 4:
Predicted probabilities of having a first birth by partnership status and education for women aged 17–45, 1991–2012



Note. Predicted probabilities are adjusted by age and employment status.
Sources: BHPS (1991–2009), UKHLS (2010–2014).

possible that these women were responding to incentives to give birth outside of a live-in partnership. However, this finding must be interpreted with some caution, as it was found to be no longer significant (though still in the same direction) when the two-wave lagged employment status was used. Because there were relatively few inactive women who were in a partnership prior to having a first birth, we offer no substantive interpretation for the possible link between inactivity and marital birth versus no birth (an association that was not replicated in our robustness check).

While the probability of having a first birth within cohabitation varied greatly by women's education, it may have also changed according to the male partner's education and employment status. Table 4 presents the results of the multinomial logistic regression for having a first birth among couples. The first two columns show the relative risk ratios for having a first birth within cohabitation and within marriage (respectively), as opposed to having no birth; and the third column displays the relative risk ratios of having a cohabiting birth versus having a marital birth at the couple level.

The results for the combined education variable for couples indicate that there was a generally negative association between couples' education and the likelihood of having a first birth within cohabitation. Thus, for couples in which either the man or the woman had a low level of education (except in cases in which a highly educated woman was partnered with a less educated man), the relative risk ratios

Table 4:
Relative risk ratios of having a first birth among couples (women aged 17–45), 1991–2012

	Cohabiting birth vs. no birth	Marital birth vs. no birth	Cohabiting birth vs. marital birth
Woman's age	0.726**	1.931***	0.376***
Woman's age squared	1.004*	0.989***	1.014***
Man's age	1.091	1.454***	0.750**
Man's age squared	0.998	0.994***	1.004**
Education (woman-man):			
Both low	1.250	1.129	1.106
W low-M higher	1.507*	0.968	1.556
W med-M low	1.487*	1.120	1.328
Both medium	1.000	1.000	1.000
W med-M high	0.547*	1.118	0.489*
W high-M lower	0.595*	0.991	0.600†
Both high	0.464**	0.952	0.487**
Woman's employment status last year:			
Employed	1.000	1.000	1.000
Unemployed	1.578†	1.298	1.216
Inactive	1.460	2.624***	0.556
In education	0.493†	0.508	0.971
Man's employment status last year:			
Employed	1.000	1.000	1.000
Unemployed	1.645*	0.732	2.249*
Inactive	2.898**	0.365†	7.948**
In education	1.079	0.284†	3.802
Period:			
1991–1995	1.000	1.000	1.000
1996–2000	1.283	0.892	1.438
2001–2005	1.645*	0.809†	2.034**
2006–2012	2.766***	0.806**	3.433***
N births	241	590	257
Couple-months	77,676	77,676	77,676

†p < .1, *p < .05, **p < .01, ***p < .001.

for having a first birth while cohabiting versus having no birth were higher than they were for moderately educated couples. The finding that this relationship was not significant for couples in which both partners were less educated may be due to the small sample size. By contrast, among couples in which the woman was highly educated, or was moderately educated but had a highly educated partner, the relative risk ratios for having a first birth while cohabiting were lower than those of the reference group of moderately educated partners (see column 1). As in the model for women, the likelihood of having a marital birth did not vary by couples' education (column 2). It should also be noted that as in the case for women, no significant interaction was found between couples' education and period (not shown).

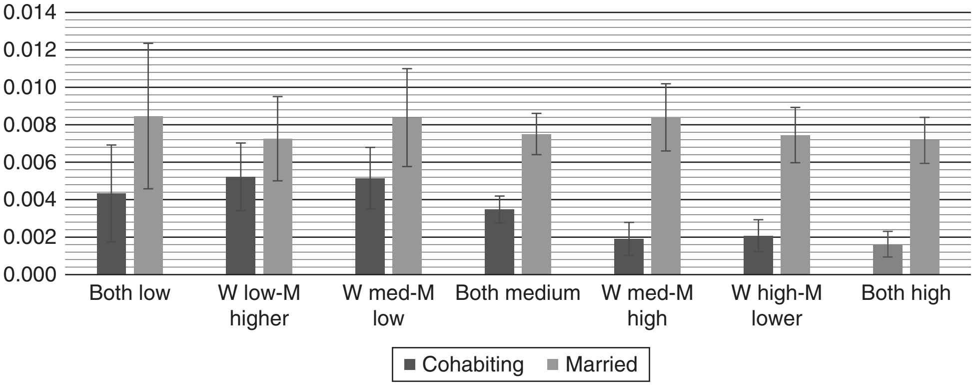
When we tested the relative risk of having a cohabiting birth versus having a marital birth (column 3), we found that the relative risk ratios for having a cohabiting birth rather than a marital birth were significantly lower relative to those of the reference group only among moderately and highly educated women who were partnered with a highly educated man. Thus, these findings provide partial support for the second hypothesis that there is a negative relationship between men's education and having a first birth while cohabiting.

Couples in which the man was inactive or unemployed had higher relative odds of having a cohabiting birth than couples in which the man was employed (column 1), and this relationship appears to be stronger when the relative risk ratios of having a cohabiting birth are contrasted with those of having a marital birth (column 3). These findings support the third hypothesis, which states that when the male partner is not employed, a first birth is more likely to occur within cohabitation than within marriage. In addition, it has been shown that a man's employment status is a much stronger predictor of having a non-marital birth than a woman's employment status. This result demonstrates that traditional norms regarding the gendered division of labour and the man's role as the primary breadwinner continue to be relevant. These findings are also supported by the robustness check that used two-year lagged employment status for the male and the female partner (not shown).

In order to better understand the interaction between men's and women's education and its association with marital status at birth, we have derived the predicted probabilities for cohabiting and marital births by couples' educational composition. As we can see in Figure 5, the relationship between the man's education and the transition to a first birth within cohabitation differed by the woman's education. As was predicted by the fourth hypothesis, we found that the relationship between the man's education and having a child while cohabiting was the most pronounced for couples in which the woman was moderately educated (see bar charts 3, 4, and 5). On the other hand, among women with a high (bar charts 6 and 7) and with a low level of education (barcharts 1 and 2), the probability of having a first birth within cohabitation did not vary significantly by the level of the male partner's education. These differences could be explained by the lower opportunity costs of early childbearing for less educated women, which may have offset the importance of the man's education. Similarly, we found that the higher opportunity costs of early childbearing among highly educated women led to a delay in the first birth, regardless of partner's education.

Finally, in accordance with the regression analysis, we observed no significant differences by education in the probability of having a first birth within marriage, although the gap between the probability of having a cohabiting birth and having a marital birth varied by the educational attainment of both partners.

Figure 5:
Predicted probabilities of having a first birth by marital status and couples' education (women aged 17–45), 1991–2012



Note. Predicted probabilities are adjusted by men's and women's age and employment status.
Sources: BHPS (1991–2009), UKHLS (2010–2014).

6 Discussion

In the present study, we explored how the partnership context at first birth varied according to the educational and employment status of women and their partners over the past two decades. The descriptive analysis of the first birth by women's partnership status from 1991 to 2012 showed that there were substantial increases in the shares of first births within cohabitation among women of all educational groups, with the levels being higher among women with a low (54%) or a moderate (53%) level of education than among women with a high level of education (26%). Nevertheless, as highly educated women also became more likely over the observed period to have a first birth while cohabiting, the differences by educational level in the likelihood of having a non-marital birth did not change significantly over the study period. Meanwhile, the proportion of first births to unpartnered women remained relatively stable. Policy interventions aimed at reducing the incidence of teenage pregnancies may have played some part in this relative stability, along with the imposition of opportunity costs for non-partnered mothers through welfare-to-work reforms (Brewer et al. 2012).

Thus, our first hypothesis that the educational gap in the likelihood of having a first birth outside of marriage is widening has not been confirmed. This result may reflect changes in the educational composition of women in Britain; i.e. as the proportion of women with a higher level of education increases, the highly educated group becomes more heterogeneous. This trend could have helped to suppress any further divergence by education in shares of cohabitating births.

The increase in the share of first births within cohabitation among all educational groups may also reflect a growing acceptance of new forms of living arrangements, as suggested by the second demographic transition theory. However, this shift in family norms does not explain the continuing negative educational gradient in births within cohabitation. Therefore, it is more likely that this pattern is the result of differential earnings potential (opportunity costs); an explanation that is also supported by findings from the couples' analysis. It should be noted that cohort changes in the timing of the first birth by education may also help to explain the observed patterns. As previous studies have shown, the rise in the age at first birth across cohorts has been much more pronounced among highly educated women than among their less educated peers (Berrington et al. 2015b; Ratcliffe and Smith 2006). Since less educated women tend to have their children relatively early in the life course, they are also less likely than better educated women to be married when they have their first child. Furthermore, our findings are related to changes in partnership status at first birth across time periods. While each period is dominated by different birth cohorts, possible cohort effects on changes in family behaviours may be obscured.

After taking both men and women's characteristics into account, we found that the relative risk ratios of having a first birth within cohabitation rather than within marriage were significantly lower among medium and highly educated women who were partnered with a highly educated man than among medium educated couples. This finding indicates that the educational levels of both partners affected the likelihood of having a non-marital birth, and that this likelihood declined with men's education, as predicted by the second hypothesis. In addition, the findings support the third hypothesis, which states that a first birth is more likely to occur within cohabitation rather than within marriage when the male partner is not in paid employment. The results also indicate that the female partner's employment status was less significant than her marital status at first birth. These findings support the assumption that economic insecurity is an important determinant of non-marital childbirth, especially when it affects the male partner.

Finally, the fourth hypothesis on the interaction between men's and women's educational attainment is also supported, as the results indicate that men's educational gradient for cohabiting versus being married at the first birth was steepest among couples in which the woman was moderately educated, while there was less variation when the female partner had either a low or a high level of education. These results may reflect the differential opportunity costs of non-marital childbearing for each group; i.e. the opportunity costs associated with having a child while cohabiting may be particularly low for the least educated women and particularly high for the most educated women, regardless of the male partner's education. By contrast, moderately educated women may be more influenced by their partner's earnings capacity when making decisions about childbearing and marriage. These findings are in line with the marriage market search theory, which posits that a highly educated woman with strong marriage prospects is more likely to wait until she is married to have her first child, while a less educated woman who is less likely to marry a well educated man would gain less from postponing childbirth until after marriage. However, a woman with a medium level of education may have less certain marriage prospects; thus, the timing of her first birth is more likely to depend on her partner's earnings potential.

To date, there is no evidence for the UK of significant growth in the differences in rates of non-marital childbearing by level of education. However, given that marriage rates are declining more sharply among women with low and moderate educational levels than among highly educated women, it seems likely that educational differences in non-marital childbearing will remain, and that they could increase further. As McLanahan (2004, 2011) has argued, this pattern may reflect and preserve social class disparities, as individuals with fewer economic resources continue to have higher birth rates within cohabitation, which is a less stable union form than marriage. Given the traditional gendered division of labour that tends to arise in the wake of parenthood, union breakdown is often associated with reduced economic circumstances for both mothers and children. Thus, the persistent differences by level of education in rates of non-marital first births among women matter, not least because of their ramifications for the life chances of their children's generation.

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References

Berrington, A. 2014. The changing demography of lone parenthood in the UK. Working Paper 48, ESRC Centre for Population Change: University of Southampton.

Berrington, A. and J. Stone 2015. Cohabitation trends and patterns in the UK. ESRC Centre for Population Change Report: University of Southampton. http://www.cpc.ac.uk/publications/Cohabitation%20trends%20and%20patterns%20in%20the%20UK.pdf, Accessed on 25 February 2016.

Berrington, A., B. Perelli-Harris and P. Trevena 2015a. Commitment and the changing sequence of cohabitation, childbearing, and marriage: Insights from qualitative research in the UK. *Demographic Research* 33(12): 327–362.

Berrington, A., J. Stone and E. Beaujouan 2015b. Educational differences in timing and quantum of childbearing in Britain: A study of cohorts born 1940-1969. *Demographic Research* 33(26): 733–764.

Blossfeld, H.-P. and R. Müller 2002. Union disruption in comparative perspective: The role of assortative partner choice and careers of couples. *International Journal of Sociology* 32(4): 3–35.

Brewer, M., A. Ratcliffe and S. Smith 2012. Does welfare reform affect fertility? Evidence from the UK. *Journal of Population Economics* 25:245–266.

Brown, S. L. 2010. Marriage and child well-being: Research and policy perspectives. *Journal of Marriage and Family* 72(5): 1059–1077.

Buck, N. and S. McFall 2012. Understanding Society: Design overview. *Longitudinal and Life Course Studies* 3(1): 5–17.

Bumpass, L. 1990. What's happening to the family? Interactions between demographic and institutional change. *Demography* 27(4): 483–498.

Ermisch, J. F. 2001. Cohabitation and childbearing outside marriage in Britain. In *Out of wedlock: causes and consequences of nonmarital fertility*, eds L. L. Wu and B. Wolfe, 109–139. New York: Russell Sage Foundation.

Ermisch, J. F. 2003. *An economic analysis of the family*. Princeton: Princeton University Press.

Ermisch, J. F. 2008. The new dynamics of family formation and the explosion of childbearing outside marriage. In *Women and employment: Changing lives and new challenges*, eds J. Scott, S. Dex and H. Joshi, 133–155. Cheltenham: Edward Elgar.

Ermisch, J. F. and M. Francesconi 2000. Cohabitation in Great Britain: Not for long, but here to stay. *Journal of the Royal Statistical Society Ser. A* 163(2): 153–171.

Esteve, A., J. García-Román and I. Permanyer 2012. The gender-gap reversal in education and its effect on union formation: The end of hypergamy? *Population and Development Review* 38(3): 535–546.

Gibson-Davis, M. C., K. Edin and S. McLanahan 2005. High hopes but even higher expectations: The retreat from marriage among low-income couples. *Journal of Marriage and the Family* 67: 1301–1312.

Goldstein, J. R. and C. T. Kenney 2001. Marriage delayed or marriage foregone? New cohort forecasts of first marriage for U.S. women. *American Sociological Review* 66(4): 506–519.

Goodman, A. and E. Greaves 2010. *Cohabitation, marriage and child outcomes*, Commentary 114, London: Institute for Fiscal Studies. http://www.ifs.org.uk/publications/4823. Accessed on 28 February 2016.

Grow, A. and J. Van Bavel 2015. Assortative mating and the reversal of gender inequality in education in Europe: An Agent-Based Model. *PLoS ONE* 10(6): e0127806. DOI: 10.1371/journal.pone.0127806.

Harkness, S., P. Gregg and L. MacMillan 2012. Poverty: the role of institutions, behaviours and culture. The Joseph Rowntree Foundation, University of Bath.

Inanc, H. 2015. Unemployment and the timing of parenthood: implications of partnership status and partner's employment. *Demographic Research* 32(7): 219–250.

Kiernan, K. 2004. Unmarried cohabitation and parenthood in Britain and Europe. *Law and Policy* 26(1): 33–55.

Kiernan, K. and K. Smith 2003. Unmarried parenthood: new insights from the Millennium Cohort Study. *Population Trends* 114: 26–33.

Kiernan, K., S. McLanahan, J. Holmes and M. Wright 2011. Fragile families in the US and UK. Working Paper WP 11-04- FF, Center for Research on Child Well-Being: Princeton University.

Knies, G. ed. 2015. *Understanding society – UK household longitudinal study: Wave 1-5, 2009-2014, User Manual*. Colchester: University of Essex.

Laslett, P., K. Oosterveen and R. M. Smith 1980. *Bastardy and its comparative history*. London: Edward Arnold.

Lesthaeghe, R. 2010. The unfolding story of the Second Demographic Transition. *Population and Development Review* 36(2): 211–251.

Lesthaeghe, R. and J. Surkyn 1988. Cultural dynamics and economic theories of fertility change. *Population and Development Review* 14(1): 1–45.

Lundberg, S. and R. A. Pollak 2013. Cohabitation and the uneven retreat from marriage in the U.S., 1950-2012. Discussion Paper No. 7607, Bonn: IZA.

Lynn, P. 2011. Maintaining cross-sectional representativeness in a longitudinal general population survey. Understanding Society, Working Paper Series No 2011–04.

Lynn, P., J. Burton, O. Kamineska, G. Knies and A. Nandi 2012. An initial look at non-response and attrition in Understanding Society. Understanding Society, Working Paper Series, No 2012-02.

McLanahan, S. 2004. Diverging destinies: How children are faring under the second demographic transition. *Demography* 41(4): 607–627.

McLanahan, S. 2011. Family instability and complexity after a nonmarital birth: Outcomes for children in fragile families. In *Social class and changing families in an unequal America*, eds M.-J. Carlson and P. England, 108–133. Stanford: Stanford University Press.

Mills, M. and H.-P. Blossfeld 2005. Globalization, uncertainty, and the early life course: A theoretical framework. In *Globalization, uncertainty and youth in society*, eds H.-P. Blossfeld, E. Klijzing, M. Mills and K. Kurz, 1–24. Abingdon: Routledge.

Ní Bhrolcháin, M. and E. Beaujouan 2013. Education and cohabitation in Britain: A return to traditional patterns? *Population and Development Review* 39(3): 441–458.

Nitsche, N., A. Matysiak, J. Van Bavel and D. Vignoli 2015. Partners' educational pairings and fertility across Europe. Families and Societies, Working Paper Series no. 38.

Office for National Statistics 2015. Births by Parents' Characteristics, England and Wales. http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/datasets/birthsbyparentscharacteristics. Accessed on 28 October 2016.

Office for National Statistics 2016. Mid-year population estimates: Single year of age and sex for local authorities in the United Kingdom; estimated resident population 1991–2012. https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland. Accessed on 27 October 2016.

Oppenheimer, V. K. 2003. Cohabiting and marriage during young men's career-development process. *Demography* 40: 127–149.

Oppenheimer, V. K., M. Kalmijn and N. Lim 1997. Men's career development and marriage timing during a period of rising inequality. *Demography* 34: 311–330.

Perelli-Harris, B. and T. P. Gerber 2011. Nonmarital childbearing in Russia: Second demographic transition or pattern of disadvantage? *Demography* 48(1): 317–342.

Perelli-Harris, B., W. Sigle-Rushton, M. Kreyenfeld, T. Lappegård, R. Keizer and C. Berghammer 2010. The educational gradient of childbearing within cohabitation in Europe. *Population and Development Review* 36(4): 775–801.

Perelli-Harris, B., M. Kreyenfeld, W. Sigle-Rushton, R. Keizer, T. Lappegård, A. Jasilioniene, C. Berghammer and P. Di Giulio 2012. Changes in union status during the transition to parenthood in eleven European countries, 1970s to early 2000s. *Population Studies* 66(2): 167–182.

Perelli-Harris, B., M. Kreyenfeld, W. Sigle-Rushton, R. Keizer, T. Lappegård, A. Jasilioniene, C. Berghammer, P. Di Giulio and K. Koeppen 2009. The increase in fertility in cohabitation across Europe: Examining the intersection between union status and childbearing. Rostock, MPIDR Working Paper WP-2009-021.

Ratcliffe, A. and S. Smith 2006. Fertility and women's education in the UK: a cohort analysis. Working Paper No. 07/165, Centre for Market and Public Organisation: University of Bristol.

Rendall, M. S., O. Ekert-Jaffé, H. Joshi, K. Lynch and R. Mougin 2009. Universal versus economically polarized change in age at first birth: a French-British comparison. *Population and Development Review* 35(1): 89–115.

Sassler, S., S. Roy and E. Stasny 2014. Men's economic status and marital transitions of fragile families. *Demographic Research* 30(3): 71–109.

Sigle-Rushton, W. 2008. England and Wales: Stable fertility and pronounced social status differences. *Demographic Research* 19: 455–502.

Smith, S. and A. Ratcliffe 2009. Women's education and childbearing: A growing divide. In *Fertility, living arrangements, care and mobility: Understanding population trends V. 1*, eds J. Stillwell, E. Coast and D. Kneale, 41–58. Dordrecht: Springer.

Taylor, M. F., J. Brice, N. Buck and E. Prentice-Lane 2010. *British Household Panel Survey user manual, Volume A: Introduction, technical report and appendices*. Colchester: University of Essex.

University of Essex. Institute for Social and Economic Research. 2010. *British Household Panel Survey: Waves 1-18, 1991-2009.* [data collection]. *7th Edition.* UK Data Service, SN: 5151, DOI: 10.5255/UKDA-SN-5151-1.

University of Essex. Institute for Social and Economic Research, NatCen Social Research. 2015. *Understanding Society: Waves 1-5, 2009-2014: Special Licence Access*. [data collection]. *6th Edition.* UK Data Service, SN: 6931, DOI: 10.5255/UKDA-SN-6931-5.

Van Bavel, J. 2012. The reversal of gender inequality in education, union formation and fertility in Europe. *Vienna Yearbook of Population Research* 10: 127–154.

Vincent-Lancrin, S. 2008. The reversal of gender inequalities in higher education: An ongoing trend. In *OECD higher education to 2030. Vol. 1*, 265–298. Demography. Paris: OECD.

Wiik, K. A., E. Bernhardt and T. Noack 2010. Love or money? Marriage intentions among young cohabitors in Norway and Sweden. *Acta Sociologica* 53(3): 269–287.

Wu, L. L., L. Bumpass and K. Musick 2001. Historical and life course trajectories of nonmarital childbearing. In *Out of wedlock: Causes and consequences of nonmarital fertility*, eds L. L. Wu and B. Wolfe, 3–48. New York: Russell Sage Foundation.

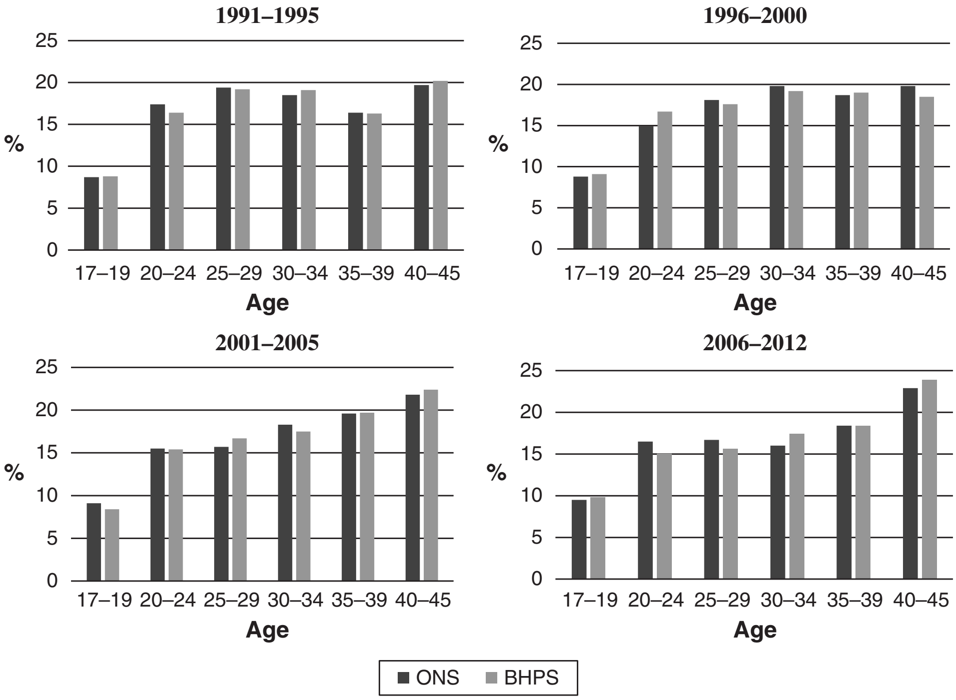
Appendix

Comparability of educational attainment in the BHPS and the UKHLS

The main variables used to measure the level of education in the UKHLS do not perfectly align with the educational measures of the BHPS (Knies 2015). For example, the UKHLS survey does not distinguish between different numbers of qualifications for GCSEs or A-Levels. However, a high level of comparability between the two surveys can be achieved by collapsing some of the original education categories in the BHPS. Thus, the following classification is used:

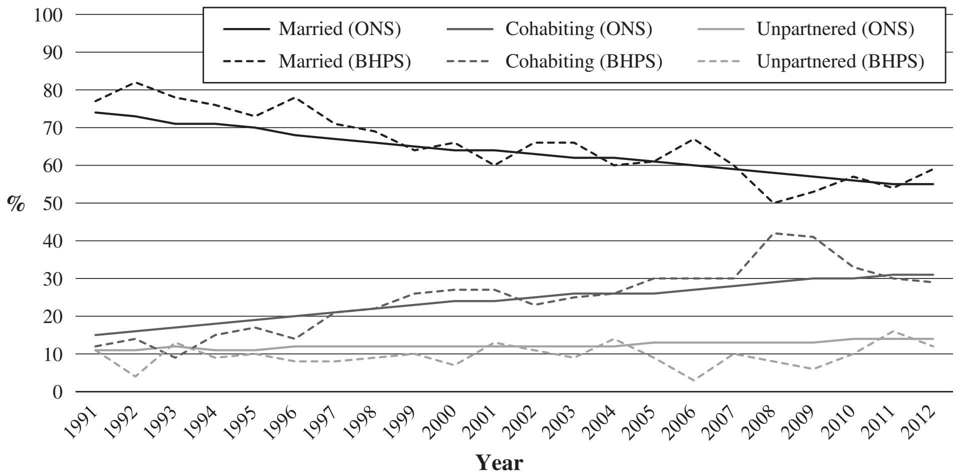
Low education (lower secondary qualifications) – includes CSE Grades 2–5, O-Level grades D–E, GCSE grades D–G, Scottish SCE Ordinary Grade bands D–E or 4–5, Scottish Standard Grade levels 4–7, and no qualifications.

Figure A.1:
Age structure distribution of women aged 17–45 by period in Britain – comparison of the BHPS original sample with the ONS vital registration data



Sources: BHPS 1991-2009; UKHLS 2010-2014; ONS (2016).

Figure A.2:
Trends in live births (all birth orders) by partnership status for women aged 20–45 in England and Wales, 1991–2012



Sources: BHPS 1991-2009; UKHLS 2010-2014; ONS (2015).

Medium education (upper secondary qualifications) – includes A-Levels, Scottish Certificate of Sixth Year Studies, Higher School Certificate, Ordinary National Certificate/Diploma, BEC/TEC/BTEC, National/General Certificate or Diploma, O-Level grades A–C, GCSE grades A–C, CSE grade 1, Scottish O-Grades (pass or bands A–C or 1–3), School Certificate or Matric, Scottish Standard Grade Levels 1–3, and City & Guilds Certificate.

High education (degree level and other higher qualifications) – First degree or higher, Higher National Certificate/Diploma, teaching qualifications, and nursing qualifications.

In order to check the comparability of the educational measure, we performed a cross-tabulation of individual qualifications in wave 18 of the BHPS and the second wave of UKHLS (see Table A.1). The cross-tabulation shows a very close match between the two surveys. Overall, 94% of respondents who were interviewed in both waves had the same level of education and 6% had a higher level of education in the 2010/11 survey than in the 2008 survey. The main reason for this increase is the accumulation of additional qualifications between the two waves. A negligible proportion of respondents had a lower level of education (0.2%), which can be attributed to coding errors or incorrect reporting of qualifications. We therefore conclude that, on the whole, the comparability of the measures of educational attainment used in the two surveys is very high.

Table A.1:
Cross-tabulation of educational attainment at wave 18 of the BHPS and at the 2nd wave of the UKHLS (sample sizes in parentheses)

Education at wave 18 BHPS	Education at wave 2 UKHLS			
	Low	Medium	High	Total
Low	87% (1339)	12% (189)	1% (18)	100% (1546)
Medium	0% (8)	95% (2564)	5% (122)	100% (2687)
High	0% (1)	0% (1)	100% (1431)	100% (1433)
Total	24% (1348)	48% (2754)	28% (1571)	100% (5666)

Sources: BHPS (1991-2009), UKHLS (2010-2014)

The distribution of educational qualifications for men and women from 1991 to 2012 is also presented in Table A.2. It shows that the share of individuals with higher education more than doubled, from 14% in 1991 to 30% in 2012. The proportion of individuals with upper secondary education also increased, from 38% in 1991 to 49% in 2012. Meanwhile, the share of individuals with lower secondary education decreased, from 48% in 1991 to 21% in 2012. The share of highly educated men was higher than the share of highly educated women until recent years, when women overtook men.

Table A.2:
Distribution of educational attainment by survey and year

Data source	Year	All respondents				Women (aged 16+)				Men (aged 16+)			
		Low	Medium	High	*N*	Low	Medium	High	*N*	Low	Medium	High	*N*
BHPS	1991	48	38	14	9,885	51	35	14	5,306	44	41	15	4,579
	1992	45	39	15	9,546	48	37	15	5,109	41	42	16	4,437
	1993	43	41	16	9,255	46	38	16	5,007	39	44	17	4,287
	1994	41	41	17	9,132	45	39	16	4,939	38	44	18	4,247
	1995	40	43	18	8,918	43	40	17	4,829	36	45	18	4,122
	1996	39	43	18	9,150	41	41	17	4,925	35	46	19	4,250
	1997	38	44	19	9,111	40	42	18	4,896	35	46	20	4,231
	1998	37	44	19	8,954	39	42	19	4,832	34	46	20	4,132
	1999	36	44	20	8,818	38	43	19	4,776	34	45	21	4,062
	2000	35	44	21	8,711	37	43	20	4,726	33	45	22	4,010
	2001	34	45	21	8,619	36	44	20	4,658	32	46	22	3,988
	2002	33	45	21	8,469	36	44	21	4,599	31	47	22	3,921
	2003	32	46	22	8,252	35	44	21	4,476	30	48	23	3,814
	2004	32	46	22	8,137	34	45	22	4,433	29	48	23	3,759
	2005	31	47	23	7,957	33	45	22	4,393	29	48	23	3,666
	2006	30	47	23	7,912	32	46	22	4,312	28	49	24	3,642
	2007	29	47	23	7,768	31	46	23	4,262	27	49	24	3,541
	2008	29	48	24	7,507	30	47	23	4,132	27	49	25	3,429
UKHLS	2010	24	49	27	6,499	26	47	27	3,496	21	52	27	3,003
	2011	22	49	28	6,216	25	46	29	3,308	20	53	28	2,908
	2012	21	49	30	5,800	24	46	30	3,081	19	52	29	2,719

Sources: BHPS (1991–2009), UKHLS (2010–2014)

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Do different educational pairings lead to different fertility outcomes? A cohort perspective for the Greek case

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Abstract

The paper investigates fertility differentials by educational pairing in a cohort perspective. Based on Greek census data, the analysis generates empirical results in demographic areas that have yet to be fully explored, such as the quantum of completed cohort fertility by the partners' educational levels (particularly among homogamous, hypergamous, and hypogamous couples), permanent childlessness among highly educated couples and the completed fertility patterns by birth order across different educational pairings. The findings confirm the shift from the traditional pattern of educational hypergamy (women marrying up) to hypogamy (the woman is more educated than the man) and to medium and high educational homogamy. They also document that the differentials in fertility patterns by couples' levels of education appear to be related more to the tempo than the quantum of fertility, with the notable exception of the less educated homogamous couples; the completed fertility levels are significantly higher among this particular educational pairing than among the other educational pairings. The study suggests that educational pairing is likely to be an important topic in the investigation of human reproduction, particularly given that the increase in female educational levels and the shifts in traditional gender roles are leading to changes in fertility decision-making processes.

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1 Introduction

Education has long been seen as playing a significant role in shaping fertility outcomes, and has been characterised as a main determinant of economic well-being later in life (Thomson et al. 2013). In both the micro-economic model introduced by Becker's New Home Economics (Becker 1960) and the cultural approaches to fertility that focused on the role of education in the diffusion of new values and ideas (Lesthaeghe 1995), it was argued that the educational gradient is closely associated with fertility tempo and quantum, and especially with persistent differentials in fertility outcomes (Sobotka et al. 2015; Wood et al. 2014). Scholars have also asserted that education is linked to fertility through mechanisms related to field-specific socialisation and self-selection (Hoem et al. 2006; Van Bavel 2010). Indeed, educational orientation has been shown to affect the type and the sector of employment individuals choose, and is thus linked to differences in the earning potential and reproductive behaviour of individuals.

In the existing literature, the dimensions of the association between education and fertility mentioned above have mainly been investigated among women, and especially among highly educated women. By contrast, there is relatively little demographic research on this relationship among men. The limited empirical findings on this issue suggest that the negative association between education and fertility does not vary by gender (Zhang 2011), but that men and women with similar educational levels have different fertility rates (Nisén et al. 2014) and different patterns of childlessness (Kravdal and Rindfuss 2008). It has also been shown that the association between the long-term changes in the TFR and the trends in education-specific fertility levels differ between men and women (Tragaki and Bagavos 2014).

In addition, even though it is widely accepted that interactive processes among partners are significant determinants of fertility behaviour, only a few empirical studies have looked at the question of how partners' educational levels interact with their fertility outcomes. Most of these studies examined fertility differentials between educationally homogamous and heterogamous couples, based on the theoretical assumption—and, to a lesser extent, empirical evidence—that the former tend to have more children than the latter (Corijn et al. 1996; Huber and Fieder 2011; Mascie-Taylor 1986; Testa et al. 2014; Thomson 1997). The relatively recent reversal of the gender gap in education, or the increase in the number of highly educated women resulting from the growth in female participation in higher education (Grow and Van Bavel 2015; Van Bavel 2012; Esteve et al. 2012), has led scholars to develop a renewed interest in investigating the question of how the educational attainment of couples shapes their fertility behaviour (Nitsche et al. 2015). It is important to note that this reversal has been accompanied by significant shifts in patterns of assortative mating, whereby women are increasingly likely to be in either a hypogamous relationship in which the woman is more educated than her partner, or in a homogamous relationship in which both partners are highly educated. It follows that the transition from the traditional pattern of women 'marrying up' (i.e., forming a hypergamous relationship in which the male partner is more educated than the female partner) to the more recent pattern of women 'marrying down' (i.e., forming a hypogamous relationship) affects the bargaining power and the decision-making processes of the partners regarding employment, financial resources, and the division of family work by gender. These shifts may in turn be expected to influence fertility.

We have two main motivations for conducting our study. First, given that in Greece men and women with similar educational levels have different fertility rates (Bagavos and Tragaki 2014), it is likely that education is related not only to varying patterns of union formation, but to varying patterns of fertility behaviour among couples. Second, the increase in women's educational levels over the last 30 years has modified family formation patterns in Greece. This trend is likely to affect fertility in two main ways. First, it could have a 'compositional' effect on overall fertility levels, as the relative shares of homogamous and heterogamous couples change. Second, it implies a shift away from hypergamous relationships (in which the man is more educated) and towards hypogamous relationships (in which the woman is more educated), and an increase in the educational levels of homogamous couples. If these developments lead to an increase in women's bargaining power, they could affect decisions made at the couple level regarding labour market participation and the timing and quantum of fertility, and the differences in the fertility levels of various educational pairings. Thus, in this paper we seek to analyse the differences in the fertility levels of homogamous and heterogamous (hypergamous/hypogamous) couples, as well as fertility differentials among educationally homogamous couples. Investigating these questions can help us gain a better understanding of the relationship between education and fertility in Greece. Our study thus extends existing analyses of the association between various educational pairings and fertility outcomes by educational level (Rendall et al. 2010), educational field (Bagavos 2010), and male educational attainment (Tragaki and Bagavos 2014).

In our study, we use data on cohorts born between 1945 and 1969 to analyse various aspects of couples' fertility patterns from a cohort perspective. In particular, we examine the timing of entry into parenthood; the probability of having a first, a second, and a third birth; the level of completed fertility; and the effective reproductive lifetime, or the difference between the mean ages at the last and the first birth. While this is largely an explorative and descriptive exercise, it provides new insights into how couples' educational levels interact with fertility tempo and quantum. Thus, our analysis generates empirical results in demographic areas that have yet to be fully explored, such as the quantum of completed cohort fertility by the partners' educational levels (particularly among homogamous, hypergamous, and hypogamous couples), permanent childlessness among highly educated couples (and not just among highly educated women), and the completed fertility patterns by birth order across different educational pairings.

2 Theoretical considerations, empirical findings, and the Greek context

Educational homogamy is expected to result in higher fertility than educational heterogamy. It is generally assumed that the partners in an educationally homogamous relationship are likely to have similar values (Corijn et al. 1996). In addition, as educational homogamy appears to facilitate agreement and understanding between the partners, these couples are likely to have shared goals (Thomson 1990) and similar lifestyles (Kalmijn 1991). If these arguments are correct, we can expect to find that fertility levels differ not just between homogamous and heterogamous couples, but across homogamous couples (Corijn et al. 1996). Whether the partners in a couple have common values might affect their fertility, but educationally homogamous couples do not necessarily have higher fertility levels than heterogamous couples. For example, if less educated homogenous couples share an orientation towards traditional values whereas highly educated homogenous couples embrace modern, individualistic values; then the former group of couples may be expected to have higher fertility than the latter group of couples.

Highly educated homogamous couples are also predicted to have low fertility levels by micro-economic models of fertility (Becker 1993). If the partners in a couple try cope with the problem of forgone earnings related to the decision to have a (or an additional) child by choosing to specialise in paid work or childrearing tasks, then an increase in the woman's educational gradient, and thus in her earning potential, leads to lower specialisation gains associated with marriage, and to lower fertility. This is particularly likely to be the case if the partners are both highly educated. By contrast, models that focus on the advantages of pooling resources (Oppenheimer 1997) have questioned the specialisation model, and have emphasised the increasing importance of dual-earner couples. These approaches have suggested that, compared to male-breadwinner couples, dual-earner couples are more flexible and are better able to adapt to labour market challenges; thus, among these couples the returns to marriage do not necessarily decline as the partners become more similar in their earning potential. This theory predicts that, compared to their less educated counterparts, couples in which both partners are highly educated may be expected place a similarly high value on gender equality, and to have more stable employment situations that help them cover the costs of childrearing. Thus, highly educated couples would be expected to have higher fertility than less educated couples (Nitsche et al. 2015; Dribe and Stanfors 2010).

The argument that educationally homogamous couples have higher fertility than educationally heterogamous couples has, however, been challenged by micro-economic and bargaining models of fertility. According to one micro-economic perspective, hypergamous couples are expected to have higher fertility than other couples because the man is likely to specialise in paid work while the woman is likely to specialise in childrearing tasks. However, bargaining approaches have posited that educationally homogamous and heterogamous couples will differ in their fertility levels because they differ in their fertility decision-making processes (Nitsche et al. 2015; Neyer et al. 2013; Hener 2010). For example, Thomson has argued that there is a 'power rule' in fertility decision-making (Thomson 1990), whereby a woman who has an equal or a larger share of the resources in her partnership is better able to cope with the conventional gender division of domestic work by bargaining for either more help with these tasks from her (male) partner, or for purchasing support from the market. Thus, this woman may be expected to have higher fertility than a woman whose partner has more resources than she does (Nitsche et al. 2015). Accordingly, as the female partner's bargaining power is highest among hypogamous couples (Klesment and Van Bavel 2015), these couples are expected to have higher fertility than other educational pairings.

The association between couples' educational levels and fertility outcomes can also be investigated with respect to changes in gender roles. Indeed, a number of scholars have argued that gender egalitarianism is particularly relevant for high fertility (Esping-Andersen and Billari 2015; Neyer et al. 2013; McDonald 2000a). If both of the partners in a couple are highly educated, they are likely to have similar views on gender equality and to place a high value on equal gender roles—and are thus expected to have higher fertility than other couples (Nitsche et al. 2015). However, gender equality is a complex and multi-dimensional issue. Fraser (1994), McDonald (2000a, 2000b), and, more recently, Neyer et al. (2013) pointed out that there is a distinction between gender equality and gender equity: the former refers to gender differences in domains like work, education, family, and childrearing tasks; while the latter refers to perceptions of fairness and opportunities (Esping-Andersen and Billari 2015). Although gender equity is considered to be more relevant for fertility than gender equality, gender equity can be difficult to measure. Thus, gender equality is often used as a surrogate predictor for fertility levels. However, the decision to use indicators of gender equality to measure how gender equity shapes fertility outcomes has resulted in inconclusive findings. This is primarily because most analyses do not consider all three dimensions of gender equality—namely, employment, financial resources, and family work—that contribute to the ability to maintain a household, the degree of agency, the capacity to choose, and the degree of gender equity in household and care work (Neyer et al. 2013). It follows that although the increase in the proportion of women who are highly educated could be seen as a driving force in the trend towards more equal gender roles, it does not necessarily lead to higher fertility. In fact, adopting gender-egalitarian practices seems to be a necessary precondition for reaching an adequate degree of gender equity, and therefore for achieving relatively high fertility levels. In other words, although highly educated homogamous couples are more likely than other educational pairings to place a high value on equal gender roles, highly educated partners might still have relatively low fertility until 'gender egalitarianism has achieved dominant normative status' (Esping-Andersen and Billari 2015) among these couples. This dominant normative status with respect to gender egalitarianism probably applies to the dual-career or 'power' couples (Dribe and Stanfors 2010) who have been shown to be more likely to continue having children and to be less likely to separate than simple dual-earner highly educated couples or other educational pairings. In addition, even if educationally homogamous couples have convergent marketable skills—which, according to Becker (1960, 1993), implies lower returns to marriage—differences in fertility may persist among these couples. In particular, differences in the fertility levels of highly and less educated homogamous couples are less likely to be attributable to differences in rational choices than to differences in perceptions of gender inequality; i.e., unequal gender roles may be seen as fair and just by less educated couples, but as unfair and unjust by highly educated couples.

Empirical studies on the interactions between couples' educational levels and fertility outcomes have generated mixed results, which suggests that these interactions are subject to specific dimensions related to parity, birth cohort, the social context in which childbearing occurs, and the definitions of educational groups. In particular, it has been found that the female partner's educational attainment is more relevant than that of her male partner for parenthood in Germany (Bauer and Jacob 2009) and for completed fertility in the USA (Sorenson 1989). In addition, Mascie-Taylor (1986), using British data, found that educationally homogamous couples have a higher rate of completed fertility than educationally heterogamous couples. By contrast, it has been shown that highly educated homogamous couples have a lower probability of parenthood (Bauer and Jacob 2009) and a greater tendency to delay their first birth (Corijn et al. 1996) than less educated homogamous couples in Germany and in the Netherlands and Flanders, respectively. It has further been shown that highly educated homogamous couples are less likely than hypogamous couples to remain childless, but that they are less likely to become parents than hypergamous couples in Germany (Wirth 2007, cited by Nitsche et al. 2015). For Sweden, Dribe and Stanfors (2010) found that 'power couples'—or couples in which both partners are highly educated and have high-powered careers—are considerably more likely than other educational pairings to continue having children after they have had a first child. In a recent cross-country study, Nitsche et al. (2015) found that in many countries, highly educated homogamous couples are more likely to delay the transition to parenthood and to have a second or a third child than either hypogamous couples (in which the female partner is more educated) or hypergamous couples (in which the male partner is more educated). In short, even if the distinction between the timing- and the quantum-related effects on fertility of couples' educational levels are not always obvious, there is clear empirical evidence that different educational pairings are associated with different fertility outcomes.

The existing empirical findings also suggest that whether the male or the female partner's educational level has a greater impact on fertility decision-making and fertility outcomes strongly depends on country-specific social and institutional factors. Among the birth cohorts in Greece who are the focus of our study, the trends towards rising female educational levels and the reversal of gender inequality in education have not necessarily translated into gender balance in labour market participation or in the division of family and household tasks. Over the past 20 years, the employment rates of highly educated Greek women have remained lower than those of highly educated Greek men, and have not differed significantly from those of men with low or medium levels of education (Bagavos and Tragaki, 2014). In addition, employment rates and educational levels in Greece have different associations with period fertility depending on gender. While employment seems to be a precondition for fatherhood regardless of the man's educational level, non-employment is linked with higher fertility among women, and particularly among women with low or (to a lesser extent) medium levels of education (Bagavos and Tragaki 2014). The amount of time individuals spend on household tasks also varies considerably by gender. In their study of Labour Force Survey (LFS) data on the reasons for inactivity by age and sex in Greece, Lagoudakou and Bagavos (2016) found that a girl who is currently age 15 is expected to spend 10 years of her total life expectancy performing household and family tasks, whereas the corresponding figure for a boy of the same age is only one year. Differences in institutional contexts are also linked to differences in fertility levels. Rendall et al. (2010) noted that in Greece, the timing and the quantum of first childbearing differs markedly by female educational level, with the gap being especially large between women with high and low levels of education. They attributed these patterns to the family policy regime in Greece, which makes it difficult for women to combine employment and motherhood.

We refer to these contextual factors in formulating hypotheses regarding couples' expected fertility outcomes depending on the partners' educational levels in Greece. In line with several previous studies, we might expect to find that educationally homogamous couples tend to have more children than educationally heterogamous couples. However, the social and institutional contexts in Greece could imply that there are pronounced fertility differentials across homogamous couples, and especially between those with low and high educational levels. In Greece, being in employment is more likely to be a precondition for male than for female fertility; labour market participation rates differ by gender; and female employment is negatively associated with fertility, largely because of the lack of child care. Given these conditions, less educated couples may be expected to have higher fertility than highly educated homogamous couples. Thus, among the cohorts under study, the shared goals of less educated homogamous couples might include having a relatively large number of children in a male-breadwinner family, whereas the shared goals of highly educated homogamous couples might include prioritising the labour market participation of both partners over having children. These differences in goals might also prove relevant when we compare the fertility of less educated homogamous couples with the fertility of various types of heterogamous couples, either because the partners in hypergamous couples do not have the same fertility expectations, or because even in a hypogamous couple, the woman's bargaining power remains limited given the social and institutional conditions.

3 Data and methods

In this paper, we analyse fertility outcomes by couples' educational levels for five-year cohorts who were born in Greece between 1945 and 1969. The data on both partners' educational levels, and on each female partner's number of children ever born and ages at the birth of her first and last child, are drawn from the three most recent censuses. The census data for 1991 and 2001 were provided by Integrated Public Use Microdata Series, International (IPUMS 2015), a project dedicated to collecting and distributing census data from around the world; and the census data for 2011 came from the Hellenic Statistical Authority (EL.STAT. 2015). To avoid inconsistencies in the censoring of fertility histories, we investigated the fertility patterns of women using 1991 census data for the cohorts born between 1945 and 1949, 2001 census data for the cohorts born in the 1950s, and 2011 census data for the cohorts born in the 1960s. Thus, for all of the cohorts studied, the end of the reproductive period is set at a minimum age of 42. However, since information on the years of the first and the last birth was not available in the 1991 census, 2001 census data were used to investigate the timing of the first and the last birth for the cohorts born in 1945–49. Full population data were used for the cohorts born in the 1960s (EL.STAT. 2015: 2011 census), and census micro-data were used for the cohorts born between 1945 and 1959 (IPUMS 2015: 1991 and 2001 censuses).

We restricted our analyses to native-born women and men; i.e., to native-born couples. We imposed this restriction because we were interested in examining the association between educational attainment and fertility among couples who had attended Greek educational institutions, and who were exposed to the same country-specific contextual factors that might have shaped their fertility outcomes. In addition, using cohort data from censuses carried out in different years implicitly assumes that the population is closed during the reproductive years; an assumption that can reasonably be made for the native-born population only (Rendall et al. 2010). Finally, including only native-born couples in our study sample allows us to avoid the problem of inconsistencies in the educational levels of natives and migrants; an issue that is of particular importance in the census data (Tsimbos 2006).

Information on the educational gradient of couples was gathered from the data on the educational levels of men and women who were living as a couple at the time of the census. The term 'couples' refers to married couples (in which both partners were alive at the time of the census) and to unmarried couples who were living together at the time of the census (or 'in a consensual union' in the 2011 census). For the 2011 census, this information was provided by EL.STAT. (2015). For the 1991 and 2001 censuses, this information was accessed using the 'Attach Characteristics' option of the IPUMS (2015) data, which allowed us to attach information on the spouse to a respondent's observation[1].

[1] We thank Tim Moreland from the IPUMS Team, who has directed our attention to this option.

A three-category educational attainment classification (low, medium, and high) based on the International Standard Classification of Education (ISCED) was applied to the male and female partners in each couple. Individuals with no education, primary education, or lower secondary education (three years after the completion of six years of primary education) were assigned to the category 'low education' (ISCED 1 or 2). Individuals with completed upper secondary or post-secondary non-tertiary education were assigned to the category 'medium education' (ISCED 3 or 4). Finally, individuals with low or high levels of tertiary education were assigned to the category 'high education' (ISCED 5 or 6).

The mean numbers of children per woman by the couples' educational levels and the female birth cohort were computed based on the reported 'number of children ever born alive'. Since this information makes it possible to discern the number of women with at least one, two, or three children, we were able to estimate first-, second- and third-birth (cumulative) probabilities for the various educational pairings and birth cohorts. For first births, we analysed the timing and quantum of entry into motherhood based on women's responses to the question on the 'year of birth of the first child'. Based on this information, we computed the first-birth probabilities by the female cohort, by age, and by the couples' educational levels. Then, using a first birth life table (Rendall et al. 2010; Chen and Morgan 1991), we converted these probabilities (hazards) into cumulative proportions of women in the female cohort and couples' educational clusters for having a first birth by given ages (cumulative first birth probabilities). The 'year of birth of the last child' was also used to compute the effective reproductive lifetime—estimated by the difference between the mean ages at the last and the first birth—by birth cohorts and educational pairings.

In our paper we opted to use a cohort approach that allowed us to estimate the real completed fertility of several birth cohorts. But because the respondents were asked retrospectively about their number of children ever born the main implication of this choice is that it was not easy to link socio-economic factors with fertility behaviour at the time when it actually occurred. While this shortcoming might be considered of limited importance when examining the impact of a long-standing individual characteristic like educational level, it is likely to be more relevant when studying the effects of other characteristics such as the timing and duration of participation in the labour market. Our choice of methodological approach has to be seen in relation to the census data used in our analysis. Incomplete counts and misstatements in reconstructing individual (in our case cohort) histories are the most common problems that can arise when using census data to study fertility outcomes. Incomplete counts are related to errors of omission (children who died or left home, children born of a husband other than the current husband, and children given away for adoption) and to errors of inclusion (foetal deaths reported as children who died in infancy, children born to another wife of the current husband, and adopted children). Misstatements in reconstructing birth cohort histories may also be related to mortality and to international migration. Nevertheless, our use of data derived from successive censuses greatly mitigates these potential drawbacks and allows us to assume that our descriptive analysis is based on reasonably sound data.[2]

Another important issue that arises when using census data to study fertility outcomes is how to deal with factors such as remarriage, cohabitation, divorce, step-parenting and adoption. Indeed, the potentially distorting effects of these factors raise the question of whether census data are appropriate for examining couples' fertility outcomes. We argue that these factors do not affect the accuracy of our data since they are of limited importance during the period of study; thus, we assume that our data largely reflect first partnerships. It should be noted that in Greece, cohabitation status has only very recently been recognised by law (2009). While this status was taken into account in the 2011 census data, cohabitation remains rare in Greece. Similarly, rates of divorce and remarriage—and thus of step-parenting—have been very low in Greece. According to census data the proportion of Greek women aged 30–49 who are divorced remains small, having increased from 2% in 1991 to just 6% in 2011. Moreover, rates of adoption are low in Greece, as the process of adoption is governed by court orders that require prospective parents to meet a number of financial and socio-economic criteria.

4 Results

In the following, we present our results on fertility levels and trends by couples' educational levels for five-year age groups of the 1945–69 birth cohorts. The educational pairings of homogamous couples are presented for couples with low, medium, and high levels of education. The remaining six categories of educationally heterogamous couples are classified according to whether they are hypergamous (the man is more educated) or hypogamous (the woman is more educated). In addition, we provide more detailed results by single cohort and for each of the nine educational pairings in Appendix A.1.

Before presenting our descriptive results, we should point out that they might be subject to certain selection biases: i.e., individuals are selected into entering a partnership and parenthood, and are also selected as they choose to stay in a partnership. The results presented below should therefore be interpreted with these potential biases in mind. We first compare changes in couples' distributions by the partners' educational levels across cohorts (Table 1). It is clear that these developments are heavily influenced by the increasing female education gradient, which implies that the proportions of women with low levels of education were decreasing, while the proportions of women with medium and high levels of

[2] In order to estimate how these drawbacks can affect our results we also estimated fertility outcomes by the partners' educational levels for the birth cohorts 1945–49 and 1950–59 using data from the 2001 and 2011 censuses and from the 1991 and 2001 censuses, respectively. Based on this analysis, we concluded that the differences were of extremely limited importance.

Table 1:
Per cent distribution of partners' educational levels (five-year groups of the 1945–74 birth cohorts)

Partners' educational levels*	Cohort groups					
	1945–49	**1950–54**	**1955–59**	**1960–64**	**1965–69**	**1970–74**
Homogamy	77	70	66	63	60	59
Low	60	47	38	33	23	16
Medium	10	13	17	17	20	26
High	6	9	10	13	17	17
Heterogamy	23	30	34	37	40	41
Hypergamy (man more educated)	17	19	21	18	17	16
Low_High	2	2	2	2	1	1
Low_Medium	9	9	10	8	7	6
Medium_High	6	8	9	8	8	9
Hypogamy (woman more educated)	6	11	14	19	24	25
Low_High	0	1	1	2	3	2
Low_Medium	4	7	9	12	13	14
Medium_High	2	3	4	5	8	9

Source: Author's own estimations based on IPUMS data for the 1991 and 2001 censuses and on EL.STAT. data for the 2011 census.
*We thank one of the reviewers who advised us to use the above-mentioned category coding and labels.

education were increasing. Homogamous couples became less common, declining from 77 per cent among the oldest couples (in which the female partner was born between 1945 and 1949) to 59 per cent among the youngest couples (in which the female partner was born between 1970 and 1974). Conversely, heterogamous couples became more common, increasing from 23 per cent among the oldest couples to 41 per cent among the youngest couples. There were also pronounced changes in the per cent distributions across homogamous couples: 60 per cent of the oldest couples, but just 16 per cent of the youngest couples, had low levels of education. By contrast, the shares of homogamous couples with medium or high levels of education grew across these cohorts, from 10 to 26 per cent and from six to 17 per cent, respectively. Hypogamous couples also became increasingly common: from the oldest to the youngest cohorts, there was an increase in the share of couples in which the woman had a high level of education and the man had medium level of education (from two to nine per cent), and in which the woman had a medium level of education and the man had a low level of education (from four to 14 per cent). Meanwhile, the share of hypergamous couples in which the man had a high level of

Table 2:
Mean number of children per women by educational pairing (five-year groups of the 1945–1969 birth cohorts)

Partners' educational levels	Cohort groups				
	1945–49	**1950–54**	**1955–59**	**1960–64**	**1965–69**
Homogamy	2.21	2.17	2.15	2.13	2.06
Low	2.30	2.30	2.34	2.33	2.33
Medium	1.88	1.89	1.92	1.93	1.90
High	1.86	1.85	1.83	1.88	1.88
Heterogamy	2.00	1.99	1.99	2.00	1.98
Hypogamy	1.95	1.95	1.94	1.99	1.96
Hypergamy	2.02	2.01	2.02	2.01	2.00
Total*	2.16	2.11	2.09	2.08	2.03

Source: Author's own estimations based on IPUMS data for the 1991 and 2001 censuses and on EL.STAT. data for the 2011 census.
*Based on women living in a couple at the time of the census.

education and the woman had a medium level of education increased slightly across these cohorts, from six to nine per cent.

Table 2 presents the levels of completed fertility by couples' educational levels across cohorts (see also Appendix A.1). The findings confirm our assumption that homogamous couples had higher completed fertility levels than heterogamous couples. However, this gap is attributable to the relatively high fertility levels (at about 2.3 children per woman) among less educated homogamous couples, since homogamous couples with medium and (in particular) high levels of education had lower fertility than any heterogamous pairing (hypergamy or hypogamy). When highly educated homogamous couples were considered as a reference category, we found that less educated homogamous couples had higher completed fertility levels (of around 24% to 28%) than highly educated homogamous couples; the fertility levels of the remaining educational pairings were also higher (the differences in the mean number of children varied from 1% to +10%) than the fertility levels of the highly educated homogamous couples.

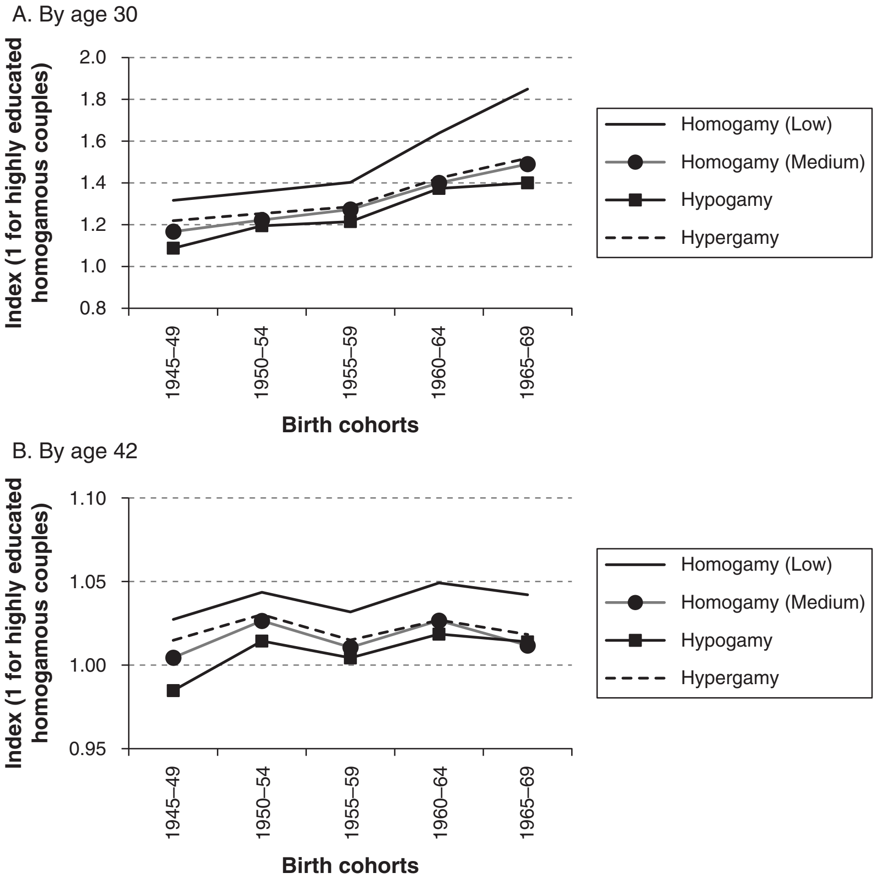
Another noteworthy finding is that the nearly stable pattern of completed fertility by educational pairing contrasts to some extent with the decreasing trend in total cohort fertility from the cohorts born in the late 1940s to the cohorts born in the late 1960s (from 2.16 to 2.03 children per woman). We suggest that this result is related to compositional rather than to behavioural factors; in a context in which the relationship between completed fertility and couples' educational levels is stable, a decline in the share of the educational pairings with the highest fertility levels—here, the less educated homogamous couples—leads to a decline in total cohort fertility rates.

These findings also suggest that, even though the likelihood of entry into motherhood was similar across educational pairings, the timing of the first birth varied significantly across cohorts. In Figure 1a, we can see that the cumulative first birth probability among highly educated homogamous couples was comparable to that among the other educational pairings by age 30. At that age, highly educated homogamous were substantially less likely than other educational pairings to have entered parenthood. In addition, the differences in the first birth risks of highly educated homogamous couples and of the remaining educational pairings increased sharply across cohorts; whereas the differentials in first birth intensity ranged from around one (no difference) to almost 1.4 for the oldest cohorts, the corresponding figures for the youngest cohorts born in the late 1960s varied from 1.4 to 1.8. As expected, we found that the differentials in first childbearing were more pronounced between highly educated homogamous couples and the educational pairings that had the highest levels of completed fertility; namely, the less educated homogamous couples.

Surprisingly, however, the proportions of women who had had a first birth by the end of their reproductive lifetime differed little across cohorts and by couples' educational levels (Figure 1b). In other words, women were equally likely to have become a mother regardless of their educational pairing or birth cohort. Indeed, the differentials between highly educated homogamous couples and other educational pairings in terms of entry into parenthood were related almost exclusively to the timing, not to the quantum, of first-birth risk. This finding is clearly reflected in the changes in the figures for the mean age at first childbearing (Table 3). A transition from early to late first motherhood for the cohorts born before and after 1960 was detected for all women living in a couple. The mean age at first birth was 24.7 for the 1945–49 birth cohorts, 24 for the cohorts born in the late 1950s, and 26.1 for the cohorts born in the late 1960s. This overall shift towards having the first child at older ages was evident for all educational pairings, with the notable exception of the women in a less educated homogamous couple, among whom the first birth schedule remained rather stable. In addition, large differences in the mean age at first birth can be seen across cohorts and educational pairings. When we compared other educational pairings and highly educated homogamous couples, we found that the differences in the entry into parenthood ranged from two to five years among the 1945–49 cohorts, and from 3.3 to 8.7 years among the cohorts born in the second half of the 1960s. The differentials were smallest relative to hypogamous couples, and were largest relative to less educated homogamous couples.

Table 4 shows that differences in completed fertility levels between homogamous couples with high and low levels of education are attributable to the higher probabilities among the latter than among the former group of having a second or a third child. We also note that highly educated homogamous couples clearly had lower third-birth probabilities than hypergamous and hypogamous couples; and that these differences, while small, account for the gap in completed fertility. However,

Figure 1:
Cumulative first birth probability by ages 30 and 42 (five-year groups of the 1945–1969 birth cohorts) - (Index 1 for highly educated homogamous couples)



Source: Author's own estimations based on IPUMS data for the 1991 and 2001 censuses and on EL.STAT. data for the 2011 census.

we should also point out that the differences in the likelihood of having a third child between highly educated couples and the other educational pairings decreased over time and across cohorts.

Another interesting aspect of these fertility patterns is that because highly educated homogamous couples delayed their entry into parenthood, they also had a shorter effective reproductive lifetime (estimated by the difference between the mean age at the last and the first birth). Figure 2 shows that these couples had a shorter average reproductive period than all of the other couples. The differences in reproductive lifetime were most pronounced when we compared these couples with

Table 3:
Mean age at first birth by educational pairing (five-year groups of the 1945–1969 birth cohorts)

Partners' educational levels	Cohort groups				
	1945–49	1950–54	1955–59	1960–64	1965–69
Homogamy (Low)	23.6	22.6	21.7	21.7	21.8
Homogamy (Medium)	26.2	25.6	24.9	25.7	26.6
Homogamy (High)	28.7	28.7	28.5	29.9	30.5
Hypogamy	26.6	25.7	25.2	25.8	27.2
Hypergamy	25.3	24.9	24.2	25.0	25.8
Total	24.7	24.3	24.0	24.8	26.1

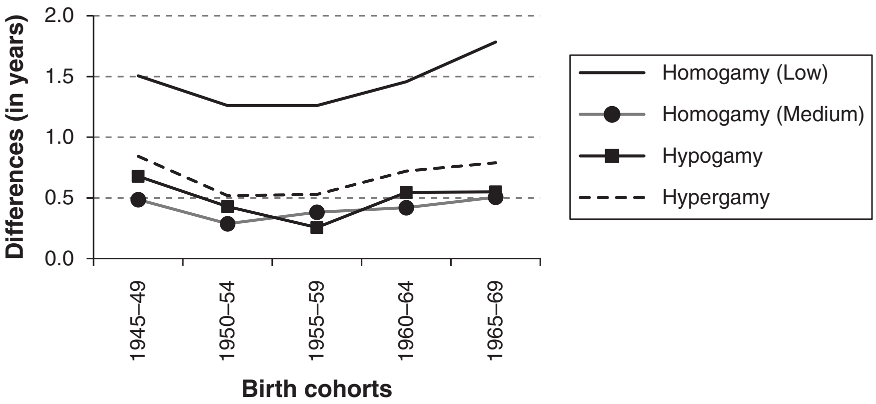
Source: Author's own estimations based on IPUMS data for the 1991 and 2001 censuses and on EL.STAT. data for the 2011 census.

Table 4:
Cumulative second and third birth probabilities by educational pairing (five-year groups of the 1945–1969 birth cohorts)

Partners' educational levels	Cohort groups				
	1945–49	1950–54	1955–59	1960–64	1965–69
	2nd birth probability				
Homogamy (Low)	0.91	0.90	0.91	0.90	0.89
Homogamy (Medium)	0.82	0.82	0.82	0.81	0.79
Homogamy (High)	0.81	0.80	0.78	0.77	0.77
Hypogamy	0.83	0.83	0.82	0.83	0.81
Hypergamy	0.86	0.84	0.85	0.83	0.81
Total	0.88	0.86	0.86	0.84	0.82
	3rd birth probability				
Homogamy (Low)	0.38	0.38	0.38	0.37	0.38
Homogamy (Medium)	0.20	0.18	0.20	0.20	0.21
Homogamy (High)	0.19	0.18	0.19	0.20	0.22
Hypogamy	0.25	0.25	0.23	0.23	0.24
Hypergamy	0.27	0.25	0.24	0.24	0.26
Total	0.32	0.30	0.28	0.27	0.27

Source: Author's own estimations based on IPUMS data for the 1991 and 2001 censuses and on EL.STAT. data for the 2011 census.

Figure 2:
Differences in the effective reproductive lifetime* between highly educated homogamous couples and other educational pairings (in years) - (five-year groups of the 1945–1969 birth cohorts)



Source: Author's own estimations based on IPUMS data for the 1991 and 2001 censuses and on EL.STAT. data for the 2011 census.
*Difference between the mean ages at the last and the first birth

less educated homogamous couples (between 1.3 and 1.8 years), and were smaller when we compared these couples with the other educational pairings (between one-quarter and less than one year).

5 Conclusions and discussion

We used census data to analyse fertility patterns by couples' educational levels for female birth cohorts born between 1945 and 1969. In line with recent studies (Esteve et al. 2012; Van Bavel, 2012; Grow and Van Bavel 2015), we found that the increase in female educational levels was accompanied by an increase in the incidence of hypogamy (the woman is more educated than the man) and of medium and high homogamy. This finding suggests a shift away from the traditional pattern of educational hypergamy (women marrying up).

The findings indicate that the homogamous couples tended to have higher completed fertility than heterogamous couples. Nevertheless, this result relied on the relatively high fertility levels among the less educated homogamous partners, as the homogamous couples with medium and (in particular) high levels of education had lower fertility than any other educationally heterogamous pairing (hypergamy or hypogamy).

The differentials in fertility patterns by couples' levels of education appear to be related more to the tempo than the quantum of fertility, with the notable exception of the completed fertility levels among less educated homogamous couples. Across all birth cohorts, the completed fertility levels were around 25% higher among this particular educational pairing than among the other educational pairings. This gap was based on different probabilities of having a second or a third birth, but not on the probability of having a first birth. In fact, the chances of having a first birth were almost equal across educational pairings and birth cohorts. It is, however, clear that entry into motherhood occurred at the highest ages among the highly educated homogamous couples. In addition, our findings suggest that the differences in the timing of first childbearing between highly and less educated homogamous couples became more pronounced, while the differences between these couples and the remaining educational pairings remained at rather constant levels.

Our finding that the highly educated homogamous partners entered parenthood relatively late in life is in line with previous empirical results (Corijn et al. 1996; Nitsche et al. 2015). In addition, our finding that the discrepancies in the mean age at first motherhood increased between highly educated and less educated homogamous couples is similar to a conclusion reached by Rendall and colleagues (2010) in their analysis of the link between women's educational levels and fertility in Greece. However, we are taking their findings a step further by arguing that their results are probably more closely related to differences in the first birth rates between highly and less educated homogamous couples than between highly and less educated women. Our results on similar distributions of childlessness by couples' educational levels and birth cohorts contrast with those of other studies (Wirth 2007, cited by Nitsche et al. 2015; Bauer and Jacob 2009). While contextual factors may play a role, these discrepancies are probably related to our decision to examine permanently childless women instead of the proportion of childless women at an age that does not necessarily mark the end of the reproductive lifetime.

The trend towards low fertility among highly educated homogamous couples appears to run counter to the ongoing transformation of gender roles and relations, which can be seen as a precondition for gender egalitarianism, and which could in turn lead to higher fertility. Nevertheless, increasing female educational levels do not necessarily translate into the levels of gender equality that are expected by highly educated women. It has been asserted that a sufficient level of gender equity is a necessary precondition for more fertility (Esping-Andersen and Billari 2015), but achieving gender equity is a long-term process that involves adapting social institutions and family relationships to meet the new expectations. Over time, movement towards gender equality may be expected to result in higher fertility. However, it is important to keep in mind that gender equality has three dimensions: employment, financial resources, and family work. Thus, gender equality does not simply mean 'sameness of distribution', but encompasses the ability to maintain a household, the degree of agency, the capability to choose, and the degree of gender equity in household and care work (Neyer et al. 2013). Highly educated 'power couples' (Dribe and Stanfors 2010) in Sweden have likely come close to achieving gender equality, which may be why they have high fertility levels. But the highly educated homogamous couples of our birth cohorts in Greece appear to have made less progress in several key dimensions of gender equality.

In addition, institutional aspects of fertility, and particularly the lack of adequate policies supporting women in combining employment with motherhood, likely contribute substantially to both the very late timing of entry into motherhood and the low fertility levels among highly educated homogamous couples. A number of studies have suggested that family policies mediate the growth of socio-economic differentials in fertility (Schulze and Tyrell 2002), and that fertility is positively related to policies that make it easier for women to balance their work and family responsibilities (Thévenon 2011). In a conservative 'southern European' family policy model, such as that of Greece, the low level of institutional compatibility between family and employment appears to lead highly educated women to delay childbearing (Rendall et al. 2010), and is probably the main reason for the late and relatively low fertility among highly educated homogamous Greek couples.

However, the extent to which gender equality is associated with fertility may depend on people's perceptions of gender equality, and on how those perceptions align with their values. This dynamic is probably behind our finding that less educated homogamous couples had the highest fertility levels. While this result may appear to contradict micro-economic models of the family, it does not necessarily indicate that there is no task specialisation between less educated partners. However, it is very likely that among these couples this task specialisation process is determined not by an (economic) rationale, but by their adherence to traditional gender roles; i.e., to the assumption that the man will participate in the labour market and the woman will handle the family work responsibilities. Indeed, if this one(male)-breadwinner model is perceived as fair and just by less educated partners who share traditional values, these couples may be expected to have relatively high fertility, despite the persistence of gender inequality. Moreover, selection effects probably apply to this particular educational pairing, whereby less educated partners become more selective across cohorts, specifically with regard to observed and perceived gender equality and attitudes towards paid and unpaid work, which may in turn lead to higher levels of completed fertility.

One limitation of our study, which is indeed characteristic of the cohort perspective, is that it does not take into consideration the most recent socio-economic developments in Greece. The reproductive behaviour of the birth cohorts we studied occurred in a context in which the changes in gender roles had been modest; i.e., in a transitional period in terms of gender egalitarianism. Thus, the fertility behaviour of the cohorts may have been more affected by gender equality expectations than by the ongoing changes in gender equality in employment, financial resources, and family work. In other words, the differences in fertility levels by the partners' educational levels could display different patterns among the cohorts born in 1970 onwards, and particularly among highly educated women with an equally or less educated male partner. Future research should address these issues, and especially the shifts in male and female breadwinning patterns.

A further limitation of our study lies in the data we used for the estimations. Fertility patterns by the couples' educational levels were investigated using data on the fertility of women who were in an educationally dissimilar couple. Accordingly, our fertility indicators provide more information about the female than the male partners, and mainly reflect the fertility of women living in a couple, rather than the fertility of couples as such.

However, we believe that educational pairing is likely to be an important topic in the investigation of human reproduction, particularly given that the increase in female educational levels and the shifts in traditional gender roles are leading to changes in fertility decision-making processes. Our cohort approach provides useful insights into how differences in fertility are associated with couples' educational levels, an issue that has seldom been analysed in the previous demographic literature. Our approach makes it possible to estimate different fertility schedules with respect to entry into parenthood, fertility by birth order, and completed cohort fertility for various educational pairings. Thus, our study contributes to the discussion on the role of couples' educational attainment in shaping fertility outcomes.

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References

Bagavos C. 2010. Education and childlessness: the relationship between educational field, educational level, employment and childlessness among Greek women born in 1955–1959. *Vienna Yearbook of Population Research* 8, 51–75.

Bagavos C. and A. Tragaki 2014. Economic uncertainty and fertility outcomes in Greece: the "structural"-"distributional" effect of education level and employment status on male and female fertility levels. Paper presented at the European Population Conference 2014, Budapest, 25–28 June.

Bauer G. and M. Jacob 2009. The influence of partners' education on family formation Equalsoc Working Paper 2009/4. http://www.researchgate.net/publication/228388443.

Becker G. S. 1960. An economic analysis of fertility. In *Demographic and Economic Change in Developed Countries*, ed. G. S. Becker 209–231. Princeton University Press.

Becker G. S. 1993. *A treatise on the family*. Enlarged edition. Cambridge, MA: First Harvard University Press.

Chen R. B. and S. P. Morgan 1991. Recent trends in the timing of first births in the United States, *Demography* 28(4): 513–533.

Corijn M., A. 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 First Child. *Journal of Marriage and the Family* 59(1): 117–126.

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(30): 847–877.

EL.STAT 2015. 2011 Census data. Obtained by http://www.statistics.gr/el/statistical-data-request, after special request.

Esping-Andersen G. and F. C. Billari 2015. Re-theorizing Family Demographics. *Population and Development Review* 41(1): 1–31.

Esteve A., J. García-Román and I. Permanyer 2012. The gender-gap reversal in education and its effect on union formation: The end of hypergamy? *Population and Development Review* 38(3): 535–546.

Fraser N. 1994. After the family wage: Gender equity and the welfare state. *Political Theory* 22(4): 591–618.

Grow A. and J. Van Bavel 2015. Assortative mating and the reversal of gender inequality in education in Europe: An agent-based model. *PLOS One*, http://www.plosone.org/article/fetchObject.action?uri=info:doi/10.1371/journal.pone.0127806&representation=PDF.

Hener T. 2010. Do couples bargain over fertility? Evidence based on child preference data. Ifo Working Paper No. 92. https://www.cesifo-group.de/portal/page/portal/96878EC443EB4BE6E04400144FAFBA7C.

Hoem J., G. Neyer and G. Andersson 2006. Education and childlessness: The relationship between educational field, educational level, and childlessness among Swedish women born in 1955–59, *Demographic Research* 14(15): 331–380.

Huber S. and M. Fieder 2011. Educational homogamy lowers the odds of reproductive failure. *PLoS* 6(7): 1–6.

IPUMS 2015. 1991 and 2001 censuses data for Greece. Obtained by https://international.ipums.org/international/ upon special request.

Kalmijn, M. 1991. Shifting boundaries: Trends in religious and educational homogamy. *American Sociological Review* 56(6): 786–800.

Klesment M. and J. Van Bavel 2015. The reversal of the gender gap in education and female breadwinners in Europe. Families And Societies Working Paper 26. Stockholm University, Department of Sociology. http://www.familiesandsocieties.eu/wp-content/uploads/2015/01/WP26KlesmentVanBavel.pdf.

Kravdal Ø. and R. R. Rindfuss 2008. Changing relationships between education and fertility a study of women and men born 1940–64. *American Sociological Review* 73(5): 854–873.

Lagoudakou, K. and C. Bagavos 2016. Economic crisis and changes in life cycle stages of individuals: a temporal and spatial approach with the application of Sullivan method. Paper presented at the International Conference Journées Internationales du Travail, Athens, 11–14 May.

Lesthaeghe R. 1995. The second demographic transition in Western countries: an interpretation. In *Gender and family change in industrialized countries*, ed. K. O. Mason and A.-M. Jensen, 17–62. Oxford: Clarendon Press.

Mascie-Taylor C. G. N. 1986. Assortative mating and differential fertility. *Biology and Society* 3(4): 167–170.

McDonald P. 2000a. Gender equity, social institutions and the future of fertility. *Journal of Population, Research* 17(1): 1–16.

McDonald P. 2000b. Gender equity in theories of fertility transition. *Population and Development Review* 26(3): 427–439.

Neyer G., T. Lappegard and D. Vignoli 2013. Gender equality and fertility: Which gender equality matters? *European Journal of Population* 29(3): 245–272.

Nisén J., P. Martikainen, K. Silventoinen and M. Myrskylä 2014. Age-specific fertility by educational level in the Finnish male cohort born 1940–1950. *Demographic Research* 31(5): 119–136.

Nitsche N., A. Matysiak, J. Van Bavel and D. Vignoli 2015. *Partners' educational pairings and fertility across Europe*. Families and Societies Working Papers Series, n. 38. http://www.familiesandsocieties.eu/wp-content/uploads/2015/06/WP38NitscheEtAl2015.pdf.

Oppenheimer V. K. 1997. Women's employment and the gain to marriage: The specialization and trading model. *Annual review of sociology* 23: 431–453.

Rendall M., E. Aracil, C. Bagavos, C. Couet, A. Derose, P. Digiulio, T. Lappegård, I. Robert-Bobée, M. Rønsen, S. Smallwood and G. Verropoulou 2010. Increasingly heterogeneous ages at first birth by education in Southern European and Anglo-American family-policy regimes: A seven-country comparison by birth cohort. *Population Studies* 64(3): 209–227.

Schulze H. and H. Tyrell 2002. What happened to the European family in the 1980s? The polarization between the family and other forms of private life. In *Family life and family policies in Europe*, Volume 2, Problems and Issues in Comparative Perspective, ed. F. Kaufmann, A. Kuijsten, H. Schulze and K. P. Strohmeier, 69–119. Oxford: Oxford University Press.

Sobotka T., E. Beaujouan K. Neels, R. R. Rindfuss and Z. Brzozowska 2015. Education and fertility in low-fertility countries: A long-term perspective. Paper presented at the International Conference on Education and Reproduction in Low-Fertility Settings, Vienna, 2–4 December 2015.

Sorenson A. M. 1989. Husbands' and wives' characteristics and fertility decisions: A diagonal mobility model. *Demography* 26(1): 125–135.

Testa M. R., L. Cavalli and A. Rosina 2014. The effect of couple disagreement about child-timing intentions: A parity-specific approach. *Population and Development Review* 40(1): 31–53.

Thévenon O. 2011. Family policies in OECD countries: A comparative analysis, *Population and Development Review* 37(1): 57–87.

Thomson, E. 1990. Two in one: structural models of couple behaviour. In *Family variables: Conceptualization, measurement and use*, ed. C. W. Draper and A. C. Marcos, 129–142. Newbury Park, CA: Sage.

Thomson E. 1997. Couple childbearing desires, intentions, and births. *Demography* 34(3): 343–354.

Thomson E., M. Winkler-Dworak and S. Kennedy 2013. The standard family life course: An Assessment of variability in life course pathways. In *Negotiating the life course: Stability and change in life pathways*, ed. A. Evans and J. Baxter, 35–52. Dordrecht: Springer.

Tragaki A. and C. Bagavos 2014. Male fertility in Greece: trends and differentials by education level and employment status. *Demographic Research* 31(6): 137–160.

Tsimbos C. 2006. The Impact of migration on growth and ageing of the population in a new receiving country: The case of Greece, *International Migration* 44(4): 231–254.

Van Bavel J. 2010. Choice of study discipline and the postponement of motherhood in Europe: the impact of expected earnings, gender composition and family attitudes, *Demography* 47(2): 439–458.

Van Bavel J. 2012. The reversal of gender inequality in education, union formation and fertility in Europe. *Vienna Yearbook of Population Research* 10: 127–154.

Wirth H. 2007. Kinderlosigkeit von hochqualifizierten Frauen und Männern im Paarkontext – Eine Folge von Bildungshomogamie? In *Ein Leben ohne Kinder. Kinderlosigkeit in Deutschland*, ed. K. Dirk and M. Kreyenfeld, 137–170. Wiesbaden: VS Verlag.

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(46): 1365–1416.

Zhang L. 2011. *Male fertility patterns and determinants*. The Springer Series on Demographic Methods and Population Analysis 27. Springer editions.

Appendix A.1:
Mean number of children per women by educational pairing (birth cohorts 1945–1969)

	Partners' educational levels (Her_His education)									
Birth cohort	Low_Low	Low_Medium	Low_High	Medium_Low	Medium_Medium	Medium_High	High_Low	High_Medium	High_High	Total
1945	2.28	2.01	1.94	1.97	1.89	1.94	1.72	1.70	1.81	2.14
1946	2.27	2.05	2.04	2.05	1.82	1.97	1.94	1.77	1.90	2.15
1947	2.34	2.08	2.07	2.03	1.89	1.92	1.86	1.85	1.87	2.19
1948	2.31	2.12	1.94	1.93	1.89	1.96	2.00	1.81	1.90	2.16
1949	2.34	2.14	2.03	2.10	1.92	1.85	1.90	1.95	1.84	2.17
1950	2.26	2.09	2.10	2.10	1.90	1.90	1.94	1.68	1.82	2.11
1951	2.33	2.13	2.01	2.07	1.85	1.94	1.72	1.77	1.80	2.13
1952	2.29	2.00	2.26	2.03	1.90	1.87	1.80	1.72	1.88	2.10
1953	2.35	2.10	2.02	2.01	1.89	1.90	1.83	1.78	1.90	2.12
1954	2.30	2.11	2.12	1.99	1.91	1.94	1.94	1.95	1.83	2.10
1955	2.32	2.09	2.03	1.99	1.94	1.85	1.81	1.81	1.90	2.10
1956	2.34	2.17	2.06	2.03	1.94	1.85	1.86	1.75	1.83	2.11
1957	2.34	2.17	2.31	2.09	1.92	1.89	1.80	1.70	1.83	2.10
1958	2.39	2.14	2.00	2.02	1.87	1.87	1.97	1.71	1.84	2.09
1959	2.31	2.11	2.13	1.99	1.95	1.92	2.22	1.77	1.77	2.07
1960	2.32	2.12	2.04	2.05	1.93	1.90	1.92	1.83	1.86	2.09
1961	2.33	2.14	2.08	2.07	1.94	1.91	1.96	1.84	1.88	2.09
1962	2.32	2.12	2.06	2.04	1.93	1.91	1.90	1.82	1.88	2.08
1963	2.34	2.15	2.07	2.04	1.93	1.87	1.94	1.86	1.87	2.07
1964	2.34	2.12	2.04	2.07	1.91	1.90	1.97	1.84	1.90	2.07
1965	2.34	2.15	2.02	2.06	1.92	1.92	1.92	1.84	1.89	2.06
1966	2.34	2.14	2.14	2.06	1.93	1.88	1.94	1.86	1.90	2.05
1967	2.34	2.13	2.15	2.05	1.91	1.88	1.91	1.82	1.89	2.03
1968	2.33	2.13	2.05	2.05	1.89	1.87	1.95	1.83	1.87	2.01
1969	2.32	2.09	1.96	2.01	1.87	1.83	1.94	1.81	1.85	1.99

Source: Author's own estimations based on IPUMS data for the 1991 and 2001 censuses and on EL.STAT. data for the 2011 census.

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Educational field and fertility in western Germany: an analysis of women born between 1955 and 1959

Anja Oppermann*

Abstract

The existing research on education and fertility has been enriched by studies that take into account educational field in addition to educational level. The present paper adds western Germany, which has exceptionally high levels of childlessness, to the list of cases for which comparable research has been conducted. The association between educational attainment, childlessness, and ultimate fertility among women born between 1955 and 1959 is examined using data from the 2008 German Microcensus. Despite the strong association with the level of education, childlessness also varies by educational field in western Germany. Consistent with findings from other countries, the results show that women educated in teaching and health care have the lowest rates of childlessness at each educational level, while women educated in administration, economics or social sciences have the highest levels of childlessness. Educational field and level account equally for variation in ultimate fertility.

1 Introduction

In recent years, the existing research on education and fertility has been enriched by studies that take into account the educational field in addition to the educational level (Lappegård and Rønsen 2005; Hoem et al. 2006a; Hoem et al. 2006b; Martín-García and Baizán 2006; Neyer and Hoem 2008; Rønsen and Skrede 2010; Van Bavel 2010; Begall and Mills 2012; Michelmore and Musick 2014; Oppermann 2014). All of the above studies have found an impact of the field that is independent of the level. The operationalisation of educational attainment varies considerably between these studies, particularly with regard to the number of educational categories used in the analysis. Nevertheless, three studies analysing childlessness in three different countries – namely, Sweden, Austria, and Greece – applied a comparable

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setup (Hoem et al. 2006a; Neyer and Hoem 2008; Bagavos 2010). Each study used national register or census data to examine childlessness among women born between 1955 and 1959. The operationalisation approaches were very similar, as each used approximately 60 categories of educational attainment (around 50 in the case of Greece). These categories were based on combinations of educational levels and fields. For Sweden, a companion paper also looked at ultimate fertility (i.e. the average number of children) (Hoem et al. 2006b).

The present paper adds to this existing knowledge by applying a comparable setup to western Germany. While German family policy is somehow similar to that of Austria, fertility is very low in western Germany, and the region has one of the highest rates of childlessness worldwide (Dorbritz 2008). For this reason, the case of western Germany is of particular interest to demographers. The present paper adds to the existing research which has repeatedly shown a strong association between educational level and fertility (e.g. Blossfeld and Huinink 1991; Kreyenfeld 2002; Kreyenfeld and Konietzka 2008). Given this crucial role of the educational level, it is of interest to examine the strength of the impact of the field of education in western Germany, and to compare the impact with that in Sweden, Austria and Greece. So far, relatively little attention has been paid to the possible impact of the field of education on fertility in the western German context. Using data from the German Socio-Economic Panel (SOEP) study, it has been shown that educational field matters for the transition to parenthood for women, but not for men (Oppermann 2014).

In the present paper, data from the 2008 German Microcensus[1] on educational attainment and childlessness are treated in a manner comparable to that of the approaches used in previous studies. Additionally, ultimate fertility is examined in accordance with the methodology applied in a study for Sweden by Hoem et al. (2006b). The association between educational field and ultimate fertility in western Germany is explored for the first time. Consequently, the paper also provides reference data for researchers examining the association between education and fertility in the German context.

The focus of this paper is on western Germany rather than Germany as a whole for several reasons: the cohort under examination (women born between 1955 and 1959) were brought up and experienced the majority of their fertile years while Germany was separated into two different countries (the Federal Republic of Germany and the German Democratic Republic). The institutional settings differed considerably – for example, with regard to career opportunities as well as the compatibility of employment and childcare – as did fertility behaviour in the two parts of Germany (Kreyenfeld 2004; Dorbritz 2008; Henz 2008). Moreover, because

[1] The full sample of the 2008 German Microcensus was used for the analysis. This was possible because the author was granted on-site access as a guest researcher. The author is very grateful for the kind support of the team at the Research Data Centre of the Federal Statistical Office and the statistical offices of the *Länder* in Berlin-Mitte.

fertility behaviour has continued to differ between the two parts of the country since reunification, it is still common to study fertility patterns in eastern and western Germany separately (e.g. Goldstein and Kreyenfeld 2011). While it would be interesting to examine how these different institutional settings are associated with the relationship between educational field and fertility, the number of eastern German cases in the Microcensus do not allow for such a comparison. Although the present paper focuses on western Germany, in Section 6.1.2 some comparisons are drawn for educational lines where the sample for eastern Germany consists of a sufficient number of cases to do so.

In the next section, I discuss the key features of the western German educational system and family policy framework, along with selected research findings. In the subsequent section, I summarise the main arguments for why the educational field is of relevance for fertility behaviour, and relate them to the western German context. In the section on data and methods, I describe the data from the 2008 German Microcensus, and how the analysis is conducted. The analysis focuses on western German women born between 1955 and 1959. I present the main results, and compare the findings for western Germany with those for eastern Germany, and with previous findings from other countries. I conclude with some reflections on these findings, and discuss their implications for further research.

2 The western German context

In this section, I introduce patterns observed in the western German context that are assumed to be of relevance for the association between education and fertility decisions: namely, the dominant characteristics of the German educational system, family policy, and value orientations. I also describe overall fertility trends and important findings.

One main characteristic of the German educational system is the early tracking of pupils (Shavit and Müller 2000; Jacob and Tieben 2009) after four years of primary school. In general, the flexibility of the educational system is rather low (Kerckhoff 2001). While the proportions of women participating in secondary and tertiary education have been increasing, choices of educational fields are still strongly gender-segregated (Wirth and Dümmler 2004; BMBF 1997; BMBF 2007; Charles and Bradley 2009). For example, women are overrepresented in health care and men are overrepresented in engineering (Charles and Bradley 2009). There is a strong link between the educational system and labour market opportunities (Schneider 2008; Shavit and Müller 2000). It is very common in Germany to earn a qualification that is closely related to a specific occupation, and to remain in this occupation throughout one's working life (Kerckhoff 2001). Numerous occupations are tied to formal educational qualifications (Buchmann and Charles 1995, 85).

In addition to the educational system, family policy measures and dominant value orientations within a country have an impact on fertility behaviour (Henz 2008; Dorbritz 2008; Kravdal and Rindfuss 2008; Blossfeld and Huinink 1991; Hoem et al. 2006a; Hoem et al. 2006b; Kreyenfeld 2002; Gauthier 2007; Brewster and Rindfuss 2000). The most recent developments are not discussed here, since these (for example, the introduction of *Elterngeld* in 2007) occurred after women born between 1955 and 1959 had reached the end of their fertile years. Throughout the fertile years of the cohort under consideration, traditional family attitudes and gender roles prevailed in western Germany (Pfau-Effinger and Smidt 2011; Pfau-Effinger 2012). There was a strong link between marriage and childbearing. In 1990, only 10.05 per cent of children were born to unmarried mothers in the western part of Germany (Dorbritz 2008, 573). Pregnancy was an occasion for marriage (Dorbritz 2008, 573 and 579; Sobotka 2008; Blossfeld and Rohwer 1995; Federkeil 1997).

A traditional division of labour was supported by many features of German family policy at that time. The tax system supported marriage, with or without children. Marriages with one main earner (usually a male breadwinner) benefited the most from a tax policy known as *Ehegattensplitting* (Federkeil 1997, 87; Steiner and Wrohlich 2006; Daly 2000, 91). The lack of full-time day care has hindered compatibility of family and employment, which only recently became a political goal in Germany. Long parental leave, on the other hand, has always been supported financially – with a guaranteed return to the previous job after up to three years[2] of a child's life. Traditionally, day care has mainly been provided by the *Kindergarten*, which is a preschool for children between the ages of three and six that usually offers instruction for four hours a day (Federkeil 1997, 90; Daly 2000, 81; Henz 2008, 1456; Dustmann and Schönberg 2012). Until very recently, day care for children under the age of three or of school age was in short supply[3] (Federkeil 1997, 90), which means that the cohort under examination was unable to benefit from developments of the last few years.

Fertility rates in Germany have been below replacement rate since the end of the "Golden Age of Marriage" in the 1960s (Dorbritz 2008, 562; Federkeil 1997, 82). A polarisation between childless women and women who have opted to have more than one child can be observed. Women seem to choose between these two lifestyles as compatibility between family life and employment is low (Dorbritz 2008, 560). The strong impact of education on fertility – particularly on the timing of childbirth, but also on childlessness or ultimate fertility – has attracted considerable attention in light of the low fertility rates in western Germany. Research on this topic has generally shown that women tend to postpone having children until after graduation (e.g. Blossfeld and Huinink 1991; Kreyenfeld and Konietzka 2008; Kreyenfeld 2010). While highly educated women (for whom the opportunity costs

[2] Parental leave with job protection was expanded from two to six months in 1979. This protected period was increased to 10 months in 1986, to 18 months in 1990, and to 36 months in 1992 (Dustmann and Schönberg 2012).

[3] The school hours in western Germany are normally in the morning, and only occasionally in the afternoon. Moreover, the start and the end of the school day varies during the week.

of having children are especially high) are more likely to remain childless than less well educated women, highly educated women who ultimately enter motherhood (despite the opportunity costs) tend to have a second child (bifurcation). This pattern is partly attributable to the self-selection of particularly family-prone women into motherhood (Kreyenfeld 2002).

3 A brief argument: why the field is of relevance

The reasons for including the educational field in the analysis of the association between education and fertility are discussed in detail by Hoem et al. (2006a). Here, I highlight the main arguments, and relate them to the western German context. A close link between education and labour market opportunities is assumed. As described above, this link is a particular characteristic of many occupations in western Germany. Educational fields differ in terms of the degree to which the labour market opportunities associated with those fields make reconciling family and career easier or more difficult: flexible working hours and part-time work and high job security are assumed to have a positive effect on compatibility. In western Germany, high compatibility is expected in fields with a high proportion of women, for reasons of both self-selection and a self-reinforcing dynamic: it is assumed that women choose fields with high compatibility of family and employment; and that, at the same time, a high proportion of women in a field will enforce a higher level of compatibility. Educational fields vary with regard to skill depreciation and occupational specificity. Skill depreciation refers to the loss of knowledge due to a temporary break, such as parental leave (Martín-García and Baizán 2006). This risk might be particularly high in technical fields when important developments are missed during a break (Hoem et al. 2006a). Occupational specificity refers to the fact that some educational fields are more likely to lead to a certain occupation than others (Oppermann 2014). Despite the close link between education and occupation in western Germany, fields such as the arts, humanities, or social sciences do not normally prepare people for specific occupations, unlike, for instance, medicine or law.

The above-mentioned characteristics of educational fields are assumed to have an impact on the individual's choice of field. Preferences regarding future lifestyle, particularly in terms of work content and family life, as well as the anticipation of working conditions and compatibility of employment and parenthood, are of relevance for this choice. Especially for women educated in care-related fields, such as teaching and health care, it is assumed that preferences and personality traits simultaneously have an impact on the choice of educational field and fertility behaviour (ibid.). Indeed, this association seems to be independent from country context, as low levels of childlessness have been found repeatedly among women educated in care-related fields across different countries. Thus, this pattern is likely to be observed in western Germany as well. Socialisation is also assumed to play a role in the association between educational field and fertility. The selection of an educational field affects the social environment during the years spent in education and later in adult life, and this in turn shapes an individual's preferences with regard to childbearing (Martín-García and Baizán 2006; Van Bavel 2010).

4 Hypotheses

Against the background of the theoretical considerations and the western German context, I expect to find the following:

Given the strong association between educational level and fertility that has been repeatedly shown, I expect to find that the level of education is strongly associated with childlessness. In light of the close link between educational qualifications and occupational opportunities in western Germany, I also expect to observe that the field of education is of relevance for childlessness, but to a lesser extent than the level of education.

For western Germany, I expect women who choose motherhood and are educated in fields with high levels of childlessness to be particularly family-prone. Therefore, I expect to find that mothers in fields with high levels of childlessness have similarly high or even higher numbers of children than mothers in fields with lower levels of childlessness (bifurcation).

Very much in line with findings for other countries, I expect to observe that women educated in care-related fields (teaching and health care) in western Germany have low levels of childlessness, as this association tends to be linked to individual preferences and personality traits, rather than to country context.

In addition, I expect to find that women educated in fields with a high risk of skill depreciation (technology) or with uncertain occupational prospects (humanities, social sciences), as well as in fields with long educational enrolment, have high levels of childlessness.

5 Data and methods

The data source for the present analysis is the 2008 German Microcensus. The Microcensus consists of one per cent of households in Germany.[4] Respondents are not normally asked about children, and one can only infer the existence of children from the household composition. In the wave conducted in 2008, female respondents aged 15–75 were asked to respond (voluntarily) to questions about whether they had given birth to a child, and their number of children. The German

[4] While the previous studies on Sweden, Austria, and Greece used register or census data – and, therefore, information on the whole cohort of women born between 1955 and 1959 – this type of data is not available for Germany. The census carried out in 2011 does not include the information required for this analysis.

Microcensus includes information on each respondent's highest level of education, as well as on his or her educational field; identified through the use of approximately 90 categories. The aim of the present analysis is to provide figures that are comparable to those reported in previous findings. The studies by Hoem et al. (2006a and 2006b) were the first to use such detailed educational categories. The approach to data management Hoem et al. applied to the Swedish data is used as a guide for data management here. Information on the ISCED (International Standard Classification of Education) level of the highest educational degree and on the field of education is used to produce categories that are as similar as possible to those used by Hoem et al. (2006a and 2006b).

Figure 1 shows how the German educational system fits into the ISCED framework, and how the ISCED levels were combined to match the levels used in the analysis by Hoem et al. 2006a and 2006b.[5] For the present analysis, 50 categories of educational attainment are used. The analysis is conducted for women born between 1955 and 1959; i.e. for the cohort examined in the studies on Sweden, Austria, and Greece. The sample is restricted to women living in western Germany in the survey year of 2008. Women in eastern and western Germany differ with regard to their fertility behaviour (Kreyenfeld 2004; Henz 2008; Dorbritz 2008). Thus, ideally, the sample would have been restricted by residence prior to German reunification in 1990.

Unfortunately, however, the German Microcensus does not include information that allows us to identify a respondent's place of residence prior to 1990. Using the current residence is the next-best option; and this approach has been applied in previous studies of Germany (e.g. Wirth 2007; Huinink et al. 2012). The analysis sample consists of 19,879 women. As can be seen in Table A.1 in the appendix, group sizes of educational lines vary, and the results for small groups have to be interpreted with caution. The weights provided by the Microcensus were applied to ensure that the figures presented here are of the highest possible quality. The analysis mainly consists of descriptive and graphical methods (scatterplots). The relationship between educational level and educational field and fertility – i.e. childlessness and ultimate fertility – is explored using two-way analyses of variance.[6]

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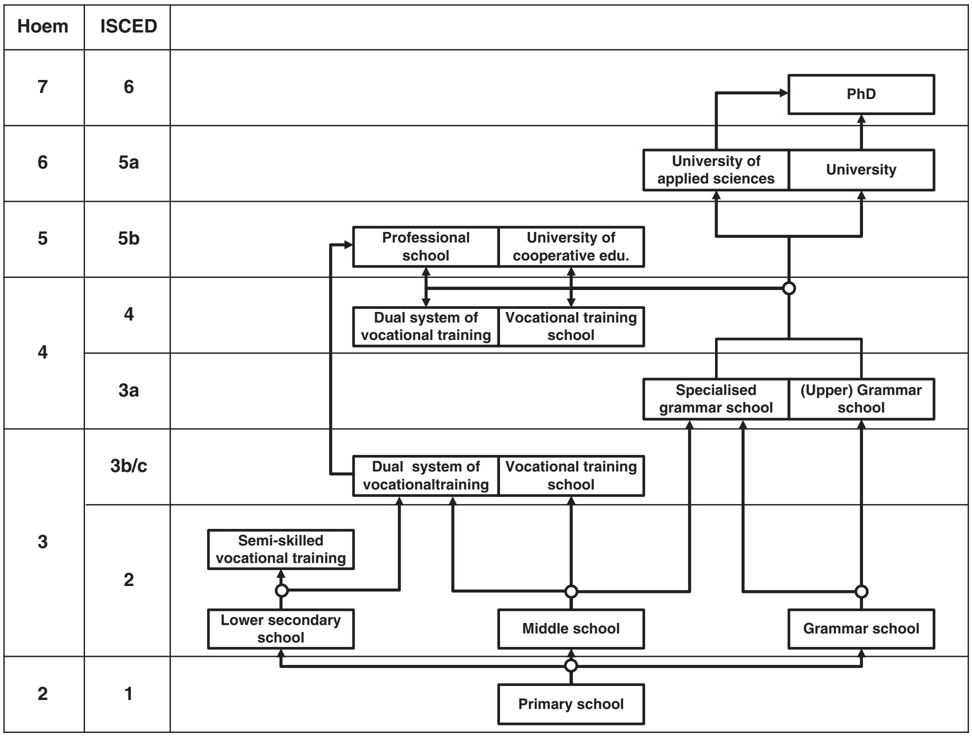
[5] Due to the structure of the German educational system, some groups are not completely identical. For example, teachers in Germany have a university degree (level 6), while some teachers (such as preschool teachers) in Sweden have educational level 5. Also, the information on the field of education does not allow for some of the distinctions made by Hoem et al. For instance, a midwife and a nurse cannot be differentiated, and are both classified as health care specialists. A detailed table on how the educational categories used in the present analysis correspond to those used in Hoem et al. (2006a) is available upon request, as is a Stata do-file on the conditioning of the Microcensus data on educational attainment.

[6] The two-way analyses of variance are conducted with six categories of educational level and eight categories of educational fields. The results are available upon request.

Figure 1:
German educational system



Source: Own diagram.

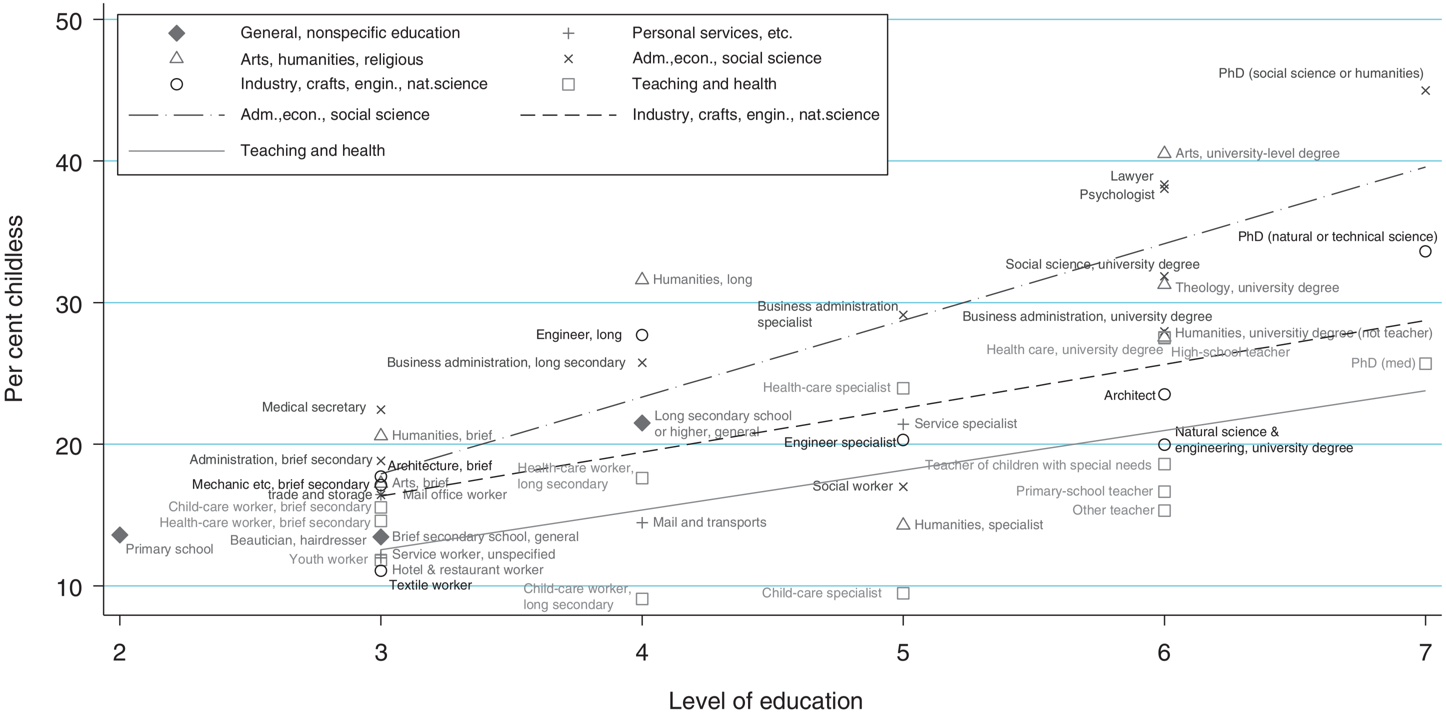
6 Results

The following figures and discussions are mainly based on Table A.1 in the appendix.

6.1 Childlessness

As was mentioned above, the level of childlessness is high in western Germany, varying from nine per cent among child care workers to 45 per cent among women with a PhD in the social sciences or the humanities. The overall share of childlessness in the sample is 17.8 per cent. Figure 2 shows the main findings on the relationship between educational level, educational field, and childlessness

Figure 2:
Per cent permanently childless, by education group; western German women born in 1955–59



Source: Research Data Centre of the Federal Statistical Office and the statistical offices of the *Länder*, 2008 German Microcensus, own calculations.

among western German women born between 1955 and 1959.[7] Figure 2 clearly shows an association between the field of education and childlessness. It also shows an association between the educational level and childlessness; the trend lines are relatively steep. The margin between the groups with the highest and the lowest rates of childlessness at each educational level increases with a rising level of education. Women educated in teaching and health care are the group with the lowest rates of childlessness at each educational level; while women educated in administration, economics, or the social sciences are the groups with the highest levels of childlessness. Social workers seem to be an exception within this group: their low levels of childlessness are more closely aligned with the group of women educated in teaching and health care. The results for women educated in the arts or the humanities do not show a clear pattern. The rate of childlessness for women with a PhD in medicine is around 26 per cent, while the corresponding figure for women with a PhD in the natural or the technical sciences is approximately 34 per cent. Women with a PhD in the social sciences or the humanities are the group with the highest level of childlessness within the analysis sample.[8] A two-way analysis of variance shows that the level of education accounts for more of the variation in childlessness than the field of education. Table A.2 in the appendix shows the association between educational level and childlessness in the analysis sample.

6.1.1 Childlessness and the mean age at completion of education

It is very common in western Germany to postpone the birth of a first child until after graduation. Nevertheless, Figure 3 also shows an association with the field of education. Again, women educated in teaching and health care are among those with the lowest levels of childlessness. While the mean age at completion for women educated as teachers of children with special needs or as psychologists is about the same (30.5 and 30.7, respectively), their rates of childlessness differ considerably. While special needs teachers have a childlessness rate of about 19 per cent, psychologists have a childlessness rate of 38 per cent. Therefore, a higher age

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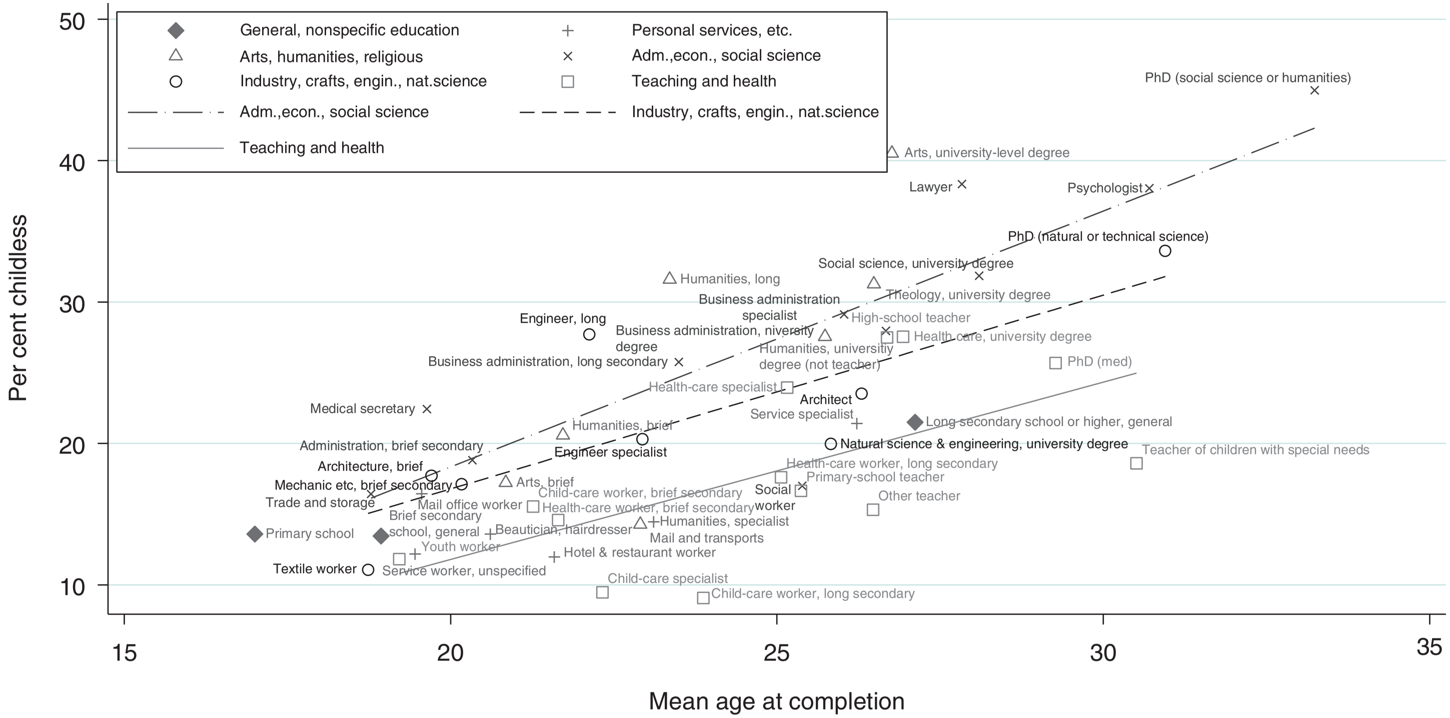
[7] In order to make the comparison easier, the layout of Figure 2 resembles the layouts of Hoem et al. (2006a and 2006b) through the use of similar markers. Coloured figures are available upon request. In Figure 2, all of the markers are labelled; while in some of the following graphs, only selected markers are labelled.

[8] In order to examine whether the relationship between educational level, educational field, and childlessness is persistent over time, the two neighbouring cohorts (1950 to 1954 and 1960 to 1964) are examined. The results of this analysis show that the overall level of childlessness has risen from cohort to cohort: 16.3 per cent of the women born between 1950 and 1954, 17.8 per cent of those born between 1955 and 1959, and around 20 per cent of those born between 1960 and 1964 remained childless. Educational level and childlessness are strongly related in each cohort. The pattern of the association between educational attainment (level and field) and childlessness is remarkably similar between the 1955 to 1959 cohort and the 1960 to 1964 cohort. Only the level of childlessness is higher in the latter cohort.

Figure 3:
Per cent permanently childless, by mean age at completion of education; western German women born in 1955–59



Source: Research Data Centre of the Federal Statistical Office and the statistical offices of the *Länder*, 2008 German Microcensus, own calculations.

at completion of education does not necessarily lead to higher levels of childlessness in western Germany. In some educational fields, it might be easier for women to combine childbearing with educational enrolment than it is in others. Some of the women educated as teachers for children with special needs might have had their first child prior to graduation, whereas women training to become a psychologist may have found it more difficult to have a child before completing their education.[9]

6.1.2 Childlessness in eastern Germany

During the years prior to reunification, the patterns of fertility behaviour developed quite differently in East and West Germany. On average, women in the German Democratic Republic (GDR) had their children at an earlier age and were more likely to be unmarried at the time of the first birth than women in West Germany. The overall level of childlessness was also lower in East than in West Germany (Kreyenfeld 2004; Dorbritz 2008).

These fertility trends in the GDR are often explained by the pronatalist policy measures introduced from the 1970s onwards, which provided child allowance and maternity leave. Having a child improved the chances of getting a home, while day care was available and affordable (Dorbritz 2008, 563). Under the political regime of the GDR, women were expected to participate in the labour market as well as to become mothers (Kreyenfeld 2004; Henz 2008). Thus, the institutional settings in the two parts of Germany were very different during the fertile years of the cohort under examination. As Dobritz put it, the choice to have children was easier in the GDR because of the combination of limited life choices and a higher level of social security (Dorbritz 2008, 563). I therefore expect to find that the association between educational level, educational field, and childlessness is less pronounced in eastern than in western Germany. However, like for western Germany, I expect to observe that eastern German women educated in care-related fields (teaching and health care) have especially low levels of childlessness.

The number of cases in the 2008 Microcensus for eastern German women born between 1955 and 1959 are too small to allow for a comparison of the full range of educational lines. Consequently, Table A.3 in the appendix provides a comparison of childlessness levels in eastern and western Germany for those educational lines for which data on at least 50 women in eastern Germany are available.

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[9] While the Microcensus contains information on the year in which the highest educational degree was received, it does not include information on the age at or the year of the birth of the first child. Given the German educational system described above, and the strong tendency of women to postpone childbirth until after graduation, I would not expect to find that many women had their first child prior to graduation in western Germany. However, this assumption cannot be examined using these data. It cannot be ruled out that educational lines differ with regard to compatibility with having children while in educational enrolment, as findings from Norway and Sweden imply (Lappegård Rønsen 2005; Hoem et al. 2006a).

The overall rate of childlessness is 7.4 per cent in eastern Germany; and no real association between the level of education and childlessness can be detected. The rate of childlessness is about average for each educational level. Higher childlessness rates can be observed among women who completed primary school only or who hold a PhD; but the sample sizes for both groups are very small (37 and 29, respectively).

In both eastern and western Germany, below-average childlessness rates are observed among women educated in teaching or child care. Childlessness is low among women educated in health care only among those with a low educational level in western Germany, while no clear pattern can be seen in eastern Germany. Women educated in personal services (e.g. hotel or restaurant workers, beauticians, or hairdressers – all educational level 3) have below-average childlessness rates in both parts of Germany. Unlike in western Germany, childlessness among women educated in administration or social sciences is not clearly above-average in eastern Germany. It may be assumed that the high levels of childlessness found among western German women are caused by the low degree of occupational specificity of these educational lines, and the insecurities that derive from this. Apparently, these insecurities were minimised in East Germany.

6.1.3 The findings in an international perspective

The findings of the present analysis add to a set of comparable studies on Sweden, Austria, and Greece (Hoem, et al. 2006; Neyer and Hoem 2008; Bagavos 2010). All of these countries are industrialised, but they differ in terms of their welfare states and family policy regimes. Sweden is known for its social democratic welfare state, generous family policies, and strong emphasis on gender equality (Gauthier 2002). Greece is among the group of countries with a southern European family policy framework, which is characterised by low benefit levels and a range of private and public incentive schemes (ibid.). The geographical neighbours western Germany and Austria are known for their conservative family policies oriented towards a traditional division of labour between men and women (ibid.). The two countries also have quite similar educational systems, especially in terms of the early tracking of students and the "dual system of vocational training" (Schneider 2008; Neyer and Hoem 2008). The findings for western Germany should therefore be more similar to those for Austria than for Sweden or Greece.

However, there are some important differences between western Germany and Austria. Whereas western Germany is more urbanised, the agricultural sector is more important in Austria than in western Germany (United Nations 2013; STATISTICS AUSTRIA 2013). Tourism and related occupations also play a greater role in Austria than in Germany (STATISTICS AUSTRIA 2013). On the other hand, the degree of gender segregation among educational fields is higher in Germany than in Austria (Charles and Bradley 2009).

In both Sweden and Austria, the overall childlessness rate among women born between 1955 and 1959 is about 15.7 per cent. Across the four countries, the childlessness rate is lowest among this cohort in Greece, at 12.3 per cent; while the childlessness rate is highest in western Germany, at 17.8 per cent.

A strong correlation between educational level and childlessness is observed in western Germany, Austria, and Greece. In Austria and western Germany, the level of education accounts for more variance in childlessness than the field of education. In Greece, both are equally important; while in Sweden, the field is even more important than the level.

When comparing the patterns of childlessness across the four countries, the similarities are more striking than the differences. A correlation between the field of education and childlessness can be seen in all four countries, with low rates of childlessness in the fields of teaching and child care. High rates of childlessness are found among women educated in administration and the social sciences. Women educated in health care have low rates of childlessness in Sweden and western Germany, but high rates in Austria and Greece. A clear pattern of high childlessness among women educated in engineering and the natural sciences can be seen in Greece, but not in Sweden, Austria, or western Germany.

Furthermore, I expected to find that levels of childlessness are high among western German women educated in the arts, the humanities, and religion. However, the results do not show a clear pattern. Childlessness among this group varies between 14 per cent (for those specialising in the humanities) to 41 per cent (for those with a university degree in the arts). The latter result is in line with findings from Sweden, but the generally high childlessness rate among this group in Sweden as well as in Austria is not found in western Germany. Uncertain career prospects are assumed to be behind the high rates of childlessness in this group in Sweden. In western Germany, dropping out of the labour market and becoming a mother and a housewife might have been an attractive option for women in these fields. In other words, these women might have opted for the latter choice to avoid the difficulties associated with the former choice. In all of the countries analysed, women educated in the fields of administration, economics, or the social sciences have medium to high rates of childlessness.

Childlessness among women educated for a service job in a hotel or restaurant is low in Austria and western Germany, but is high in Sweden. While the finding for Sweden is explained by working conditions, such as unusual working hours that are difficult to combine with family life; these working conditions might have prompted German women to leave the labour market to become mothers and housewives. It has also been pointed out that in Austria, women educated for jobs in hotels or restaurants might be working in family businesses offering enough flexibility to combine parenthood and employment (Neyer and Hoem 2008). Among women educated in agriculture, the childlessness rate is low in Austria, while Sweden and western Germany are more or less on a par. As was mentioned above, both sectors are more important in Austria than in western Germany, and therefore contribute to the overall level of childlessness to a greater extent.

The relationship between educational attainment and childlessness observed in western Germany is most similar to the relationship observed in Sweden, although in western Germany the impact of the level of education is greater and the overall level of childlessness is higher than in Sweden. Differences in the patterns of childlessness observed in Austria and in western Germany are probably mainly attributable to the larger roles played by tourism and agriculture in Austria. Greece is unique in many ways, but the high childlessness rate among women holding a PhD is very similar to that in western Germany.

6.2 Ultimate fertility

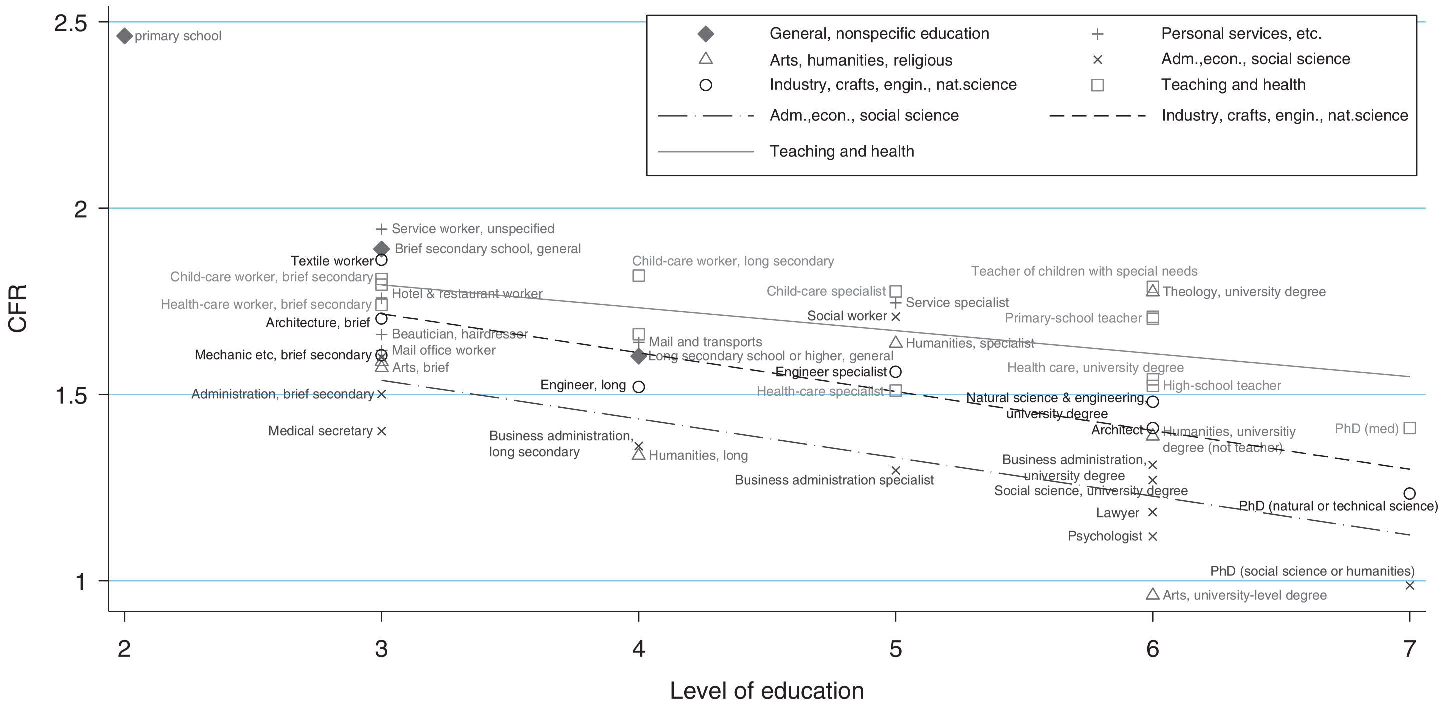
Figure 4 shows the relationship between educational level, educational field, and ultimate fertility for western German women born between 1955 and 1959.[10] The most striking feature of this relationship is that women with low educational levels (primary school, level 2) have high levels of ultimate fertility. On average, women educated only to primary school level have about 2.5 children; 71 per cent have two or more children, and among those who enter motherhood the average number of children is 2.9. Childlessness in this group is low (14 per cent), but not exceptionally so; many groups with higher levels of education have lower rates of childlessness. However, no other group has an ultimate fertility rate that is even close to that of this group. Education at this level includes little or no specific labour market qualifications. It might be the case that the low labour market potential of these women encouraged them to opt for a traditional division of labour, and to focus on housework and child care while their partner provided for the financial needs of the household as male breadwinners.

Figure 4 shows, as expected, that ultimate fertility decreases with an increasing level of education. It also shows an association with the field of education in the expected order, but this association seems to be less pronounced than it is for childlessness. Again, social workers are exceptions in their group, and are more comparable to teachers and health care workers. Although this is the group with the highest ultimate fertility; with the exception of educational level 2, ultimate fertility for the other educational lines is at the same level. The ultimate fertility levels of women in teaching and heath care do not deviate from general trends as much as expected, given the low levels of childlessness found for this group in western Germany. In Sweden, this group has the highest ultimate fertility at each level of education. The ultimate fertility levels of women in the arts and humanities do not display a clear pattern. Members of this group have relatively high levels of childlessness, but women educated in theology are among the women at educational level 6 with the highest ultimate fertility.

A two-way analysis of variance shows that educational level and educational field account equally for variation in ultimate fertility. When childlessness and ultimate fertility are compared, it becomes clear how strongly these two factors are

[10] The association between educational attainment and ultimate fertility does not change between the three cohorts: 1950 to 1954, 1955 to 1959, and 1960 to 1964.

Figure 4:
Ultimate fertility (CFR) by educational group; western German women born in 1955–59



Source: Research Data Centre of the Federal Statistical Office and the statistical offices of the *Länder*, 2008 German Microcensus, own calculation.

related. The first group is again women with primary school education only. These women are notable for their low rates of childlessness, and particularly for their exceptionally high levels of ultimate fertility. The second group consists of women educated in theology. Given their rather high rates of childlessness, their relatively high levels of ultimate fertility come as a surprise. This becomes even more obvious when comparing ultimate fertility levels and the number of children born to those women who become mothers.

The average number of children born to women educated in theology is 1.8, but the average number of children born to those who became mothers is 2.6 (while the childlessness rate is about 31 per cent). This result resembles the finding for Sweden of a bifurcation between women who are childless and women who go on to have a relatively large number of children after entering motherhood. Contrary to expectations, this is the only group among whom such a polarisation pattern is found. I had expected to find that a low compatibility of childbearing and rearing within an educational line would lead to high childlessness among women educated in these lines. I had also expected to observe that women who chose to become mothers despite this lack of flexibility are particularly family-prone (as Kreyenfeld (2002) puts it). This family proneness should have increased the probability of these women having a second child. The findings of the present analysis imply that family proneness and the choice of educational field are closely related.

7 Discussion and conclusion

The main finding of this analysis is that despite the strong association between educational level and childlessness in western Germany, the educational field is also of importance. The field and the level of education account equally for variation in ultimate fertility. The strong impact of the educational level on childlessness was expected, but the strength of the effect of the field is more pronounced than anticipated.

The present analysis shows that at all educational levels, women educated in teaching and child care have exceptionally low rates of childlessness in western Germany. Low rates of childlessness among these women have also been observed in Sweden, Austria, and Greece. These findings are in line with the assumption that, in this group, the choice of an educational field is an expression of preferences or even of personality traits that are independent of the institutional context. This assumption is further supported by similar findings from eastern Germany.

I had expected to find a high level of childlessness among graduates in industry crafts, engineering, and the natural sciences, due to the high risk of skill depreciation associated with breaks in employment in these fields. This cannot be confirmed, as childlessness among these graduates was found to be at a medium level, and this pattern was only observed in Greece, but not in Sweden or Austria. I had also expected to observe a high level of childlessness among western German women educated in the humanities or social sciences. While no clear pattern was found for the first group, a high rate of childlessness was found for the second group. This observation for women educated in the social sciences is consistent with the results for Sweden, Austria, and Greece. The findings for Sweden, Austria, and Greece are based on register or census data; while the findings for Germany are from a representative sample of one per cent of households in Germany. Despite the large sample size, these findings are less reliable than the results for the whole cohort, particularly for educational lines consisting of a small number of respondents.

As expected, I found that a higher mean age at completion of education is associated with higher rates of childlessness. Very interestingly, an association with the field is also observed: a higher age at completion does not necessarily lead to higher levels of childlessness in western Germany. One can only speculate about the possible causes for this finding, as the data do not allow for further examination. It is possible that it is easier in some educational fields than in others to have children while enrolled in education. It is also possible that women educated in fields such as teaching and health care (the field with the weakest association between mean age at completion and childlessness) 'catch up' with having children soon after graduation. If this is the case, differences in the school-to-work transition and aspects of job security may play an important role.

The associations between educational level, educational field, and ultimate fertility resemble those observed for childlessness. The number of children decreases as the level of education increases, but differences between fields are also observed. The number of children is highest among women educated in teaching or health care. However, this group does not stand out as prominently as might be expected due to the low levels of childlessness among its members.

The only educational line for which a bifurcation between childlessness and the number of children born to those women who do become mothers can be observed is theology (university degree). I had expected to find that women educated in fields with high rates of childlessness who opted for motherhood are very family-prone, and that this family proneness would have a positive impact on the probability of having further children. However, this was not confirmed in the present analysis. For western Germany, it has repeatedly been shown that women with high educational levels are less likely than less well educated women to enter motherhood. However, highly educated women who become mothers have a tendency to have more than one child (Blossfeld and Huinink 1991; Kreyenfeld 2002). This pattern is partly attributable to the previously discussed family proneness of these women (Kreyenfeld 2002). The findings of the present analysis imply that the educational field also plays a major role in the association between educational attainment and fertility behaviour. The choice of an educational field such as teaching or health care might be an expression of family proneness. Therefore, including the educational field in the analysis of the association between education and fertility should increase our understanding of this relationship.

The main finding of the present analysis is that there is an association between the field of educational attainment and fertility in western Germany. Across countries, similarities and differences in this pattern can be observed. The differences are attributable to variation in institutional settings, and match these settings. Given the differences in the institutional settings, the similarities between the countries are much more remarkable.

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References

Bagavos, C. 2010. Education and childlessness: The relationship between educational field, educational level, employment and childlessness among Greek women born in 1955–1959. *Vienna Yearbook of Population Research* 8: 51–75. DOI: 10.1553/populationyearbook2010s51.

Begall, K. and M. C. Mills 2012. The influence of educational field, occupation, and occupational sex segregation on fertility in the Netherlands. *European Sociological Review*. DOI: 10.1093/esr/jcs051.

Blossfeld, H. and J. Huinink 1991. Human capital investments or norms of role transition? how women's schooling and career affect the process of family formation. *American Journal of Sociology* 97(1): 143–68.

Blossfeld, H. and G. Rohwer 1995. West Germany. In *The new role of women. Family formation in modern societies*, ed. H. Blossfeld, 56–76. Boulder: Westview Press.

BMBF 1997. Berufsbildungsbericht 1997. Berlin: Bundesministerium für Bildung und Forschung. http://www.bmbf.de/pub/bbb_97.pdf.

BMBF 2007. Berufsbilungsbericht 2007. Berlin: Bundesministerium für Bildung und Forschung. http://www.bmbf.de/pub/bbb_07.pdf.

Brewster, K. L. and R. R. Rindfuss 2000. Fertility and women's employment in industrialized nations. *Annual Review of Sociology* 26: 271–96. DOI: 10.1146/annurev.soc.26.1.271.

Buchmann, M. and M. Charles 1995. Organizational and institutional factors in the process of gender stratification: comparing social arrangements in six European countries. *International Journal of Sociology* 25(2): 66.

Charles, M. and K. Bradley 2009. Indulging our gendered selves? Sex segregation by field of study in 44 countries. *American Journal of Sociology* 114(4): 924–76.

Daly, M. 2000. *The gender division of welfare: the impact of the British and German welfare states*. Cambridge: Cambridge University Press.

Dorbritz, J. 2008. Germany: family diversity with low actual and desired fertility. *Demographic Research* 19: 557–97.

Dustmann, C. and U. Schönberg 2012. Expansions in maternity leave coverage and children's long-term outcomes. *American Economic Journal: Applied Economics* 4(3): 190–224. DOI: 10.1257/app.4.3.190.

Federkeil, G. 1997. The federal republic of Germany: polarization of family structure. In *Family life and family policies in Europe, Volume 1, Structures and trends in the 1980s*, eds F.X. Kaufmann, A. Kuijsten, H.-J. Schulze and K. P. Strohmeier, 77–113. Oxford, UK: Clarendon Press.

Gauthier, A. H. 2002. Family policies in industrialized countries: is there convergence? *Population (English Edition)* Vol. 57 (3): 447–74. DOI: 10.3917/pope.203.0447.

Gauthier, A. H. 2007. The impact of family policies on fertility in industrialized countries: a review of the literature. *Population Research and Policy Review* 26(3): 323–46. DOI: http://www.springerlink.com/link.asp?id=102983.

Henz, U. 2008. Gender roles and values of children: childless couples in East and West Germany. *Demographic Research* 19: 1451–500. DOI: 10.4054/DemRes.2008.19.39.

Hoem, J. M., G. Neyer, and G. Andersson 2006a. Education and childlessness – the relationship between educational field, educational level, and childlessness among Swedish women born in 1955–59. *Demographic Research* 14: 331–80.

Hoem, J. M., G. Neyer, and G. Andersson 2006b. Educational attainment and ultimate fertility among Swedish women born in 1955–59. *Demographic Research* 14: 381–403.

Huinink, J., M. Kreyenfeld, and H. Trappe 2012. Familie und Partnerschaft in Ost-und Westdeutschland. Eine Bilanz. In *Familie Und Partnerschaft in Ost- Und Westdeutschland. Ähnlich Und Doch Immer Noch Anders*, eds J. Huinink, M. Kreyenfeld and H. Trappe, 9th ed., 9–28. Journal of Family Research – Sonderheft. Opladen, Berlin, Toronto: Verlag Barbara Budrich.

Jacob, M. and N. Tieben 2009. Social selectivity of track mobility in secondary schools. *European Societies* 11(5): 747–73. DOI: 10.1080/14616690802588066.

Kerckhoff, A. C. 2001. Education and social stratification processes in comparative perspective. *Sociology of Education* 74(January): 3–18. DOI: 10.2307/2673250.

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? *Demographic Research* 7(July): 15–48. DOI: 10.4054/DemRes.2002.7.2.

Kreyenfeld, M. 2004. Fertility decisions in the FRG and GDR: an analysis with data from the German fertility and family survey. *Demographic Research* Special 3(April): 275–318. DOI: 10.4054/DemRes.2004.S3.11.

Kreyenfeld, M. 2010. Uncertainties in female employment careers and the postponement of parenthood in Germany. *European Sociological Review* 26(3): 351–66. DOI: 10.1093/esr/jcp026.

Kreyenfeld, M. and D. Konietzka 2008. Education and fertility in Germany. In *Demographic change in Germany: the economic and fiscal consequences*, eds I. Hamm, H. Seitz and M. Werding, 165–87. Berlin: Springer.

Lappegård, T. and M. Rønsen 2005. The multifaceted impact of education on entry into motherhood. *European Journal of Population-Revue Europeenne De Demographie* 21(1): 31–49. DOI: 10.1007/s10680-004-6756-9.

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.

Michelmore, K. and K. Musick 2014. Fertility patterns of college graduates by field of study, US Women Born 1960–79. *Population Studies* 68(3): 359–74. DOI: 10.1080/00324728.2013.847971.

Neyer, G. and J. M. Hoem 2008. Education and permanent childlessness: Austria vs. Sweden; a Research Note. In *Demographic challenges for the 21st century: a state of the art in demography; conference organized as a tribute to the continuing endeavours of Prof. Dr. Em. Ron Lesthaeghe in the Field of Demography.*, eds Surkyn, J., Deboosere, P. and Van Bavel, J. Brussels: VUBPRESS.

Oppermann, A. 2014. Exploring the relationship between educational field and transition to parenthood—an analysis of women and men in western Germany. *European Sociological Review* 30(6): 728–49. DOI: 10.1093/esr/jcu070.

Pfau-Effinger, B. 2012. Women's employment in the institutional and cultural context. *The International Journal of Sociology and Social Policy* 32(9/10): 530–43. DOI: 10.1108/01443331211257634.

Pfau-Effinger, B. and M. Smidt 2011. Differences in women's employment patterns and family policies: Eastern and Western Germany. *Community, Work & Family* 14(2): 217–32. DOI: 10.1080/13668803.2011.571401.

Rønsen, M. and K. Skrede 2010. Can public policies sustain fertility in the nordic countries? Lessons from the past and questions for the future. *Demographic Research* 22: 321–46.

Schneider, S. L. 2008. Applying the ISCED-97 to the German Educational Qualifications. In *The international standard classification of education: an evaluation of content and criterion validity for 15 European countries*, ed. S. L. Schneider, 76–102. Mannheim: Mannheimer Zentrum für Europäische Sozialfoschung.

Shavit, Y. and W. Müller 2000. Vocational secondary education. *European Societies* 2(1): 29–50. DOI: 10.1080/146166900360710.

Sobotka, T. 2008. The rising importance of migrants for childbearing in Europe. *Demographic Research* 19: 225–47.

STATISTICS AUSTRIA 2013. *Statistisches Jahrbuch Österreichs*. http://www.statistik.at/web_en/publications_services/statistisches_jahrbuch/index.html.

Steiner, V. and K. Wrohlich 2006. Familienpolitische Reformen und ihre Wirkungen auf die Erwerbsbeteiligung von Eltern. *Zeitschrift Für Sozialreform* 52(4): 421–38.

United Nations, Department of Economic and Social Affairs, ed. 2013. World urbanization prospects, the 2011 revision: urban population, 1950–2050. http://esa.un.org/unup/CD-ROM/WUP2011-F03-Urban_Population.xls.

Van Bavel, J. 2010. Choice of study discipline and the postponement of motherhood in Europe: the impact of expected earnings, gender composition, and family attitudes. *Demography* 47(2): 439–58.

Wirth, H. 2007. Kinderlosigkeit von hoch qualifizierten Frauen und Männern im Paarkontext – Eine Folge von Bildungshomogamie? In *Ein Leben ohne Kinder: Kinderlosigkeit in Deutschland*, eds D. Konietzka and M. Kreyenfeld, 167–97. Wiesbaden: VS Verlag für Sozialwissenschaften.

Wirth, H. and K. Dümmler 2004. Zunehmende Tendenz zu späteren Geburt und Kinderlosigkeit bei Akademikerinnen. Eine Kohortenanalyse auf der Basis von Mikrozensusdaten. *Informationsdienst Soziale Indikatoren (ISI)* 32: 1–6.

Appendix tables are on the following pages.

Appendix

Table A.1:
Basic childbearing statistics for western German women born in 1955–59

	Edu level	All	% Childless	% With 2 or more children	Mean number of children	% Never married
General education, non-specific						
Primary school	2	770	13.6	70.8	2.46	11.0
Brief secondary school, general	3	3,105	13.4	63.1	1.89	7.7
Long secondary school or higher, general	4	336	21.5	52.3	1.60	13.7
Arts, humanities, religious						
Theology, university degree	6	38	31.3	56.6	1.77	15.4
Arts, brief	3	276	17.2	53.4	1.57	11.6
Arts, university-level degree	6	138	40.5	30.7	0.96	26.2
Humanities, brief	3	56	20.6	55.6	1.59	17.4
Humanities, long	4	48	31.6	47.5	1.34	11.2
Humanities, specialist	5	24	14.3	57.9	1.64	12.5
Humanities, university degree (not teacher)	6	177	27.6	47.4	1.39	17.9
Personal services, etc.						
Hotel and restaurant worker	3	232	12.0	61.9	1.76	6.9
Service worker, unspecified	3	426	12.2	70.0	1.94	5.6
Service specialist	5	109	21.4	60.0	1.75	9.7
Beautician, hairdresser	3	588	13.6	60.0	1.66	4.7
Mail office worker	3	112	16.4	55.7	1.62	10.8
Mail and transport	4	19	14.5	49.4	1.64	10.2
Administration, economics, social sciences						
Administration, brief secondary	3	2,583	18.8	53.9	1.50	8.0
Business administration, long secondary	3	431	25.8	46.5	1.36	15.5
Business administration specialist	4	179	29.1	42.8	1.30	14.1
Business administration, university degree	5	273	28.0	45.2	1.31	14.6
Medical secretary	6	730	22.4	47.2	1.40	8.4
Trade and storage	3	2,523	16.4	55.0	1.60	7.1
Social worker	5	54	17.0	63.7	1.71	7.0
Psychologist	6	44	28.0	40.4	1.12	29.1
Lawyer	6	100	38.3	41.4	1.18	15.3
Social science, university degree	6	457	31.9	44.3	1.27	23.0

Continued

Table A.1: Continued

	Edu level	All	Mean number of children (never married)	Mean number of children (ever married)	Mean number of children (mothers)	Mean age at completion of education
General education, non-specific						
Primary school	2	770	0.52	2.72	2.92	17.00
Brief secondary school, general	3	3,105	0.51	2.01	2.22	18.94
Long secondary school or higher, general	4	336	0.20	1.88	2.13	27.12
Art, humanities, religious						
Theology, university degree	6	38	0.00	2.12	2.64	26.48
Arts, brief	3	276	0.59	1.71	1.92	20.84
Arts, university-level degree	6	138	0.15	1.29	1.67	26.76
Humanities, brief	3	56	0.52	1.77	2.01	21.72
Humanities, long	4	48	0.17	1.49	1.97	23.36
Humanities, specialist	5	24	0.52	1.83	1.96	22.91
Humanities, university degree (not teacher)	6	177	0.36	1.65	1.97	25.74
Personal services, etc.						
Hotel and restaurant worker	3	232	0.26	1.88	2.02	21.59
Service worker, unspecified	3	426	0.39	2.04	2.23	19.46
Service specialist	5	109	0.00	1.95	2.26	26.22
Beautician, hairdresser	3	588	0.50	1.72	1.93	20.61
Mail office worker	3	112	0.68*	1.73*	1.95	19.56
Mail and transport	4	19			1.94	23.11
Administration, economics, social sciences						
Administration, brief secondary	3	2,583	0.26	1.62	1.87	20.33
Business administration, long secondary	3	431	0.23	1.57	1.88	23.50
Business administration specialist	4	179	0.23	1.50	1.88	26.03
Business administration, university degree	5	273	0.13	1.54	1.86	26.67
Medical secretary	6	730	0.18	1.52	1.85	19.64
Trade and storage	3	2,523	0.32	1.70	1.93	18.78
Social worker	5	54	0.00	1.85	2.08	25.39
Psychologist	6	44	0.42	1.43	1.81	30.71
Lawyer	6	100	0.13	1.39	1.98	27.83
Social science, university degree	6	457	0.40	1.56	1.92	28.10

*Due to a small number of cases, the lines of mail office worker and mail and transport had to be combined.

Continued

Table A.1: Continued

	Edu level	All	% Childless	% With 2 or more children	Mean number of children	% Never married
Industry, crafts, engineering, natural sciences						
Mechanic, etc., brief secondary	3	406	17.1	55.0	1.61	7.0
Engineer, long	4	68	27.7	58.8	1.52	15.1
Engineer specialist	5	85	20.3	58.0	1.56	9.1
Textile worker	3	496	11.1	64.6	1.86	6.1
Natural sciences and engineering, university degree	6	312	20.0	54.8	1.48	10.6
Architecture, brief	3	66	17.7	65.8	1.70	9.6
Architect	6	65	23.5	50.8	1.41	13.0
Agriculture						
Farm worker, brief secondary	3	98	23.0	59.1	1.75	10.6
Agronomist, veterinarian	6	40	30.0	51.8	1.40	23.0
Health professions						
Health care worker, brief secondary	3	1,889	14.6	62.4	1.74	8.1
Health care worker, long secondary	4	278	17.6	61.4	1.66	10.2
Health care specialist	5	410	23.9	56.3	1.51	16.9
Health care, university degree	6	192	27.5	52.5	1.54	14.6
Child care worker, brief secondary	3	313	15.5	66.0	1.81	7.7
Child care worker, long secondary	4	91	9.1	62.5	1.82	12.0
Child care specialist	5	141	9.5	64.2	1.78	7.4
PhD (medicine)	7	77	25.7	51.3	1.41	22.1
Teaching						
Youth worker	3	165	11.8	64.7	1.80	7.9
Primary school teacher	6	208	16.7	63.2	1.70	10.3
Teacher of children with special needs	6	71	18.6	65.4	1.79	15.0
High school teacher	6	197	27.5	55.3	1.52	18.9
Other teacher	6	301	15.3	60.7	1.71	9.2
Non-medical research						
PhD (social sciences or humanities)	7	45	45.0	38.3	0.99	25.8
PhD (natural or technical sciences)	7	37	33.6	46.7	1.23	18.2
Total		19,879	17.8	57.6	1.67	9.64

Table A.1: Continued

	Edu level	All	Mean number of children (never married)	Mean number of children (ever married)	Mean number of children (mothers)	Mean age at completion of education
Industry, crafts, engineering, natural sciences						
Mechanic, etc., brief secondary	3	406	0.40	1.70	1.96	20.17
Engineer, long	4	68	0.26	1.77	2.16	22.13
Engineer specialist	5	85	0.09	1.75	2.00	22.94
Textile worker	3	496	0.66	1.94	2.10	18.74
Natural sciences and engineering, university degree	6	312	0.26	1.66	1.90	25.83
Architecture, brief	3	66	0.55	1.82	2.10	19.71
Architect	6	65	0.00	1.66	1.88	26.30
Agriculture						
Farm worker, brief secondary	3	98	0.37	1.92	2.29	21.55
Agronomist, veterinarian	6	40	0.25	1.76	2.02	26.29
Health professions						
Health care worker, brief secondary	3	1,889	0.40	1.87	2.06	21.65
Health care worker, long secondary	4	278	0.49	1.81	2.04	25.06
Health care specialist	5	410	0.14	1.86	2.05	25.16
Health care, university degree	6	192	0.26	1.80	2.20	26.93
Child care worker, brief secondary	3	313	0.20	1.94	2.16	21.26
Child care worker, long secondary	4	91	0.46	2.01	2.02	23.87
Child care specialist	5	141	0.35	1.89	1.98	22.33
PhD (medicine)	7	77	0.20	1.84	1.98	29.27
Teaching						
Youth worker	3	165	0.85	1.88	2.05	19.21
Primary school teacher	6	208	0.34	1.88	2.07	25.37
Teacher of children with special needs	6	71	0.46	2.05	2.22	30.51
High school teacher	6	197	0.28	1.85	2.16	26.69
Other teacher	6	301	0.24	1.89	2.06	26.47
Non-medical research						
PhD (social sciences or humanities)	7	45	0.00	1.36	1.82	33.24
PhD (natural or technical sciences)	7	37	0.00	1.56	1.94	30.95
Total		19,879	0.34	1.82	2.06	21.90

Source: Research Data Centre of the Federal Statistical Office and the statistical offices of the *Länder*, 2008 German Microcensus, own calculations.

Table A.2:
Childlessness by level of education, western German women born in 1955–59

Educational level	% Childless	*N* (Childless)
2	13.6	770
3	15.8	14,064
4	21.8	1,271
5	21.7	1,002
6	26.1	2,613
7	32.9	159

Source: Research Data Centre of the Federal Statistical Office and the statistical offices of the *Länder*, 2008 German Microcensus, own calculations.

Table A.3:
Educational attainment and childlessness in western and eastern Germany, women born in 1955–59

		Western Germany		Eastern Germany	
Field of education	**Level**	***N***	**% Childless**	***N***	**% Childless**
General education, non-specific					
Brief secondary school, general	3	3,105	13.4	176	9.0
Art, humanities, religion					
Arts, brief	3	276	17.2	66	10.3
Humanities, brief	3	56	20.6	50	14.3
Personal services etc.					
Hotel and restaurant worker	3	232	12.0	157	5.8
Service worker, unspecified	3	426	12.2	87	4.7
Beautician, hairdresser	3	588	13.6	58	3.6
Mail office worker	3	112	16.4	93	5.0
Administration, economics, social sciences					
Administration, brief secondary	3	2,583	18.8	402	6.5
Business administration specialist	5	179	29.1	123	6.0
Business administration, university	6	273	28.0	124	8.1
Medical secretary	3	730	22.4	143	5.8
Trade and storage	3	2,523	16.4	377	7.6
Social sciences, university degree	6	457	31.9	70	8.8

Continued

Table A.3: Continued

Field of education	Level	Western Germany		Eastern Germany	
		N	% Childless	*N*	% Childless
Industry, crafts, engineering, natural sciences					
Mechanic etc, brief secondary	3	406	17.1	434	8.3
Engineer specialist	5	85	20.3	74	7.2
Textile worker	3	496	11.1	325	6.5
Natural science & engineering, university	6	312	20.0	149	9.4
Agriculture					
Farm worker, brief secondary	3	98	23.0	174	6.1
Health professions					
Health care worker, brief secondary	3	1,889	14.6	187	8.1
Health care specialist	5	410	23.9	266	6.7
Health care, university degree	6	192	27.5	56	3.0
Child care specialist	5	141	9.5	179	6.3
Teaching					
Other teacher	6	301	15.3	78	1.3
Total		19,879	17.8	4,276	7.4

Source: Research Data Centre of the Federal Statistical Office and the statistical offices of the *Länder*, 2008 German Microcensus, own calculations.
Note: Selected educational lines with at least 50 observations in eastern Germany.

Table A.4:
Educational attainment and childlessness in western Germany, Sweden, Austria, and Greece, women born in 1955–59

		% Childless			
Field of education	**Level**	**W-Germany**	**Sweden**	**Austria**	**Greece**
General education, non-specific					
Primary school	2	13.6	14.7	13.0	10.0
Personal services, etc.					
Hotel & restaurant worker	3	12.0	22.4	11.7	20.0
Administration, economy, social sciences					
Administration, brief secondary	3	18.8	14.7	18.0	n.a.
Business administration, long secondary	4	25.8	16.5	22.0	14.4
Business administration specialist	5	29.1	21.1	24.0	n.a.
Social worker	5	17.0	16.5	24.0	18.7
Social science, university degree	6	31.9	22.1	37.0	15.1
PhD (social sciences)	7	45.0	31.9	n.a.	37.0
Industry, crafts, engineering, natural sciences					
Textile worker	3	11.1	13.9	9.0	n.a.
Engineer, long	4	27.7	18.4	15.0	15.3
Engineer specialist	5	20.3	17.0	27.0	n.a.
Natural science & engineering, university	6	20.0	20.2	27.0	22.8
PhD (natural sciences)	7	33.6	25.1	n.a.	28.0
Agriculture					
Farm worker	3	23.0	15.5	7.0	11.3
Agronomist	6	30.0	22.0	14.0	17.3
Health professions					
Health care worker, brief secondary	3	14.6	10.2	17.0	n.a.
Health care worker, long secondary	4	17.6	10.4	n.a.	15.3
Health care specialist	5	23.9	13.0	14.5	n.a.
PhD (medicine)	7	25.7	18.9	n.a.	32.0
Teaching					
Child care worker, brief secondary	3	15.5	8.6	n.a.	n.a.
Child care worker, long secondary	4	9.1	8.6	n.a.	14.9
Child care specialist	5	9.5	8.6	n.a.	n.a.
Primary school teacher	6	16.7	10.3	16.5	11.9
High school teacher	6	27.5	17.3	28.0	12.4
Total		17.8	15.7	15.7	12.3

Source: Research Data Centre of the Federal Statistical Office and the statistical offices of the *Länder*, 2008 German Microcensus, own calculations; (Hoem, Neyer, and Andersson 2006a; Neyer and Hoem 2008; Bagavos 2010), values that are not available in tables or mentioned in the paper were extracted from graphs.

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Fertility and education among British Asian women: a success story of social mobility?

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Abstract

High fertility among immigrant groups is often analysed as an expression of specific cultural factors and/or lower social status. I hypothesise that differences in educational attainment explain the fertility differentials across immigrant groups and generations in the UK. Building on previous work, and using household survey data and the Own-Child reverse-survival method, the paper presents for the first time total fertility and age-specific fertility estimates by broad categories of educational attainment for immigrant and second-generation British Pakistani, Bangladeshi, Indian, and Chinese women. I use these estimates to analyse how education influences childbearing across British Asian ethnic groups, and compare the fertility patterns of these groups to those of the whole UK population. High levels of educational attainment contribute substantially to the low overall fertility levels of Indian and Chinese women. Higher education also contributes to the lower fertility levels of the second-generation British Pakistani and Bangladeshi women relative to those of the immigrant generation. Some differences between groups remain after decomposing by educational level, which suggests that there are additional influencing factors. The results are discussed in the context of social theories on the *incorporation* of immigrants and minorities.

1 Introduction

In recent years, the body of research on childbearing among the daughters of immigrants in Europe has been growing (e.g. Mileski 2010; Scott and Stanfors 2011a, b; Dubuc 2012, 2016; Hamel and Pailhé 2015; Stichnoth and Yeter 2016; Kulu et al. 2017). Although many immigrants in Europe came from higher fertility regions, low levels of fertility are becoming increasingly common among immigrant

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women. In the UK, the reduction in fertility across successive cohorts of immigrant women has occurred in parallel to the fertility transition in their country of origin (Dubuc 2016). In Germany, Stichnoth and Yeter (2016) found a strong effect of the country-of-origin fertility rates on the fertility outcomes of immigrants, and a weakened country-of-ancestral origin effect on the fertility outcomes of the second generation.

Beyond the observed trends, the social processes that underlie the childbearing patterns of the daughters of immigrants remain poorly understood. Adding to an emerging literature that focuses on the descendants of immigrants (e.g. Dubuc 2012; Kulu and Gonzalez-Ferrer 2014; Kulu et al. 2017; Andersson et al. 2017), this paper contributes to bridging this gap by (i) producing novel fertility estimates decomposed by educational attainment, and (ii) analysing how education influences fertility among British Asian women. In the UK and elsewhere, women's education is an important factor in fertility timing and levels (Berrington and Pattaro 2014). Building on previous work that estimated and analysed the fertility of immigrants and their daughters (Dubuc 2012, 2016), this study investigates to what extent the educational attainment levels of immigrant women and their daughters are associated with fertility patterns that differ from those of all British women. I hypothesise that differences in educational attainment explain differences in fertility across Asian immigrant groups and generations in the UK, including among the second generation of 'migrants'.

I compare the fertility patterns of the four predominant groups of British women of Asian heritage for which identification data are available. These four groups display different distributions of educational attainment and fertility levels, which allow us to study how ethnicity, education, and migration status combine to influence childbearing.

1.1 Ethnic fertility differences and convergence in the UK

Since the 1980s, an ethnicity variable has been included in UK censuses and surveys (see Appendix A1) in an effort to capture the growing diversity of the British population due to international migration (for details, see Dubuc 2016),[1] and to investigate potential associated forms of discrimination. In the UK, ethnic fertility differentials are well documented, with Pakistani and Bangladeshi women having the highest total fertility levels (more than three children) and Chinese women having the lowest levels (fewer than 1.5 children) (e.g. Rees et al. 2008; Coleman and Dubuc 2010). Since the 1970s, the TFRs of the various ethnic groups have been converging (Dubuc and Haskey 2010). This trend is driven in part by the

[1] These ethnic minority categories largely reflect the post-World War II migration waves (from the Caribbean, South Asian, and Chinese diasporas). Recent trends and the broader geographic origins of immigrants have contributed to the increase in the sizes of ethnic categories such as the broad 'Black African' ethnic group and those labelled as 'other' (i.e. Other White, Other Black, Other Asian, Other).

decline in fertility across successive cohorts of immigrants in the UK (Dubuc 2016). While the reported ethnic minority populations in the UK have grown partly due to immigration, they have also expanded through natural increase. Compared to that of first-generation immigrant women, the total fertility of second-generation women in the UK tends to be closer to that of the national average and of the White British ethnic majority. Indeed, fertility among second-generation women of Indian heritage has even dropped slightly below the national average (Dubuc 2012). It is often assumed that intergenerational fertility convergence is a sign that immigrants are assimilating to the 'local' fertility behaviour (e.g. Milewski 2010; Stichnoth and Yeter 2016). The question of whether these fertility patterns are converging has been a main focus of quantitative research on immigrants and ethnic fertility. However, which benchmarks should be used and how the results should be interpreted are questions that continue to be debated. Moreover, the lack of knowledge about the processes that underlie these patterns have hampered advances in this developing theoretical debate.

1.2 Fertility and educational attainment

Women's educational attainment is generally seen as an important individual level factor in the number of children born to families within a population (e.g. Basu 2002), as well as in the differences in the timing of childbearing among women, with shifts towards later childbearing typically associated with higher educational attainment (Rindfuss et al. 1996; Mayer and Riphaln 2000; in the UK: Rendall et al. 2004; Berrington and Pattaro 2014).[2] Globally, women with more schooling tend to delay childbearing and to have fewer children by the end of their reproductive period (e.g. KC et al. 2010 and references therein), although there is evidence that educational differences in fertility levels have been narrowing in some countries in recent years (e.g. in the USA: Pew Research Center 2015). In addition, it is assumed that for women with high educational attainment, the opportunity costs of childrearing are also high. This theory was initially proposed by Becker and Lewis (1973), and the reasoning was extended to women's emancipation (Van de Kaa 1987). Childbearing and childrearing are therefore analysed as factors that compete with and limit the income and the professional prospects of highly educated women.

In the UK, shifts towards later childbearing are also associated with higher educational attainment (Rendall et al. 2005). According to Berrington et al. (2015), the educational gradient in completed family size among women born between 1940 and 1959 was primarily attributable to differences in (i) the proportion of childless women and (ii) the ages of mothers at the first birth. Much less documented is the

[2] In explaining the social classes of individuals, educational attainment has been analysed as an important factor mediating social background (Bourdieu 1974; Goldthorpe 1996). Differences in educational attainment may be used to approximate the social gradient within populations.

role that the intersection of ethnicity and education plays in childbearing patterns. Preliminary work by Meurs et al. (2015) found that higher educational attainment was associated with reduced fertility among the children of immigrants in France and Germany. In an analysis of educational attainment among immigrants and the second generation in the UK, Modood (2005) found that, on average, second-generation Pakistani and Bangladeshi men and women had lower qualification levels than the 'White majority'. By contrast, members of the Chinese and Indian ethnic groups were found to have higher educational levels than the majority group (Heath et al. 2008; Lessard-Philips 2008; Dustmann and Theodoropoulos 2010). To help shed some light on the relationship between education and fertility, I describe the age patterns of childbearing and total fertility of the four main British Asian groups, and highlight their distinct educational attainment and fertility profiles. To analyse the combined effects of education and immigrant origin on fertility, I distinguish within these ethnic groups between immigrants and their descendants born in the UK, decomposed by their highest educational attainment level.

1.3 Social theories of immigrants' incorporation

While the *assimilation theory*, which seeks to explain the social trajectories of immigrants and their descendants, has been strongly criticised, it remains an important element of the theoretical framework used to analyse fertility in these groups. The *socialisation hypothesis*, which asserts that the values and norms at the childhood place of residence have a strong influence on later reproductive behaviour, together with Gordon's seminal work (1964) on the influence of the cultural and socio-economic environment at destination, underpin the *linear assimilation theory*. This theory posits that immigrants of different origins have varying levels of fertility because they are influenced by the reproductive norms and values in their place of origin and childhood environment. Socio-demographic differences between immigrants and the local majority diminish over time – and, importantly, from generation to generation – as these groups adapt to the destination country (Goldstein and Goldstein 1983; Stephen and Bean 1992). Consequently, the children of immigrants are expected to display a fertility pattern closer to that of the local norm than their immigrant parents and same-origin immigrant women of similar birth cohorts (i.e. contemporary first generation) would. The process may take more than one generation, but socio-economic and demographic assimilation to the general profile of the society of settlement should eventually result in full fertility convergence (Bean and Marcum 1978).

In response to criticisms of the linear assimilation theory and the role of particular effects and their interaction, many contemporary analysts of immigrants' fertility have developed concurrent hypotheses (e.g. Milewski 2010). Some of these hypotheses have, for example, examined how the migration process alters fertility levels and/or age patterns at childbearing, and how the social selectivity of immigrants influences their fertility (see Dubuc 2017 for details).

The *adaptation hypothesis* focuses on how the duration of stay of immigrants leads to a convergence towards the fertility norms at destination (e.g. Adsera and Ferrer 2014). The *socialisation hypothesis* asserts that the fertility norms in the country/environment of socialisation represent the primary influence on the childbearing behaviour of immigrants. This theory would explain why, beyond the sole effect of the duration of settlement, the fertility patterns of those who migrated in early childhood are significantly closer to those of the population at destination than to those of women who migrated at older ages.

Intergenerational socio-demographic processes remain less understood. According to the socialisation hypothesis, the fertility levels of the second and successive generations are expected to converge towards those of the receiving country. This assumption is supported by evidence showing that the fertility levels of the descendants of early 20th century European immigrant waves to the USA rapidly converged with those of the native population (Morgan et al. 1994), a pattern that is generally interpreted as indicative of *assimilation*. In Europe, there is emerging evidence that the fertility trends of the children of immigrants from high-fertility countries are converging with those of the majority populations in the destination countries. According to the *characteristic hypothesis*, the persistence of differences in fertility levels between groups reflects differences in the social characteristics of their members over generations, assuming there is no strong degree of inherited cultural distinctiveness. For instance, in the USA, the role of female education in shaping fertility patterns and differences between immigrant groups and natives appears to be particularly large (e.g. Bean and Tienda 1987). But according to the assimilation theory, such social differences may be expected to fade over time in the absence of strong and persistent cultural distinctions.

The causal link formulated at the origin of the linear assimilation theory between cultural and structural assimilation processes, and, later, their co-occurrence, have been strongly criticised. In an attempt to reconcile these dimensions, the segmented assimilation theory (Portes and Zhou 1993), which posits that various groups may assimilate to various socio-economic strata of a society, adds an ethno-cultural dimension to the process of the incorporation of immigrants and their children into the society of settlement. For instance, immigrants may benefit from community solidarity and supportive shared values that nurture upward social mobility.

An early critique of the linear assimilation theory was based on the observed intergenerational decline in fertility among the middle and upper classes of the Jewish American community – and, later, among the higher segments of the Black and the Japanese-American communities in the US – to levels below those of white Americans of similar socio-economic positions. In response to this divergence from the expected intergenerational fertility convergence, Goldscheider and Uhlenberg (1969) proposed the *minority status hypothesis*. According to this theory, because of a perceived minority status penalty, and in the absence of pro-natalist norms, individuals and families have fewer children in order to facilitate their upward social mobility, possibly until full assimilation is achieved.

Looking at fertility differentials of women of Asian heritage by educational attainment and country of origin, I hypothesise that differences in education can explain fertility differences across migrant groups and generations in the UK. The findings are discussed within the theoretical framework presented above – notably, the selectivity of immigrants, their characteristics, and the socialisation hypotheses relevant to both immigrant and second-generation women – as well as within the framework of the segmented assimilation and minority status theories.

2 Data and methods (LFS-OCM)

UK birth registration data by country of origin are available for some immigrants, but these records do not specify the mothers' educational attainment, and do not identify the UK-born mothers who have immigrant parents. Thus, I used an indirect method, which was extensively presented and assessed in Dubuc (2009), that relies on household Labour Force Survey data (LFS 2002–2010) together with the reverse-survival own-children method (OCM). In this way, I was able to obtain a satisfactory sample size for estimating the fertility of sub-population/minority groups (for details, see Dubuc 2009). This method was used in previous work to produce TFRs and ASFRs by ethnicity and generation in the UK (e.g. Dubuc 2012, 2016). Here, these estimates are updated and further split by educational attainment.

Because information on the country of birth of the parents of adult respondents is not available in the LFS, information on the (self-defined) ethnicity and the country of birth of household members was used to approximate the second generation. UK-born women of Asian heritage and of reproductive ages (overwhelmingly below 40 years old) represent the second generation in the UK.[3] As the daughters of earlier waves of Asian immigrants are likely to report the same ethnicity as their parents,[4] I combine ethnicity and country of birth to distinguish between the women who were born in the UK and the women who were born overseas. Using this approach, I was able to distinguish between the first (immigrant) and the second (UK-born)

[3] The age structure of non-White ethnic minority UK-born women is presented in Dubuc (2016). In the most recent surveys, children and teenagers of the third generation cannot be distinguished from those of the second generation.

[4] In Britain, ethnic categories are largely defined according to a combination of race (as a social construct) and geographic origin (country or region of origin). Although ethnicity is self-defined by respondents in censuses and in surveys, these responses are guided by predefined categories. Jivraj and Simpson (2015) found that the ethnicity reported by each respondent in the censuses changed little across his or her life course, especially among the Chinese ethnic group and among groups identified by a single country (British Indian, Bangladeshi, and Pakistani groups). In addition, the racial structure of the ethnic categories (e.g. Asian or British Asian) is likely to favour similar self-reporting between the generations of the parents and the children (Dubuc 2016). This pattern may, however, mask heterogeneity in self-identity and a sense of belonging. Thus, the validity of defining these ethnic categories as social groups could be questioned.

generations Asian women in the UK. For simplicity, the terms *UK-born* and *second generation* are used interchangeably for the analysed ethnic groups throughout the text. Accordingly, *foreign-born* women are identified as the *immigrant generation*.

As the sample size is critical, Household LFS data 2001–2010 (April-June quarters) were pooled across years. This resulted in an increased sample size of 328,046 women who were aged 15–63 at the time of the survey. Based on this sample, I produced period fertility measures for women aged 15 to 49 (1987–2010) split by ethnicity, by generation in the UK, and by educational attainment. Children were linked to their mothers using the household relationship matrix that links individuals within a household in each survey, as this approach has been shown to provide the most accurate child-mother linkage (see Waller et al. 2014 for details on the relationship matrix). To minimise the risk of an undercount, only children up to 14 years old were considered, because older children are at increased risk of living outside their mother's household (see below and Dubuc 2009, 2012). Children and women were reverse-survived up to 14 years prior to the survey, which made it possible to estimate births counts by the age of the mother and fertility rates by the single years of age of the women.[5] As a result, each survey produced 15 consecutive years of estimates. The overall fertility estimates derived from successive surveys were produced for the period 1987 to 2010, which resulted in 190,960 births and a total of 3,629,310 woman years. After disaggregation by ethnicity, generation in the UK, and educational attainment, overall fertility estimates are presented for the 1987–2010 period only due to sample size limitations. In addition, fertility estimates derived from earlier LFS surveys (as presented in Dubuc 2012) were used to analyse the intergenerational changes in fertility in Figure 1, and to discuss the results. Immigrant women who were aged 15–49 in the earlier period (1965–1979) were used here as the *proxy parent generation* of the second-generation (UK-born) women of fertile ages over the 1987–2010 period. This allowed for an average gap of 26 years between the two generations.

Women were classified according to their highest educational qualification. The qualifications were grouped in three main categories: General Certificate of Secondary Education (GCSE; typically obtained at around age 16) and below, A-level, and higher education/degree. Total fertility (TFR) and age-specific fertility rates (ASFR) were produced. The women were then identified by their ethnic group, by whether they were foreign-born or UK-born, and by their highest educational level. Descriptive counts of women by parity are also provided for women aged 30 to 35. It was not possible to estimate the children ever born to women over age 35 by parity because the fertility histories of the female respondents were not provided in the survey. Instead, their fertility was indirectly estimated using the reverse-survival method described above. Censoring at age 35 minimised undercounts of births, as older children may have no longer been living in their mother's household at the

[5] For instance, a woman aged 25 with a child aged five in a 2005 survey would count as one birth to a woman aged 20 in 2000.

time of the survey. Empirical evidence shows that most children live with their mother up to age 15. If anything, this risk of children being undercounted is likely to result in a slight underestimation of the family size of less educated women, who tend to have their children at younger ages. Given this limitation, the analysis cannot provide information on completed fertility. Instead, the results reflect the age patterns of childbearing based on a comparison of the differences in cumulated fertility up to age 35 across groups of women.[6]

In line with findings for France (Toulemon 2004) and for the Hispanic immigrants in the USA (Parrado 2011), Dubuc (2012) reported for the UK that the fertility of immigrant women was especially low prior to migration, and high after their move. Among immigrant women in the UK, the fertility peak is commonly observed at five to six years after migration (Robards and Berrington 2016). It is increasingly recognised that because of the migration effect on the tempo of fertility, there is a risk of overestimating immigrants' total fertility when period TFR calculations are based solely on birth registrations at destination (e.g. Toulemon 2004; Sobotka and Lutz 2009; Parrado 2011). One advantage of the LFS-OCM method applied here is that it minimises the risk of overestimating the total fertility of immigrants due to the aforementioned migration tempo effect, since the counts of women and children are not truncated at the date of arrival in the UK. Thus, it is possible to take into account a pre-migration fertility history[7] of up to 14 years for the most recent migrant women; i.e. women who are most likely to experience post-migration childbearing 'recuperation'.

3 Results

3.1 Fertility of British Asian women and intergenerational changes

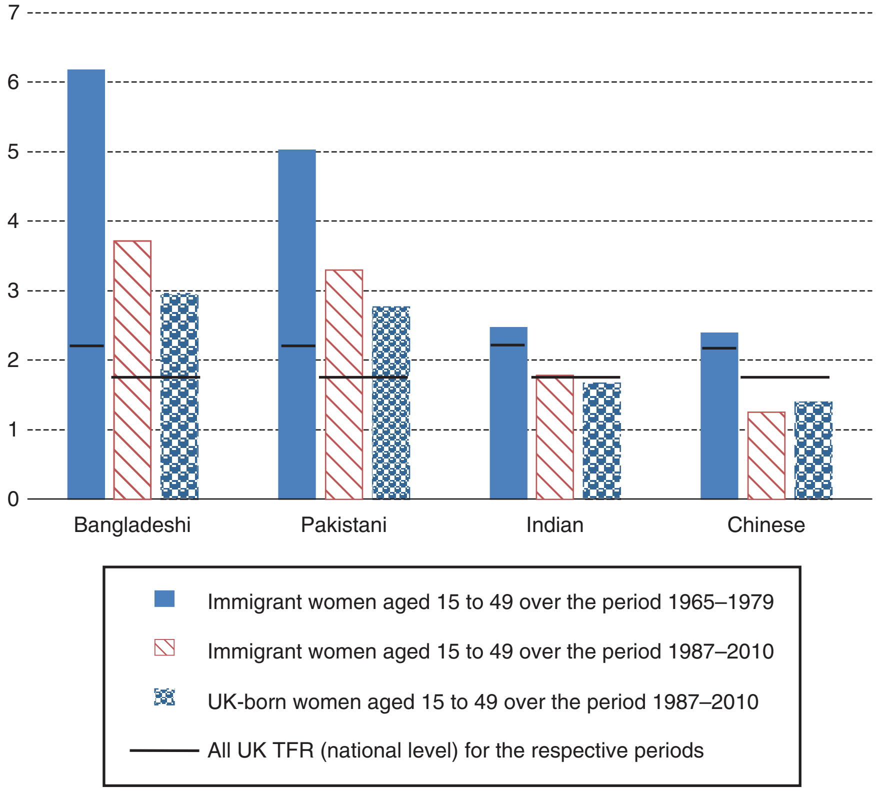
Figure 1 shows for the four main British Asian groups the total fertility (TFR)[8] of (1) immigrant women aged 15–49 in 1965–1979; (2) immigrant women aged

[6] The age structure of the second generation is still relatively young (Dubuc 2016). Even if we had the full fertility history data for these women, small sample sizes would have limited the significance of the cohort completed fertility estimates.

[7] The impact of children left behind in the country of origin on LFS-OCM fertility estimates for immigrants was estimated to be very small; overall, only 0.2% of the children arrived more than four years after their mother (see Dubuc 2012).

[8] Period total fertility rate (TFR) is the total number of children women would have if they were experiencing the age-specific fertility of women aged 15 to 49 at the time of measurement throughout their reproductive ages. Such a measure is susceptible to 'tempo' effects. Cohort completed fertility provides an accurate measure of the number of children women effectively have, but this indicator can obviously only be obtained for cohorts of women who have completed their childbearing. The TFR is computed as the sum of age-specific fertility rates (ASFRs). ASFR is the ratio of births per woman (or per 1000 women) of a particular age; typically, single-year or five-year age groups are used.

Figure 1:
Intergenerational changes in the TFR by selected ethnic groups, 1970–2010



Note: Within ethnic minority groups, women in the earlier period (1965–1979) may stand for the proxy parent generation of the UK-born generation of women aged 15–49 in the 1987–2010 period. The overall UK TFR was 2.3 in the earlier period, and was 1.78 over the 1987–2010 period.
Sources: LFS-OCM author's calculations; Data for the South Asian groups published in Dubuc 2012 are updated here up to 2010 and are augmented with results for the Chinese women group. Counts of women are detailed in Appendix A2.

15–49 in 1987–2010 (called 'contemporary' immigrants); and (3) UK-born women of the same ages as the second group. In previous work (Dubuc 2012), I found a strong decrease in total fertility across successive cohorts of South Asian immigrant women (groups 1 and 2) and across successive generations in the UK (groups 1 and 3). In addition, Figure 1 shows a reduction in fertility over time across successive generations of Chinese immigrants. The trends in fertility among South and East Asian immigrants are generally consistent with the fertility reduction in their country of origin. Over the past two decades, fertility among Indian immigrants has declined to a level only slightly higher than the UK average, and has fallen below the national average among second-generation women. Starting from very high levels in the 1970s, total fertility among Pakistani and Bangladeshi immigrants has decreased sharply over time, especially among second-generation women; however, the fertility levels of this group are still above the UK average. Fertility has fallen well below the national average for both the contemporary immigrant and the UK-born generations of Chinese women; this group had the lowest TFR among all of the ethnic categories in the UK (below 1.4). Indeed, the fertility of contemporary Chinese immigrants deviates further from the UK-wide TFR than that of second-generation British Chinese women. We now turn to the educational attainment of women, exploring how it combines with fertility and whether it accounts for differences across ethnic groups and generations in the UK.

3.2 Educational attainment of the British Asian women

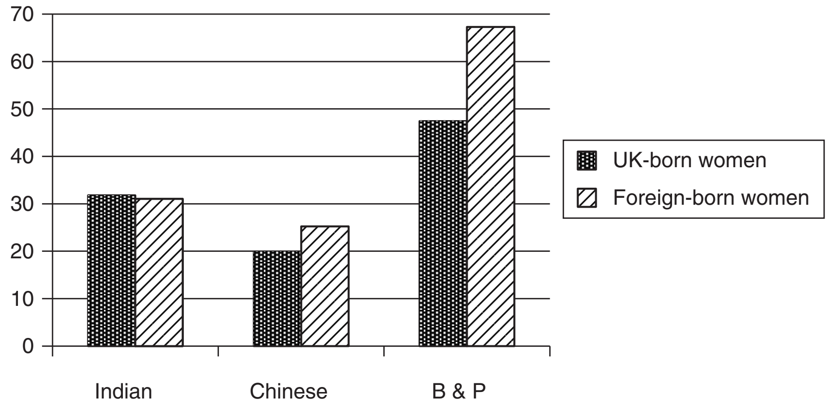
Can the very low fertility of Chinese women and the lower fertility of the young second generation of British South Asian women be explained by their educational attainment? Echoing the NOMIS report[9] which showed that the majority of the UK population are not going to university, there is evidence that about 40% of UK women aged 25–29 between 2001 and 2010 had a degree (Source LFS 2010-2010), and that another 40% of these women were in the lower qualification group of GCSE or below. It thus appears that the distribution of educational attainment was quite polarised among women in the UK over the 1987–2010 period.

Figure 2 shows that of the ethnic groups studied, the Pakistani and Bangladeshi group had the largest share of women with lower qualifications, although this share was closer to the UK average for women of the second generation. In addition, while just 35% of second-generation Pakistani and Bangladeshi women aged 25–29 over the study period had a degree, more than 50% of their British Indian counterparts and the vast majority of their British Chinese counterparts had a degree. In the past, the UK-born generation of women of Chinese ancestry aged 25–29 had slightly higher qualifications on average than the Chinese immigrant women (Figure 2). Consistent with reports of recent waves of highly educated immigrants from China (and from India to a lesser extent), the estimates for 2001–2010 suggest that this pattern no longer held in the most recent period. Educational attainment was also slightly higher in the recent cohorts of young immigrants from Pakistan and Bangladesh, but remained distinctly below the average level for all women in the UK.[10]

[9] The report can be accessed at http://www.nomisweb.co.uk/reports/lmp/gor/2092957698/report.aspx#defs.

[10] For instance, 60% of women from Pakistan and Bangladesh who were aged 25–29 between 2001 and 2010 were in the lower educational group (GCSE and below).

Figure 2:
Percentage of immigrant and second-generation Asian women aged 25–29 over the 1987–2010 period with GCSE or below as their highest qualification



Note: GCSE and below = NVG2 equivalent or below; A-level = NVG3 equivalent; Degree = NVG4 equivalent; B&P: Bangladeshi and Pakistani.
Source: LFS-APS 2001–2010. Counts of women used to estimate fertility by education (in Figures 3 and 4).

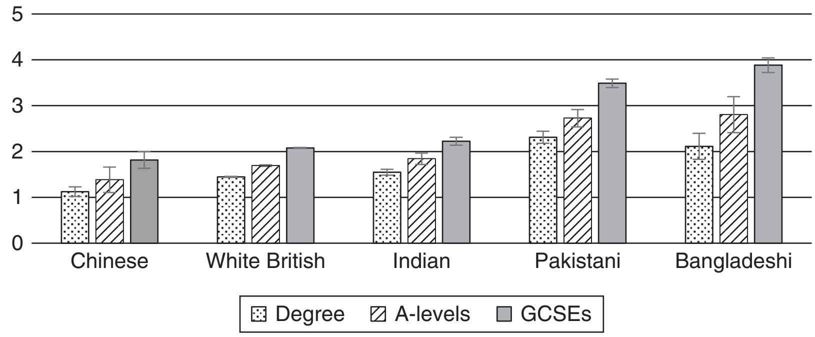
3.3 Fertility, education, and generation in the UK

I decomposed the fertility estimates presented above by women's educational attainment. Looking at all women in the UK, the results show that higher educational attainment was associated with lower period total fertility, and that this relationship varied little over time.[11] Having a higher level of education was also found to be closely associated with later childbearing. These results are consistent with studies of cohort fertility in the UK (Berrington et al. 2015; Ní Bhrolcháin and Beaujouan 2012) and elsewhere (e.g. Rindfuss et al.1996; Mayer and Riphaln 2000).

How do these fertility differences by education apply to immigrant and minority ethnic groups? TFRs and ASFRs split by ethnicity and education are shown in Figures 3 and 4, respectively (due to sample size limitations, the A-level and the degree categories are combined in Figure 4). Consistent with the data for all women living in the UK, delayed childbearing and lower fertility were found to be closely associated with higher educational attainment among British Asian women. In other words, the differences in fertility levels and timing showed consistent educational gradients across the British Asian groups (Figures 3 and 4).

[11] For instance, in 1991–1994, the TFR ranged from 2.10 for women with lower education to 1.49 for those with a bachelor's degree or higher. In 2003–10, their estimated TFR was 2.19 and 1.57, respectively. (Source: author's calculations using LFS-APS data 2001–2010.)

Figure 3:
TFR by highest educational qualification of the women and selected ethnicity (1987–2010)



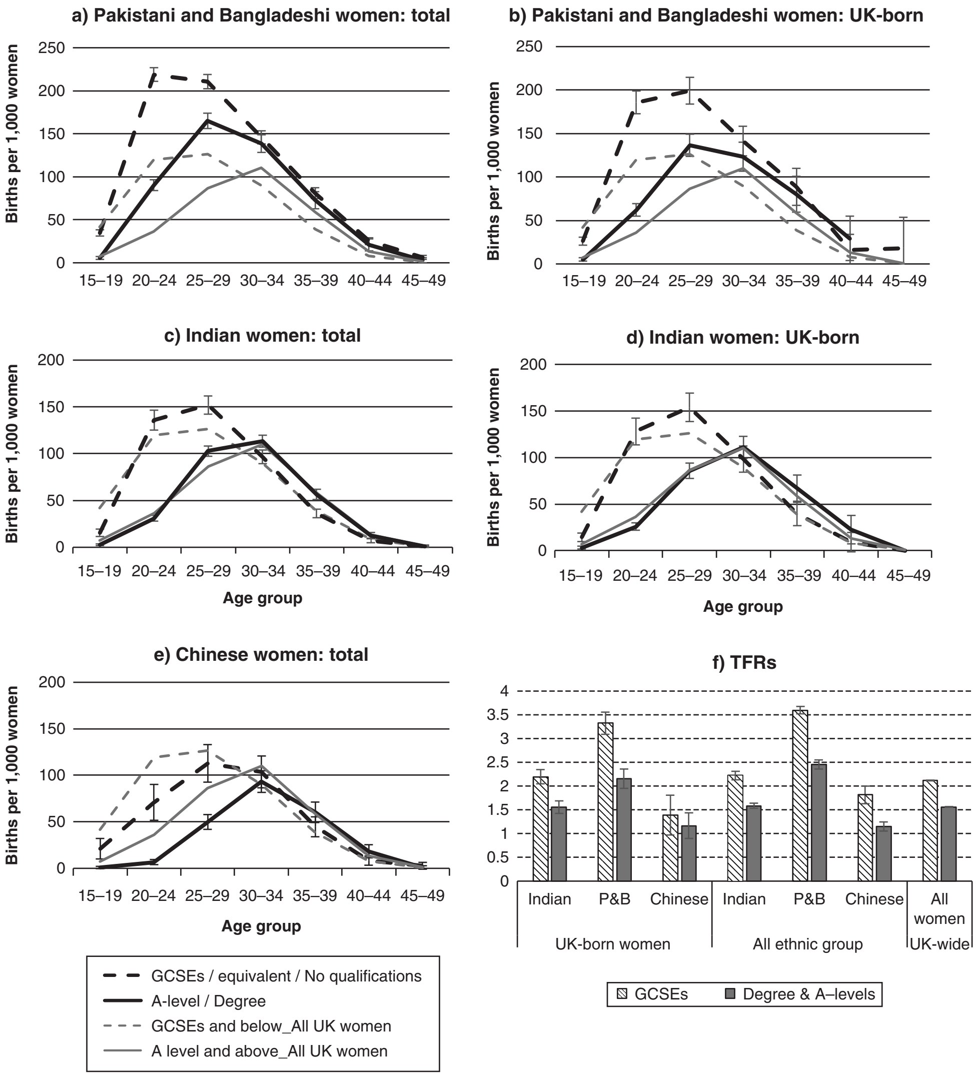
Note: The results are similar for all women in the UK and for the White British group representing the vast majority ethnic group in the UK.
Source: LFS 2001–2010. 95% confidence intervals for sub-groups are shown.

Beyond these commonalities, I observed some differences across groups. When decomposing the TFRs and the ASFRs by broad qualification levels, I was ‘controlling’ for compositional differences in education across groups. If education level ‘explained’ all the differences in fertility between immigrant and ethnic groups, the fertility rates decomposed by educational levels should have been similar across groups in Figure 3. Indeed, the TFRs and the ASFRs of immigrant and second-generation Indian women with A-level or higher qualifications were similar to the national patterns for the whole UK. However, the fertility of both generations of British Indian women in their twenties with the lowest educational level (GCSE or below) remained slightly above the national average.

In contrast with the fertility levels of the British Indian women, the fertility levels of the British Chinese women remained lower than those of all British women for the three educational groups (Figure 3), especially for women under age 30 (Figure 4). The educational composition of first and UK-born generations of Chinese women did not fully account for their very low total fertility (Figure 4). In the case of British Pakistani and Bangladeshi women, fertility levels decomposed by educational attainment remained above the levels for all British women (Figures 3 and 4). This suggests that in addition to educational composition, other factors contributed to their higher fertility. Interestingly, the deviations from the national levels were smaller for women of the second generation (Figure 4b) for both educational attainment groups.

Focusing on women aged 30 to 35, Figure 5 shows the distribution of the number of children by educational attainment for all UK women (national level) and within British Asian groups. Because the fertility and education patterns of Pakistani and

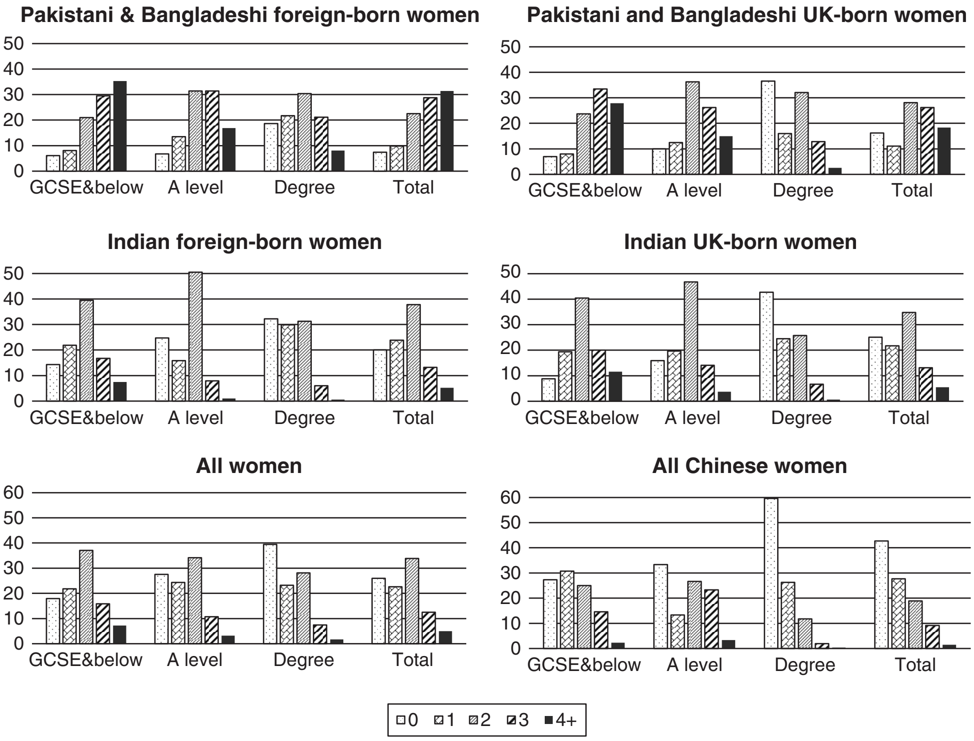
Figure 4:
ASFRs and TFRs of the main British Asian women groups by highest educational qualification (1987–2010)



Note: The ASFRs for the UK-born Chinese are comparable to the patterns presented here, but the data are not shown due to large confidence intervals. 95% confidence interval are shown.
Source: LFS 2001–2010.

Bangladeshi women were relatively close, I analysed the two groups together to increase the sample size and distinguish between immigrant and second-generation women. ‘Two children’ was the mode, particularly among UK women in their early

Figure 5:
Distribution (%) of women aged 30 to 35 at the time of the survey by parity, 1990–2010



Note: Sample size: 108,247 (all UK) women aged 30–35, including Pakistani & Bangladeshi women: 1533 foreign-born and 523 UK-born, Indian women: 1803 foreign-born and 707 UK-born, Chinese women: 545 (466 foreign-born and 79 UK-born).
Source: LFS 1990–2010.

thirties with low to medium educational attainment. Among women with a degree, being childless was the most common status overall. Although the women in this study have not completed their reproductive lives, these observations are consistent with the postponement of childbearing by highly educated women.

As expected, the results show that having a low level of education was associated with having more children overall across the migrant/ethnic groups. For instance, about 35% of immigrant Pakistani and Bangladeshi women with GCSE or lower qualifications had four or more children by ages 30–35 over the 1990–2010 period. This share was much lower for women of this ethnic group with A-level qualifications or higher (below 10% for women with a degree). Having four or more children was the most common scenario among immigrant Pakistani and Bangladeshi women aged 30–35, but having two children was the most common scenario among women of the second generation. In contrast, having four children was rare among lower educated Chinese women; and having no children at ages 30–35 was by far the most common scenario among the Chinese ethnic group (60% of women with a degree). Among British Indian women, especially those of the second generation, the average parity distribution was in line with that of the UK. The findings also indicate that among second-generation Indian, Pakistani, and Bangladeshi women aged 30–35 (Figure 5), those with a degree were more likely to have remained childless than their counterparts who were born overseas (immigrants).

4 Discussion

4.1 Education: a compositional effect

Levels of educational attainment have been particularly high among British Indian and Chinese women, and have increased among second-generation Pakistani and Bangladeshi women. Having a high educational level was found to contribute similarly to lower and delayed fertility among both immigrant groups and native women. Consequently, the high average qualification levels of British Chinese and Indian women, which are well above the national average, largely explain their low fertility. By contrast, immigrant Pakistani and Bangladeshi women still have low average qualification levels and relatively high fertility. Although full convergence has not been achieved, second-generation British Pakistani and Bangladeshi women have educational attainment and fertility levels that are closer to the UK average than those of their first-generation migrant counterparts of similar cohorts.[12]

In summary, and as hypothesised, differences in educational attainment contribute to the fertility differences observed across immigrant groups and generations in the UK. Consistent with the findings at the national level (e.g. Ní Bhrolcháin and Beaujouan 2012), I found that young women with high levels of educational attainment have lower fertility rates and higher rates of childlessness. Because the data used in this study did not allow for the analysis of cohort completed fertility,[13] whether young British Asian women with higher educational levels

[12] On average over the study period, the TFRs of second-generation Pakistani and Bangladeshi women were, respectively, 55% and 65% higher than the UK-wide TFR. But for immigrant women from Pakistan and Bangladesh, the TFRs were, respectively, 85% and 105% higher than the UK-wide TFR.

[13] The reverse-survival method used to overcome the absence of fertility history in the LFS datasets does not allow for the computing of cohort completed fertility data, and thus for the analysis of the influence of tempo effects due to expanding education on the total number of children ever born. Although the current sample size remains small, novel UK longitudinal data sources (Longitudinal Study and Understanding Society) with larger sample sizes over time are promising for future analyses of cohort fertility.

have simply delayed childbearing, and will have completed fertility above the current period TFR levels, remains unclear. Recent evidence has shown that highly educated women in the UK who delayed childbearing did not fully compensate at later ages, leaving most highly educated women with fewer children and higher levels of childlessness than less educated women (Berrington et al. 2015). Sample size remains an issue, but new UK longitudinal data would allow us in the future to analyse cohort completed fertility by migrant group. Nonetheless, the higher incidence of childlessness at ages 30–35 observed among second-generation Indian, Pakistani, and Bangladeshi women than among their immigrant counterparts suggests that – consistent with the socialisation hypothesis – there is a contextual effect in the timing, if not the level, of childbearing.

Over the last decade in India, the TFRs of women with a secondary education or above have been below the replacement level.[14] Indian immigrants largely come from the Indian urban middle class, a group that has been leading the fertility transition in India. Selectivity of migration can explain the high educational attainment of these immigrants and the closeness of their period TFR to the UK average. In contrast, immigrants from Pakistan and Bangladesh are more likely to be of rural origin and less educated. The very low fertility among the more recent immigrants from China may be partly explained by a change in the 'selectivity' of Chinese immigrants. They are increasingly students and highly educated young professionals from mainland China, whereas earlier waves of post-World War II Chinese migrants were mainly from Hong Kong, and were more likely to have a peasant background.

4.2 Beyond educational attainment, some unexplained differences across groups remain

While the fertility levels of highly educated immigrant and second-generation British Indian women are very similar to the UK average, the fertility levels of those with lower educational attainment remain slightly above the UK average. If educational composition alone was responsible for fertility differences, we would expect to have found that the overall TFR of British Indian women was lower than the UK average, and even more so for the second generation. After accounting for educational composition, the analysis showed that for all educational groups, fertility remains above the UK average for Pakistani and Bangladeshi women and below the UK average for women of Chinese background. The existence of additional factors influencing fertility is the most apparent and the most pronounced for these groups, and seems to operate largely independently

[14] As of 2011, total fertility dropped to 1.6 for women with a degree, but remained at 3.3 for illiterate women, 3.0 for women with less than a primary level of education, and 2.5 for those with a primary level of education. Source: Government of India, table 'TFR by educational level of women 2006–2011', accessed on 12 Sept 2017 at https://data.gov.in/keywords/age-specific-fertility-rates.

of women's qualification levels. Sample size restrictions prevented me from investigating the educational gradient in fertility in more detail, and the broad groups used here may hide some differences in fertility across groups. However, alternative classifications were examined (e.g. degree against A-level and below), and did not alter the results presented here. Future analyses of larger samples would help to clarify to what extent the additional (unexplained) factors shaping fertility differentials are correlated with education.

While selectivity may have affected the educational composition of Chinese migrants, these migrants were still found to have lower fertility levels when the estimates were decomposed by educational category. These results therefore suggest that the characteristic hypothesis alone cannot explain the fertility patterns of Chinese immigrant and second-generation women. According to the socialisation hypothesis, low fertility norms in contemporary China[15] should have contributed to the very low fertility levels observed among immigrant Chinese women. However, this hypothesis does not explain the depressed period fertility found among second-generation Chinese women, which should have been closer to the UK average, especially after educational composition was accounted for. Similarly, consistent with the socialisation hypothesis, the larger family norms in the countries of origin may have helped to sustain the higher fertility levels found among immigrant women from Pakistan and Bangladesh. But given the remaining differentials that were observed after decomposing the fertility of second-generation women by educational attainment, future research is needed to explain the interplay of the transnational ties and the cultural and structural factors that influence the childbearing behaviour of the daughters of immigrants.

4.3 Transnational cultural ties, social mobility, and minority status

In the United States, the socio-economic success of second-generation American Asians, especially those of East Asian origin, has framed the upward path of the segmented assimilation theory. The success of these groups has been largely attributed to the very high levels of educational attainment favoured by their cultural background and community ties, including a strong emphasis on education and on the self-organisation of community-based educational support (Zhou and Kim 2006; Zhou 2008; Byun and Park 2012). Instead of the *'tiger mum' model* of high parental educational expectations as an inherited cultural trait, Lee and Zhou (2015) emphasised the role of the 'hyper selectivity' of well-educated Chinese migrants, and of the community-based educational organisations and social network supports that benefit the whole community.

The high educational attainment levels of British Chinese women may resemble the US model, but do not explain their depressed fertility, which persists after

[15] Fertility has been decreasing since the 1970s in China and the introduction of family policy programmes culminating in the well-known 'one-child policy' have recently been relaxed.

controlling for educational level. Transnational ties and the influence of childbearing norms in China – especially in urban China, where childlessness is increasingly common, and having one child only has become the institutionalised norm over the last 40 years – might explain the depressed fertility found among British Chinese women. Conversely, the minority status hypothesis offers a plausible alternative explanation. According to Goldscheider and Uhlenberg (1969), in response to a perceived ethnic penalty, segments of a minority population may reduce their family size to facilitate their social mobility. Previous work for the UK has found that the returns to educational attainment in terms of wages are generally lower for minority groups than for the White British group (Heath et al. 2008). However, this is less the case for second-generation women of Indian or Chinese descent, with the latter group having the highest employment probability (Dustmann and Theodoropoulos 2010). It is plausible that the very low fertility among British Chinese women is a compensating factor favouring professional achievement. Tran (2016) found that delayed childbearing among Chinese migrants in New York facilitated their children's access to high-quality public schools, and noted that second-generation Chinese American "believe they must try harder to succeed in the American context" (p. 2402).[16]

5 Concluding remarks

This study documents an educational gradient in the fertility patterns of ethnic minorities in the UK, and challenges some of the discourses on their cultural distinctiveness. Nonetheless, the remaining unexplained variation also shows that additional factors shape fertility behaviours, independent of women's educational attainment, and *with differences across groups*. It remains unclear to what extent the low fertility observed among second-generation women of Chinese heritage is a means to overcome the ethnic penalty on the labour market, and/or is a mechanism for regaining the social status their parents lost after migration (see Platt 2005; Ichou 2014). The potential role of transnational influences and ties adds further complexity to the relationships between childbearing, education, ethnicity, and generation in the UK that were explored in this paper, and calls for more mixed-methods investigations of this intersectional process. The higher proportions of British Pakistani and Bangladeshi women with a degree, but also other unmeasured factors, are resulting in a smaller fertility gap for the second than for the first generation when compared to national fertility levels. Consistent with these observed changes is the increasing sense of agency around childbearing among British Pakistani women, as discussed by Hamphire et al. (2012), which is associated with more educational and work options. When interpreting the fertility of immigrants and their children,

[16] Earlier, Espenshade and Ye (1994) explained intra-group fertility differentials among Chinese American women as differential responses to structural discrimination.

the emphasis is often on the remaining distance between minority groups and the majority population. More emphasis on the group-specific patterns and the within-group dynamics that shape childbearing behaviour, over time and across generations, would help us gain a better understanding of the socio-demographic trajectories of immigrants and their children.

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References

Adsera, A. and A. Ferrer 2014. Fertility adaptation of Child migrants to Canada. *Population Studies* 68(1): 65–79.

Andersson, G., L. Persson and O. Obucina 2017. Depressed fertility among descendants of immigrants in Sweden. *Demographic Research* 36: 1149–1184.

Basu, A. M. 2002. Why does education lead to lower fertility? A critical review of some of the possibilities. *World Development* 30(10): 1779–1790.

Bean, F. D. and J. P. Marcum 1978. Differential fertility and the minority status hypothesis: An assessment and review. In *The demography of racial and ethnic groups*, eds F. D. Bean and W. Parker Frisbie, 189–211. New York: Academic Press.

Bean, F. D. and M. Tienda 1987. *The Hispanic population of the United States*. Russell Sage Foundation, 456 pages.

Becker, G. S. and H. G. Lewis 1973. On the interaction between the quantity and quality of children. *Journal of Political Economy* 81(2): S279–S288.

Berrington, A. and S. Pattaro 2014. Educational differences in fertility desires, intentions and behaviour: A life course perspective. *Advances in life Course Research* 1–18. DOI: 10.1016/j.alcr.2013.12.003.

Berrington, A., J. Stone and E. Beaujouan 2015. Educational differences in timing and quantum of childbearing in Britain: A study of cohorts born 1940-1969. *Demographic Research* 37(1): 89–123. DOI: 10.4054/DemRes.2015.33.26.

Bourdieu, P. 1974. The school as a conservative force. In *Contemporary research in the sociology of education*, ed. T. Eggleston. London: Methuen.

Byun, S. and H. Park 2012. The academic success of East Asian American youth: The role of shadow education. *Sociology of Education* 85(1): 40–60. DOI: 10.1177/0038040711417009.

Coleman, D. and S. Dubuc 2010. The fertility of ethnic minority populations in the United Kingdom, 1960s–2006. *Population Studies* 64(1): 19–41.

Dubuc, S. 2009. Application of the Own-Children method for estimating fertility of women by ethnic groups in the UK. *Journal of Population Research* 26(3): 207–225.

Dubuc, S. 2012. Immigration to the UK from high-fertility countries: Intergenerational adaptation and fertility convergence. *Population and Development Review* 38(2): 353–368.

Dubuc, S. 2016. Immigrants and ethnic fertility convergence in the UK: The role of global fertility transition and intergenerational social integration. In *Changing population of Britain*, eds T. Champion and J. Falkingham. Rowan Littlefield International Editions.

Dubuc, S. 2017. Fertility of immigrants. In *Encyclopedia of Migration*, eds F. Bean and S. Brown. Springer Science editions.

Dubuc, S. and J. Haskey 2010. Ethnicity and fertility in the UK. In *Understanding population trends and processes, Volume 3: Ethnicity and integration*, Chapter 4, eds J. Stilwell and M. van Ham, 63–82.

Dubuc, S. and L. Waller 2014. Reproductive choices and education of immigrant and second generation women in the UK. Paper at the *Annual Meeting of the Population Association of America* (PAA) conference, Boston, 1-3 Mai 2014. http://paa2014.princeton.edu/abstracts/142643, accessed 20 August 2017.

Dustmann, C. and N. Theodoropoulos 2010. Ethnic minority immigrants and their children in Britain. *Oxford Economic Papers*. Oxford University Press, p. 25. DOI: 10.1093/oep/gpq004.

Goldscheider, C. and P. R. Uhlenberg 1969. Minority group status and fertility. *American Journal of Sociology* 74(4): 361–373.

Goldstein, S. and A. Goldstein 1983. Migration and fertility in Peninsular Malaysia. A Rand Note, Prepared for The Agency for International Development, [N-1860-AID]. http://www.rand.org/pubs/notes/N1860.html.

Goldthorpe, J. H. 1996. Class analysis and the reorientation of class theory: The case of persisting differentials in educational attainment. *The British Journal of Sociology*, Special Issue for Lockwood 47(3): 481–505.

Gordon, M. M. 1964. *Assimilation in American life the role of race, religion, and national origins*. New York: Oxford University Press, p. 276.

Espenshade, T. J. and W. Ye 1994. Differential fertility within an ethnic-minority – the effect of trying harder among Chinese-American women. *Social Problems* 41(1): 97–113.

Hamel, C. and A. Pailhé 2015. Avoir des enfants en contexte migratoire. In *Trajectoires et origines. Enquête sur la diversité des populations en France*, eds C. Beauchemin, C. Hamel and P. Simon, 323–352. Paris: Collection Grandes enquête, INED.

Hampshire, K., M. Blell and B. Simpson 2012. Navigating new socio-demographic landscapes: Using anthropological demography to understand the 'persistence' of high and early fertility among British Pakistanis. *European Journal of Population* 28: 39–63.

Heath, A., C. Rothon and K. Elina 2008. The second generation in Western Europe: Education, unemployment and occupational attainment. *Annual Review of Sociology* 34: 211–235.

Ichou, M. 2014. Who they were there: Immigrants' educational selectivity and their children's educational attainment. *European Sociological Review* 11–29. DOI: 10.1093/esr/jcu071.

Jivraj, S. and L. Simpson (eds) 2015. *Ethnic identity and inequalities in Britain. The dynamics of diversity*. Policy Press, p. 238.

KC, S., B. Barakat, A. Goujon, V. Skirbekk, W. Sanderson and W. Lutz 2010. Projection of populations by level of educational attainment, age, and sex for 120 countries for 2005-2050. *Demographic Research* 22(15): 383–472.

Kulu, H. and A. González-Ferrer 2014. Family dynamics among immigrants and their descendants in Europe: Current research and opportunities. *European Journal of Population* 30(4): 411–435.

Kulu, H., T. Hannemann, A. Pailhé, K. Neels, S. Krapf and A. Gonzalez-Ferrer Gunnar Andersson 2017. Fertility by birth order among the descendants of immigrants in selected European countries. *Population and Development Review* 43(1): 30–60.

Lee, J. and M. Zhou 2015. *The Asian American achievement paradox*. New York: Russell Sage Foundation.

Lessard-Phillips, L. 2008. An examination of the educational attainments of second-generation immigrants in the United Kingdom. In *Ethnicity and Social divisions*, Chapter seven, eds K. Hallden, E. le Grand and Z. Hellgren, 171–208. Cambridge Scholars Publishing.

Mayer, J. and R. T. Riphaln 2000. Fertility assimilation of immigrants: Evidence from count data models. *Journal of Population Economics* 13: 241–261.

Meurs, D., P. A. Puhani and F. Von Haaren 2015. Number of siblings and educational choices of immigrant children: Evidence from first- and second-generation immigrants. Working paper, IZA DP No. 9106.

Milewski, N. 2010. Fertility of immigrants. A two-generational approach in Germany. *Demographic research monographs series*. Berlin Heidelberg: Springer, p. 176.

Modood, T. 2005. The educational attainment of ethnic minorities in Britain. In *Ethnicity, social mobility and public policy: Comparing the US and UK*, eds G. C. Loury, T. Modood and S. M. Teles, 288–308. New York: Cambridge University Press.

Morgan, S. P., S. C. Watkins and D. Ewbank 1994. Generating Americans: The fertility of the foreign-born in the US, 1905-10. In *After Ellis Island: Newcomers and natives in the 1910 census*, ed. S. Watkins. New York: Russell Sage Foundation.

Ní Bhrolcháin, M. and É. Beaujouan 2012. Fertility postponement is largely due to rising educational enrolment. *Population Studies* 66(3, November): 311–327.

Parrado, E. A. 2011. How high is Hispanic/Mexican fertility in the United states? Immigration and tempo considerations. *Demography* 48(3): 1059–1080.

Pew Research Center 2015. Childlessness falls, family size grows among highly educated women. PEW Research Centre report, Washington, DC, p. 17.

Platt, L. 2005. Migration and social mobility. The life chances of Britain's minority ethnic communities. Joseph Rowntree Foundation report, Policy Press, p. 44.

Portes, A. and M. Zhou 1993. The new second-generation: Segmented assimilation and its variants. *The Annals of the American Academy of Political and Social Sciences* 530: 74–96.

Rees, P. 2008. What happens when international migrants settle? Projections of ethnic groups in United Kingdom regions. In *International migration in Europe: Data, models and assessment*, eds J. Raymer and F. Willekens, 329–358. London: Wiley.

Rendall, M., C. Couvet, T. Lappegard, I. Robert-Bobée, M. Ronsen and S. Smallwood 2005. First births by age and education in Britain, France and Norway. *Population Trends* 121: 27–34.

Rindfuss, R. R., S. P. Morgan and K. Offutt 1996. Education and the changing age pattern of American fertility: 1963–89. *Demography* 33(3): 277–290.

Robards, J. and A. Berrington 2015. The fertility of recent migrants to England and Wales. *Demographic Research* 34: 1037–1052. DOI: 10.4054/DemRes.2016.34.36.

Scott, K. and M. Stanfors 2011a. Second Generation Mothers - Do the children of immigrants adjust their fertility to host country norms? In *Demographic aspects of migration*, eds T. Salzmann, B. Edmonston and J. Raymer, 123–152.

Scott, K. and M. Stanfors 2011b. The transition to parenthood among the second generation: Evidence from Sweden, 1990–2005. *Advances in Life Course Research* 16(4): 190–204.

Sobotka, T. and W. Lutz 2009. Misleading policy messages from the period TFR: Should we stop using it? European Demographic Research Papers, p. 43.

Stephen, H. E. and F. D. Bean 1992. Assimilation, disruption and the fertility of Mexican-Origin women in the United Sates. *International Migration Review* 26(1): 67–88.

Stichnoth, H. and Yester M. 2016. Cultural influences on the fertility behaviour of first and second generation immigrants in Germany. *Journal of Demographic Economics* 82: 281–314.

Toulemon, L. 2004. Fertility among immigrant women: New data, new approach. *Population and Societies* 400: 1–4.

Tran, V. C. 2016. Ethnic culture and social mobility among second-generation Asian Americans. *Ethnic and Racial Studies* 39(13): 2398–2403.

Van de Kaa, D. J. 1987. Europe's second demographic transition. *Population Bulletin* 42(1).

Waller, L., A. Berrington and J. Raymer 2014. New insights into the fertility patterns of recent Polish migrants in the United Kingdom. *Journal of Population Research* 31(2): 131–150. DOI: 10.1007/s12546-014-9125-5.

Zhou, M. 2008. The ethnic system of supplementary education: Nonprofit and for-profit institutions in Los Angeles Chinese immigrant community. In *Toward positive youth development: Transforming schools and community programs*, eds M. Shinn and H. Yoshikawa, 229–251. New York: Oxford University Press.

Zhou M. and S. S. Kim 2006. Community forces, social capital, and educational achievement: The case of supplementary education in the Chinese and Korean immigrant communities. *Harvard Educational Review* 76(1): 1–29.

Appendix

A.1 Ethnic categories in the British 2001 census and in surveys

Ethnicity is self-reported by survey respondents, but the responses are shaped by a predefined nomenclature. The 2001 classification used here had two levels. Level 1 classified individuals into five broad groups: *White*, *Mixed*, *Asian* or *Asian British*, *Black or Black British*, *Chinese*, and an additional group *Other*. Level 2 provided a finer classification nested within Level 1. This more detailed classification distinguished between 16 ethnic groups. The *White* population was subdivided into *White British*, *White Irish*, and *White Other*. There were also four *Mixed* ethnic sub-groups (*White and Black Caribbean*, *White and Asian*, *White and Black African*, *Other Mixed*), four *Asian British or Asian* sub-groups (*Indian*, *Pakistani*, *Bangladeshi*, *Other Asian*), three *Black or Black British* sub-groups (*Black Caribbean*, *Black African*, *Other Black*). The *Chinese* group and the remaining group *Other* were not subdivided further.

A.2 Counts of women aged 15–49 by category and study period

	1965–1979*:	**1987–2010**: all ethnic group**				**1987–2010: UK-born women**			
Ethnic category	**Immigrant women**	**All**	**Degree**	**A-Level**	**GCSE**	**All**	**Degree**	**A-Level**	**GCSE**
Indian	41,110	96,358	44,730	14,574	37,054	31,544	15,133	6,626	9,785
Pakistan	16,307	65,961	15,867	9,343	40,751	23,633	7,214	5,177	11,242
Bangladeshi	3,100	22,667	3,432	3,414	15,821	4,355	1,093	1,086	2,176
Chinese	6,921	23,628	13,782	2,690	7,156	3,623	2,222	575	826

Sources: *LFS 1979, 1983 to 1992; **LFS-APS data 2001–2010.

A.3 Counts of women aged 25–29 by ethnic category over the 1987–2010 period

	Degree/Higher education	**A-level (equiv.)**	**GCSE and below**
White British	212,338	114,964	275,601
(British) Indian	9332	2145	5236
(British) Chinese	2612	324	939
(British) Pakistani and Bangladeshi	4175	2129	9730

Source: LFS-APS data 2001–2010.

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The educational gradient of fertility intentions: a meta-analysis of European studies

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Abstract

Unlike achieved fertility, fertility intentions are often positively correlated with education. However, the conditions under which such a positive relationship exists are not yet well known. Using 86 pieces of research covering 13 European countries that were published between 1990 and 2011, we assess in a quantitative manner the temporal and cross-country variation in the relationship between educational attainment and reproductive intentions. Because of the sequential nature of reproductive decisions and the gendered nature of each individual's life course, we look separately at childless women and women with one child, and compare women with men. Our findings show that both first and second birth intentions and educational attainment are positively correlated, but that this relationship – which is stronger for men than for women – tends to disappear when the normative value of a two-child family is reached. Structural labour market characteristics explain a good portion of the cross-country variance: the educational slope of first and second birth intentions is steeper in countries with large shares of women in vulnerable employment situations or in part-time employment, and is flatter in countries with gender-equal labour force participation and large shares of women in highly qualified employment.

1 Introduction

Fertility intentions, or intended family size, represent an important channel through which education affects achieved fertility, or actual family size. However, the relationship between fertility intentions and educational attainment is not

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necessarily the same as the relationship between actual fertility and educational attainment. Empirical evidence indicates that more educated women do not necessarily intend to have fewer children than less educated women; they just end up having fewer children. The postponement of childbearing and the parity-specific distribution of fertility intentions (Sobotka 2009) may help to explain this apparent contradiction.

It appears that in recent decades, women are finding that having a high level of education has become more compatible with fertility. This trend is attributable to the increasing social acceptance of women's employment, the implementation of policies facilitating work and family life, and the increasing involvement of men in childcare tasks. The extent to which this trend is real, and is reflected in the literature on fertility intentions, constitutes the core contribution of this paper. Advancing our knowledge of the reproductive decision-making processes of women with low, medium, and high levels of education is useful for formulating policies aimed at stemming further fertility decline.

A large body of research has examined differences in fertility intentions by educational attainment across countries and over time. The findings of these studies on the sign of the education-intention link have been contradictory. Some scholars have shown that highly educated women are more likely than their less educated counterparts to plan to have a large family (e.g. Heiland et al. 2008; Mills et al. 2008), while others have come to the opposite conclusion (e.g. Musick et al. 2009). Recently, some authors have emphasised the role of contextual factors by suggesting that the relationship between education and fertility – and, presumably, fertility intentions – is positive in countries where the institutional arrangements support the compatibility of work and family life, as well as gender equality in the family and in the labour market (Hobson and Oláh 2006; Matysiak 2011; Neyer 2013). In a recent multi-level analysis, the cross-country and temporal variation in the link between education and birth intentions has been investigated at both the individual and the country level, as well as in a micro–macro integrated framework (Testa 2014). The empirical evidence provided in the micro-macro European context suggests that women of reproductive ages are more prone to plan to invest in both education and family size if they live in an institutional context that facilitates work-life balance; that is, in a country where work career and fertility are not seen as incompatible. Most importantly, this study suggests that both being highly educated and living in a country where a large share of women are college educated are positively associated with women's childbearing intentions.

In order to validate these previous findings, which used a cross-sectional multi-country dataset based on limited national sample sizes, we undertake for the first time a meta-analysis of all published research on the effect of educational attainment on fertility intentions. A meta-analytical approach to the study of fertility intentions is entirely new in the literature. As a systematic review of quantitative results, a meta-analytic study cannot produce genuinely innovative results. However, such a study has a twofold advantage over a single research study: namely, it can provide more general outcomes than any single analysis; and it can generate estimates with greater statistical power than the estimates produced by a single empirical study. Moreover, because it has a strong comparative point of view, a meta-analysis is particularly suitable for the purposes of our study.

The paper is organised as follows: first, we outline the theoretical framework of fertility intentions; second, we describe the methodological approach and the analytical steps taken in the computation of the meta-sample; next, we present the results in a purely descriptive manner (forest plots) and in a meta-regression format; finally, we discuss the main findings in light of the previous literature.

2 Theoretical perspectives

2.1 The role of education in fertility and reproductive decision-making theories

Both economic and cultural theories have argued that the increase in female education has played an important role in fertility decline (Becker 1991; Lesthaeghe and Surkyn 1988). However, studies on the educational gradient of second and higher order births have generated mixed results: in Western, Northern, and Southern European countries, second and third births seem to be positively associated with level of education (Kreyenfeld 2002; Caltabiano Castiglioni and Rosina 2009; Kravdal and Rindfuss 2008); while in Eastern European countries, a negative association between fertility and education tends to prevail (see, for example, Muresan and Hoem (2010)). In most countries, educational enrolment and family formation are seen as incompatible (Blossfeld and Huinink 1991). Prolonged enrolment in education has both a direct effect on the timing of fertility (i.e. a delay in the start of childbearing) and an indirect impact on the quantum of fertility (i.e. a reduction in the time left for the progression to higher order births (Ní Bhrolcháin and Beaujouan 2012). Fertility intentions can tell us the extent to which this double negative effect of education on fertility is intentional, or is instead the outcome of fertility plans that are not realised. The prediction made in the literature on the second demographic transition that ideational change lowers people's fertility intentions by emphasising individuals' self-realisation needs and values (Van de Kaa 2002; Caltabiano et al. 2009; Lesthaeghe 2010; McQuillan et al. 2014) has not come true. Post-materialist attitudes do not seem to be negatively correlated with ideal family size, and a considerable number of studies have found that fertility intentions are indeed higher among highly educated than among less educated women (De Wachter and Neels 2011; Mills et al. 2008; Roukolainen and Notkola 2002); and that these intentions are often closely clustered around the level of two children (Testa 2014).

Theories and empirical findings related to fertility are often mechanistically applied to studies of fertility intentions (Ajzen and Klobas 2013; Philipov 2011). However, almost no scholars would argue that a theory on behaviour is fully adequate for explaining the intentions that precede it (Philipov 2011). As the predictors of reproductive behaviour are not necessarily the same as the predictors of birth intentions, distinct theoretical frameworks for fertility intentions and achieved fertility are needed. Ideally, both theoretical approaches should seek to answer the question of whether achieved fertility is the result of prior intentions. Currently, no specific demographic theory of fertility intentions exists. Thus, theories of fertility or theories of decision-making are used as the theoretical framework in studies of reproductive intentions.

One of the most common theoretical frameworks of achieved fertility is the micro-economic theory (Becker 1960 and 1991) that posits that the relationship between education and childbearing is explained by two behavioural mechanisms. On the one hand, the *income effect* suggests that highly educated women are in a better position than less educated women to cope with the direct costs associated with childbearing; although this effect can be attenuated by higher investments in the quality of children, rather than in having additional children (Becker and Lewis 1973). On the other hand, the favourable labour market opportunities and higher earnings associated with higher education can negatively affect fertility, as they increase the cost of engaging in non-market activities such as childrearing (*opportunity costs*). The effect of education on fertility depends on the balance between the income effect and the opportunity costs, which can vary substantially across societal and institutional contexts (Blossfeld and Huinink 1991; Adsera 2011). This theoretical approach focuses on the observed births, and does not distinguish between intentions and outcomes. Thus, attempts to apply this theory to the study of intended fertility have led to the assumption that the income effect might be supportive of fertility intentions as well, especially in institutional contexts that facilitate the reconciliation of work and family duties (Testa 2014). In Northern Europe, for example, highly educated women are more likely than less educated women to plan to have a second or a third child (Tesching 2012).

Three main psychological theories are applied to the study of fertility intentions: the theory of planned behaviour (TPB), the theory of traits-intentions-desires-behaviour (TDIB), and the theory of conjunctural action (TCA). Furthermore, the life course theory offers a framework for studying fertility intentions dynamically over an individual's life course, and for making the link between individuals (micro-level dimension) and contexts (macro-level dimension) (Morgan and Taylor 2006). Here, agency refers to individuals constructing their biographies as self-monitored actors within the particular opportunities and constraints they face.

According to the theory of planned behaviour, intentions are the outcomes of three factors: attitudes towards the behaviour, subjective norms, and perceived behavioural control. Attitudes reflect the internal evaluation of positive or negative outcomes that might follow a certain behaviour (e.g. childbearing). Subjective norms refer to a person's perceptions of how the goal is supported or influenced by the members of his or her close social circle. Perceived behavioural control refers to the person's ability to pursue a certain goal given the available resources (e.g. housing or income). While this theory does not explicitly consider the educational dimension, it can be reasonably assumed that there is a negative education-intention correlation through the first two factors of attitudes and norms because childbearing competes with education and employment aspirations; and that there is a positive correlation through perceived behavioural control because compared to the less educated, the highly educated tend to have better housing conditions, higher incomes, more stable partnerships, and more resources to access to assisted reproduction services if needed. The main speculative argument is thus that having a high level of perceived behavioural control might lead highly educated women (and men) to form the intention to have a(n additional) child more frequently than their less educated counterparts. Importantly, according to the TPB, perceived behavioural control influences the intentions, but not the behaviour (i.e. the realisation of intentions); whereas actual behavioural control influences both the formation of intentions and the transition path from intentions to behaviour. Research has shown that the decision to become a parent – i.e. the intention to have a first birth – is driven mainly by attitudes and subjective norms (for which we assume that education has a negative influence); while perceived behavioural control is more relevant for the intention to have a second or a higher order birth (for which we assume that education has a positive influence) (Billari et al. 2009). These findings appear to support the existence of a (more) positive education-intention link at high parities. Most of the previous literature has shown that the major effect of education on childbearing relates to the timing rather than the quantum of fertility. A highly educated woman is unlikely to enter parenthood early in her life course, as doing so would likely lower her career prospects and future income (Lappegård 2002). But once a highly educated woman has a first child, she is likely to have a second because her higher earnings enable her to afford private or subsidized childcare, and because she has little remaining time to complete her childbearing career (Kreyenfeld 2002). A less educated woman, by contrast, faces lower opportunity costs for childbearing, and is thus likely to have her first child early in her life course. However, a less educated woman may find it difficult to have a second or a third child because of her low income (Liefbroer and Corijn 1999).

The other two theories of reproductive decision-making emphasise the negative correlation between educational attainment and fertility intentions. The theory of conjunctural action (TCA) postulates that there is a negative educational gradient of fertility intentions; i.e. that highly educated women place a higher value on career success and leisure than less educated women[1] (Bachrach and Morgan 2011). Similarly, the TDIB argues that highly educated women and men are more likely than their less educated counterparts to be exposed to life paths and turning point events that compete with childbearing (Miller 2011). The life course theory offers

1 The *theory of conjunctural action (TCA)* is based on social theory, psychology, and the life course framework. It takes into account conscious and unconscious processes leading to behaviour and the effect of the social context on the process. Fertility intentions may result from normative schemas people have regarding the concept of family. Therefore, expressing an intention to have two children may not be a commitment to act accordingly, but rather a result of an unconscious schema.

a dynamic perspective of birth intentions as moving targets (Yeatman et al. 2013). This theory suggests that social cues, such as cues to acquire higher educational qualifications, can lead to revisions of fertility intentions over the life course (Hayford 2009), and that these revisions tend to lower fertility more among highly educated than less educated women and men (Iacovou and Tavares 2011; Gray et al. 2012). However, the link between education and fertility intentions may also turn from negative to positive over the life course when specific birth order intentions come into play. Intentions decline with the birth of each additional child (McQuillan 2014; Liefbroer 2009), but they may decrease less among highly educated women and men who can afford to have a larger family than among less educated women and men who cannot.

2.2 Research hypotheses

In this analysis, the relationship between educational attainment and fertility intentions is examined across the three main dimensions of gender, parity, and country. According to the theories outlined above, highly educated individuals are more likely than their less educated counterparts to postpone starting a family (Billari and Philipov 2004; Kohler et al. 2002; Rindfuss et al. 1996), and the effects of this delay are more pronounced for women than for men because the timing of the start of childbearing has more implications for women than for men. Moreover, women with low levels of education are more likely than women with high levels of education to start having children before marrying or securing stable employment (Johnson-Hanks et al. 2011). Finally, because the biological window for childbearing is smaller for women than for men, women tend to be more aware of the normative age deadlines for starting a family. However, men also face childbearing constraints related to the male biological clock (Lambert at 2006) and the threat of "leaving it too late" (Thomson and Lee 2011). Far less is known about the effects of the ticking of the biological clock on the birth intentions of men than of women. Generally, young men say they intend to delay childbearing until well into their late twenties and early thirties. Research has shown that a majority of male university students in Australia plan to have children after age 35 (Thomson and Lee 2011), which is the average age at which men's biological fertility begins to decline (Lambert et al. 2006). On the other hand, educational attainment and fertility, whether achieved or intended, are positively correlated among men (see Martin-Garcia 2008 for achieved fertility; and Heiland et al. 2005 for intended fertility). Consistent with the idea that men need to have the ability to provide for their children, less educated men tend to want a smaller family, and are less likely than their better educated counterparts to report having positive first birth intentions (Lappegård et al. 2011). Since the postponement of (the start of) childbearing translates into delayed but not foregone fertility, there is a positive relationship between education and birth intentions. Hence, we hypothesise that *the educational gradient of fertility intentions is positive at the beginning of the reproductive career* *for both women and men, but more so for women (who are more likely to postpone) than for men.*

Furthermore, we expect to find that highly educated women and men are more likely than their less educated counterparts to say they intend to have a second child because the former generally have more resources for outsourcing childcare than the latter (income effect). The educational gradient of reproductive intentions tends to be positive because of the income effect, which is expected to be steeper among men than among women because men tend to have higher incomes. As the main provider for the family, a man typically has to be in a stable socioeconomic position before planning to have a second or third child (Lappegård et al. 2011; Lappegård 2012). Unlike highly educated men, highly educated women have to counterbalance the income effect of having children. Because men are less involved than women in childbearing and childrearing, men face lower opportunity costs when starting a family (Berrington 2004). Nevertheless, research has shown that the education-intention relationship can still be positive among highly educated women because combining paid work and family responsibilities may be less stressful for college educated women than for less educated women. We therefore expect to find that *the educational gradient of second birth intentions is positive for both men and women, and more so for men than for women.*

Finally, educational differences in birth intentions are expected to be smaller if labour force participation rates are similar for men and women, and if the share of highly educated women participating in the labour market is large; as these conditions signal to young women of all education groups that it is possible to have both a career and a family with children (Testa 2014). Hence, our third hypothesis reads as follows: *The positive correlation between educational attainment and second birth intentions is weaker in countries where the labour market structure favours full-time and regular employment for women.* However, we are not able to determine whether the expected smaller differences are due to the higher intentions of the less educated group or to the lower intentions of the highly educated group.

While we recognize that it would be interesting to move beyond the study of second and third birth intentions to investigate higher order births, we restrict our attention to parities zero, one, and two because of the limitations of the data, which do not contain enough cases to allow us to analyse the decision-making processes at parities higher than two.

3 Data and Methods

3.1 Research design

Meta-analysis is useful for synthesising and interpreting research results from different studies that cover one specific topic of interest. This method has been increasingly used in the social sciences (Cook and Leviton 1980; Wampler 1982;

Amato and Keith 1991; Waldforf and Pillsung 2005; Matysiak and Vignoli 2008; Matysiak and Vignoli 2008; Borenstein 2010). Unlike classical reviews of existing literature, this approach provides a clear and systematic way of comparing inter-study results. The first stage of a meta-analysis consists of conducting a literature review and selecting suitable research papers according to criteria of comparability. In a second stage, using a standardised procedure, the coefficients (or alternative parameters or statistic measures) of each study are recalculated to determine the *effect sizes*, which measure the association between the dependent and the independent variable in a comparable way.

In this meta-analysis, we selected only published research based on regression analysis; thus, beta coefficients and the related standard errors are the main objects of our meta-analytic sample. The education-intentions link is therefore considered net of possible sociodemographic confounders, including age, parity, and marital status; which are the explanatory variables considered in all of the studies included in the meta-sample. The basic unit in the meta-sample is a set of regression coefficients derived from regression models (i.e. study line[2]) that does not correspond to a single study; some studies may include several regressions providing multiple study lines.

Demographers first began asking people to report their childbearing intentions in the late 1970s. But because demographic research on fertility intentions was characterised by bivariate statistical analyses in the subsequent two decades (Westoff and Ryder 1977), we have restricted the temporal scope of our meta-analysis primarily to the past two decades, 1990–2011.

3.2 The meta-sample

The selection of studies for the meta-sample is a major trade-off in meta-analysis. A meta-analysis should ideally be comprehensive, but not too heterogeneous (Blettner et al. 1999). While scholars try to collect as many studies as possible, the selected pieces of research must satisfy the criteria of comparability. We adopted a three-step selection procedure. First, appropriate studies were identified by a search of Google Scholar and Web of Knowledge (WoK). Since the focus of this study is on the effect of education on fertility intentions, the following keywords and combinations have been utilised: "fertility intention", "fertility desire", and "education"; or "intended fertility" and "education"; or "fertility intention" and "education"; or "human capital" and "fertility intention"; or "intended number of children" and "education"; or "reproductive decision-making" and "education". Second, previously undiscovered references given in the selected papers were included in the literature collection. Only papers written in English, German, French, and Italian have been considered. In a third step, several experts, nine in total, were

[2] Each horizontal line put onto a forest plot represents a separate study being analysed, or a *study line*.

consulted for recommendations of papers not gathered in the first two phases. After seeking their advice, we were able to identify 161 papers that matched our criteria, of which 84 were found through the web search and 77 were recommended by the experts. Finally, this number was reduced considerably by excluding papers for a variety of reasons: e.g. the lack of a quantitative description of the relationship between education and fertility intentions, inaccurate measurements of education and/or fertility intentions, or a focus on specific sub-groups. After these exclusions were made, 29 papers with a total of 86 study lines remained in the meta-sample (Table 2). This final sample also contains four papers and 11 study lines in which gender has not been distinguished. In 58 of the study lines (66%), only women's education was considered; in 19 of the study lines (22%), both women's and men's education were examined; and in 11 study lines (12%), both women and men were considered, but there was no stratification by gender. This third group of study lines could not be considered in the forest plot analysis, which is conducted separately for women and men; but it was included in the meta-regression analysis, which includes gender as a control variable. For models that were built using a step-wise procedure (i.e. a gradual inclusion or exclusion of explanatory variables), only the full model specification was considered in the meta-analysis. To avoid study selection bias, results from different studies based on the same dataset have all been included in the analysis. The final meta-analytic sample covers studies conducted in the following 13 European countries: Austria, Bulgaria, Finland, France, Germany, Hungary, Italy, Norway, Poland, Russia, Switzerland, the Netherlands, and the United Kingdom. The selected meta-analytic studies were published between 1990 and 2011, and most (85%) were published between 2001 and 2011.

3.3 Fertility intentions measures

Measuring childbearing intentions is a challenging task because intentions encompass several dimensions. One important distinction is between intentions/plans and ideals/desires: intended fertility may not be the same as ideal fertility given no constraints. Another distinction is made between lifetime intentions (so-called child-number intentions or quantum intentions) and short-term intentions (so-called child-timing intentions or time-dependent intentions), which are parity-specific and depend on the number of children already born. Lifetime intentions refer to the number of children an individual intends to have over his or her whole reproductive life, while short-term intentions refer to a small temporal framework in which the intention to have the first or the next child is confined.

In building the meta-sample, we selected articles using the terms "desire" and "want", as well as the term "intention". It is generally assumed that "want" captures wishes or feelings not directly linked to action, while "intend" captures concrete plans or conscious commitments to act. We did not restrict our analysis to one of these categories for two reasons. First, focusing merely on intentions would have considerably decreased the available meta-sample size. Second, desires have been found to be even more predictive of reproductive behaviour than intentions, which suggests that a clear-cut distinction between the two measures might not be perceived by the interviewed individuals asked to report their answers in the survey (Miller 2011). Studies that refer to fertility desires, or ideals, rather than to intentions constitute just 15% of the whole meta-sample (13 out of 86 study lines)[3] (Table 1).

The meta-analysis covers studies that refer to all three measures of intentions: i.e. general childbearing intentions (the intention to have a(nother) child); child-number intentions (the intention to have a given number of children[4]), and child-timing intentions (the intention to have a(nother) child in a short-term period, usually the next two or three years). We decided we would not restrict our focus to just one of these measures because of the limited number of available papers in each of these categories. Of the study lines in the final meta-sample, 73% refer to general childbearing intentions, 20% to child-timing intentions, and only 7% to child-number intentions. The intention to have a first or another child, irrespective of timing and quantum, captures the intended parity transitions if information on the number of children already born is available and is controlled for in regression modelling; in such a case, the general intention to have another child becomes the specific first, second, third, or higher order birth intention. In most of the study lines in the meta-sample, a control for the number of children already born has been included. A summary of the different expressions of fertility intentions used in the studies covered by the meta-analysis is reported in Table 1.

3.4 The analytical approach

A crucial step in the meta-analysis is the computation of the effect sizes. In our case, the effect size is the difference between the effect of being highly educated and the effect of being less educated on fertility intentions. The following formula has been used for computation:

$$\mathrm{ES} = \begin{cases} \mathrm{COEF}_{\mathrm{high}} - \mathrm{COEF}_{\mathrm{low}}, & \\ \log(\mathrm{COEF}_{\mathrm{high}}) - \log(\mathrm{COEF}_{\mathrm{low}}), & \text{for Exp. models (e.g., Odds ratios),} \end{cases} \tag{1}$$

where ES stands for effect size, COEF stands for coefficient, and the subscripts "high" and "low" refer to the educational attainment categories; i.e. the highest and the lowest educational level, respectively. In the case of exponential models, the log-transformation of the coefficients has been used to compute the differences between the low and the high education category. Effect sizes are used to compare

[3] Robustness checks showed that the results from the studies that used intentions only did not differ significantly from the results based on the larger meta-sample that also included desires and ideals.

[4] Research studies using the variable "intention to have a given number of children" were included in the meta-analysis only if the contrast between zero children and one child or more (the choice between a family with or without children) was modelled in the regression analysis.

Table 1:
Description of the studies included in the meta-sample

Author	Country	Table	Model line*	Fertility concept	Fertility measure	Gender	Parity	Delta-coefficient
Bernineer (2011)	Germany	Table 1	na	General	Intention	Female	Parity 0	0.31
Bernineer (2011)	Germany	Table 1	na	General	Intention	Male	Parity 0	0.15
Berrington (2004)	UK	Table 5	1	General	Intention	Female	Parity 0	1.50
Bushier (2005)	Bulgaria	Table 6	1	Time	Intention	Female	Parity 0	–0.06
Bushier (2005)	Bulgaria	Table 6	2	General	Intention	Female	Parity 1	0.27
Bushier (2005)	Bulgaria	Table 6	3	Time	Intention	Female	Parity 1	0.14
Bushier (2005)	Bulgaria	Table 6	4	General	Intention	Female	Parity 2+	0.43
Bushier (2007)	Poland	Table 3	2	General	Intention	Female	Parity 0	–0.84
Bushier (2007)	Poland	Table 3	2	General	Intention	Male	Parity 0	2.40
Bushier (2007)	Poland	Table 3	4	General	Intention	Female	Parity 1	–0.30
Buehler (2007)	Poland	Table 3	4	General	Intention	Male	Parity 1	0.77
Bushier (2007)	Poland	Table 3	6	General	Intention	Female	Parity 2+	–0.62
Buehler (2007)	Poland	Table 3	6	General	Intention	Male	Parity 2+	0.04
Buehler (2007)	Poland	Table 5	6	General	Intention	Female	Parity na	–0.31
Buehler (2007)	Poland	Table 5	6	General	Intention	Male	Parity na	0.65
Cavalli (2012)	Italy	Table 2	1	General	Intention	Female	Parity na	–0.04
Cavalli (2012)	Italy	Table 2	1	General	Intention	Male	Parity na	0.17
Colloquium (2009)	France	Slide 11	1	Number	Desire	Both	Parity 0	0.60
Colloquium (2009)	France	Slide 11	2	Time	Desire	Both	Parity 0	–0.03
Colloquium (2009)	France	Slide 11	3	Number	Desire	Both	Parity na	1.20
Colloquium (2009)	France	Slide 11	4	Time	Desire	Both	Parity na	0.20

Continued

Table 1:
Continued

Author	Country	Table	Model line*	Fertility concept	Fertility measure	Gender	Parity	Delta-coefficient
Dommermuth (2011)	Norway	Table 5	3	Time	Wanting	Both	Parity 0	−0.24
Dommermuth (2011)	Norway	Table 5	6	Time	Wanting	Both	Parity na	−0.44
Fiori (2011)	Italy	Table 5	3	General	Intention	Female	Parity 1	0.31
Fiori (2011)	Italy	Table 6	3	General	Intention	Female	Parity 1	0.64
Hanappi (2014)	Switzerland	Table 2	3	General	Intention	Female	Parity 0	0.99
Hanappi (2014)	Switzerland	Table 2	4	General	Intention	Male	Parity 0	0.40
Hanappi (2014)	Switzerland	Table 3	3	General	Intention	Female	Parity na	0.59
Hanappi (2014)	Switzerland	Table 3	4	General	Intention	Male	Parity na	−0.78
Heard (2007)	France	Table 2	1	General	Desire	Male	Parity na	0.37
Heard (2007)	France	Table 2	2	General	Desire	Female	Parity na	0.09
Heiland (2008)	Germany	Table 3	3	Number	Desire	Female	Parity 0	0.18
Heiland (2008)	Germany	Table 3	5	Number	Desire	Female	Parity na	0.25
Heiland (2008)	Germany	Table 3	7	Number	Desire	Female	Parity 0	0.97
Heiland (2008)	Germany	Table 3	9	Number	Desire	Female	Parity na	0.15
Koenig (2011)	Germany	Table 3	5	General	Intention	Female	Parity 1	0.12
Koenig (2011)	Hungary	Table 4	5	General	Intention	Female	Parity 1	0.00
Mencarini (2010)	Italy	Table 1	3	General	Intention	Female	Parity na	0.33
Mencarini (2010)	Italy	Table 1	4	General	Intention	Male	Parity na	0.00
Mencarini (2010)	Italy	Table 1	5	General	Intention	Female	Parity na	0.48
Mencarini (2010)	Italy	Table 1	6	General	Intention	Male	Parity na	0.13
Miettinen (2011)	Finland	Table A2	3	General	Intention	Both	Parity 0	0.27
Miettinen (2011)	Finland	Table A2	6	General	Intention	Both	Parity 1	0.08

Continued

Table 1:
Continued

Author	Country	Table	Model line*	Fertility concept	Fertility measure	Gender	Parity	Delta-coefficient
Miettinen (2011)	Finland	Table A3	3	General	Intention	Both	Parity 2+	0.30
Miettinen (2011)	Finland	Table A3	6	Number	Ideal	Both	Parityna	0.31
Mills (2008)	Italy	Table 2	3	General	Intention	Female	Parity na	2.60
Mills (2008)	Netherlands	Table 2	3	General	Intention	Female	Parity na	1.53
Pailhe (2009)	France	Table 33-A	2	General	Intention	Female	Parity 0	0.75
Pailhe (2009)	France	Table 33-A	4	General	Intention	Male	Parity 0	−0.24
Pailhe (2009)	France	Table 33-B	2	General	Intention	Female	Parity na	0.27
Pailhe (2009)	France	Table 33-B	4	General	Intention	Male	Parity na	0.41
Pailhe (2009)	Russia	Table 33-C	2	General	Intention	Female	Parity 0	0.84
Pailhe (2009)	Russia	Table 33-C	4	General	Intention	Male	Parity 0	0.43
Pailhe (2009)	Russia	Table 33-D	2	General	Intention	Female	Parity na	0.37
Pailhe (2009)	Russia	Table 33-D	4	General	Intention	Male	Parity na	0.58
Pailhe (2009)	Germany	Table 33-E	2	General	Intention	Female	Parity 0	−0.06
Pailhe (2009)	Germany	Table 33-E	4	General	Intention	Male	Parity 0	1.43
Pailhe (2009)	Germany	Table 33-F	2	General	Intention	Female	Parity na	0.57
Pailhe (2009)	Germany	Table 33-F	4	General	Intention	Male	Parity na	0.24
Philipov (2002)	Bulgaria	Table 7	1	General	Intention	Female	Parity na	0.62
Philipov (2002)	Russia	Table 7	2	General	Intention	Female	Parity na	−0.03
Philipov (2005)	Bulgaria	Table 1	1	General	Intention	Female	Parity na	0.05
Philipov (2005)	Hungary	Table 1	2	General	Intention	Female	Parity na	0.35
Philipov (2005)	Bulgaria	Table 1	3	Time	Intention	Female	Parity na	−0.11
Philipov (2005)	Hungary	Table 1	4	Time	Intention	Female	Parity na	−0.02

Continued

Table 1: Continued

Author	Country	Table	Model line*	Fertility concept	Fertility measure	Gender	Parity	Delta-coefficient
Philipov (2005)	Bulgaria	Table 2	1	General	Intention	Female	Parity 1	0.07
Philipov (2005)	Hungary	Table 2	2	Time	Intention	Female	Parity 1	0.12
Philipov (2005)	Bulgaria	Table 2	3	General	Intention	Female	Parity 1	–0.04
Philipov (2005)	Hungary	Table 2	4	Time	Intention	Female	Parity 1	0.53
Philipov (2006)	Bulgaria	Table 1	na	General	Intention	Female	Parity na	0.05
Philipov (2006)	Bulgaria	Table 1	na	Time	Intention	Female	Parity na	–0.11
Philipov (2006)	Hungary	Table 1	na	General	Intention	Female	Parity na	0.35
Philipov (2006)	Hungary	Table 1	na	Time	Intention	Female	Parity na	–0.02
Philipov (2006)	Bulgaria	Table 2	na	General	Intention	Female	Parity 1	0.07
Philipov (2006)	Bulgaria	Table 2	na	Time	Intention	Female	Parity 1	–0.04
Philipov (2006)	Hungary	Table 2	na	General	Intention	Female	Parity 1	0.12
Philipov (2006)	Hungary	Table 2	na	Time	Intention	Female	Parity 1	0.53
Rinesi (2011)	Italy	Table 2	1	General	Intention	Both	Parity na	3.14
Schmitt (2012)	Germany	Table A2	3	General	Intention	Female	Parity 0	0.06
Schmitt (2012)	Germany	Table A2	3	General	Intention	Male	Parity 0	0.11
Schmitt (2012)	UK	Table A3	3	General	Intention	Female	Parity 0	–0.03
Schmitt (2012)	UK	Table A3	3	General	Intention	Male	Parity 0	–0.07
Testa (2012)	Austria	Table 3	1	Time	Intention	Female	Parity 0	0.32
Testa (2012)	Austria	Table 3	1	Time	Intention	Male	Parity 0	0.47
Testa (2012)	Austria	Table 3	2	Time	Intention	Female	Parity na	0.38
Testa (2012)	Austria	Table 3	2	Time	Intention	Male	Parity na	0.34

Source: *Model line refers to the explicit column in the respective table.

the educational gradients of women's and men's fertility intentions across parities, and to serve as an outcome variable in the regression models aimed at explaining the variation in the educational gradient across individuals' socio-demographic characteristics and countries. The effect sizes are also the outcome variables in the meta-regressions that use random effects. The random approach postulates that the ESs vary from study to study according to the underlying sample, and that a theoretically infinite number of study-specific ESs would then be distributed around some mean. The ES in the performed studies has to be interpreted as just a (random) sample of a particular given distribution of ESs (Borenstein et al. 2010). A main advantage of considering random effects is that the ES variance can be decomposed into two parts: a between-study variance that refers to the differences across studies, and a within-study variance that refers to the differences across models in the same study. The regression equation of the random effects model can be formalised as follows:

$$y_i = \alpha + \theta + \beta x_i + \varepsilon_i + \mu_i, \quad \varepsilon_i \sim N(0, \sigma_i^2),\ \mu_i \sim N(0, \tau^2) \tag{2}$$

The model assumes two different types of effect sizes, a within and an across study effect size:

$$y_i = \theta_i + \varepsilon_i, \quad \varepsilon_i \sim N(0, \sigma_i^2) \tag{3}$$

$$\theta_i = \theta + \beta x_i + \mu_i, \quad \mu_i \sim N(0, \tau^2) \tag{4}$$

Here, y_i is the estimated effect size in study $_i$ and θ_i is the true effect in this study. θ, on the other hand, is the overall true effect. The disturbance of the estimation of $y_i\,\varepsilon_i$, is assumed to be standard normal distributed. σ_i^2 in (3) is the within-study variance, and τ^2 in (4) is the variance across studies.

In the computation of the effect sizes, several challenges had to be faced. First, we had to re-compute (or standardise) the different educational level categories. In most of the studies, education had been coded as a three-categorical variable of "low", "medium", and "high"; with "low" corresponding to compulsory primary education and "high" corresponding to completed university education. This categorisation was kept as a benchmark for all studies, which had some important implications. In cases in which the open category "secondary education and above" was used for the highest educational attainment, this category was defined as "high", while all categories below the complete high school were marked as "low". Studies in which education was coded in a binary fashion could not be considered and were not included in the meta-sample. If education was treated as a continuous variable, the coefficient, or its logarithm, was multiplied by the number of years needed to complete tertiary education in order to obtain a comparable effect size. Another major challenge concerned the estimation of the standard errors in cases in which the intermediate category "medium level of education" had not served as a reference group (for more on this issue, see Matysiak et al. 2014). The aggregation of two single standard errors is usually a difficult task, and it is even harder if only p-values are given; in such cases, the results of recalculations become more imprecise. A common and direct approximation criterion for the standard error of the effect size uses the inverse of the study's sample size. The underlying assumption here is that studies with larger sample sizes tend to have more precise estimates. Since the sample sizes vary greatly across our meta-sample, the inverse of the logarithmic sample size has been used.

For the sake of simplicity, the countries were grouped into four clusters in the meta-regression analysis: Northern European countries, Central European countries, Southern European countries, and Eastern European countries (Table 2).[5] The clusters correspond to different family regimes and levels of women's labour force participation (Engelhardt et al. 2004), and largely reflect a grouping adopted by several other scholars investigating fertility levels in Europe (Frejka and Sardon 2004; Goldstein et al. 2009; Wilson 2013); with the exception of the UK, which is considered together with the Northern European countries. Northern European countries support the dual-earner family and the combining of work and family (Thévenon 2008), and are characterised by favourable attitudes towards working mothers (Korpi 2000) and high levels of commitment to gender equality (Duvander et al. 2010). Western European countries are characterised by attitudes that view women as supplementary income providers, and that emphasise women's roles as care-takers. Thus, these countries tend to follow a male breadwinner model and a female part-time career model (Baranowska-Rataj and Matysiak 2014). The Southern European countries also tend to follow the male breadwinner model, and are characterised by a labour market that does not favour women's participation (Esping-Andersen 1999). Finally, the Eastern European countries are characterised by gender equality in the labour market (with high shares of women participating in the labour force and in full-time employment), and by an unequal gender division of childrearing and household tasks; this combination puts a so-called "double burden" on women (Kocourková 2002). In the meta-sample, the structure of the clusters is unbalanced, with Central Europe being the most represented area (38% of all study lines), and Southern and Northern Europe being the least represented areas (17% of all study lines each) (Table 2). The effect sizes were tested for homogeneity (Hedges and Olkin (1985), and the results confirmed that there is a large degree of variation in the estimated effect sizes. The source of this variation might be related to the different social, economic, and institutional contexts of fertility intentions (especially the labour market and gender system); and to differences in the way education was measured (whether continuously or discretely). The meta-regression was carried out in order to test for the influences of country- and study-specific characteristics on the effect sizes. The software Stata/SE version 13.1 was used (see Sterne 2009); more precisely, the command *"metan"* was employed for the forest plot analysis and the command *"metareg"* was employed for the meta-regression analysis.

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[5] Northern Europe refers to Finland, Norway, and the United Kingdom. Central Europe refers to France, the Netherlands, and the German-speaking region (Austria, Germany, and Switzerland). Southern Europe refers to Italy. Eastern Europe refers to Hungary, Poland, Bulgaria, and Russia.

Table 2:
Description of the meta-sample by country and country cluster

		Papers*		Study lines	
Regions	**Countries**	***N***	***%***	***N***	***%***
Southern Europe					
	Italy	5	18%	10	12%
	Total	**5**	**18%**	**10**	**12%**
Northern Europe					
	Finland	1	4%	4	5%
	Norway	1	4%	2	2%
	UK	2	7%	3	3%
	Total	**4**	**14%**	**9**	**10%**
Central Europe					
	Austria	1	4%	4	5%
	France	3	11%	10	12%
	Germany	5	18%	13	15%
	Netherlands	1	4%	1	1%
	Switzerland	1	4%	4	5%
	Total	**11**	**39%**	**32**	**37%**
Eastern Europe					
	Bulgaria	3	11%	13	15%
	Hungary	2	7%	9	10%
	Poland	1	4%	8	9%
	Russia	2	7%	5	6%
	Total	**8**	**29%**	**35**	**41%**
Total	**13**	**28**	**100%**	**86**	**100%**

Source: *In five papers two countries are covered, one paper contains three countries.
Note: The number of study lines included in the table does not match the number of study lines displayed in the forest plots of Figures 1 and 2, because in Figures 1 and 2 studies using the measures "wanting", "desire", or "ideal" have not been included.

3.5 The meta-regression

The outcome variable of the meta-regression is the effect size; i.e. the educational gradient of fertility intentions as described in formula (4). The θ_i in formula (4) can be obtained as follows:

$$\theta_i = \theta + \beta X + \mu_i, \text{ while } \mu_i \sim N(0, \tau^2), \tag{5}$$

where X represents the set of regressors, or explanatory variables, and β is the set of coefficients.

The explanatory variables include: (1) a dummy indicating whether the study used "number", "timing", or "general" intentions; (2) a dummy indicating whether the study used the term "intention" or "desires"; (3) the midpoint of the calendar interval in which the study was carried out; (4) a dummy indicating whether the study contained results for women only; (5) one dummy for parity one and one dummy for parity two and above; and (6) one dummy for each group/cluster of countries. In addition, in order to test hypothesis three, four macro-level indicators have been included in the regression: (1) the share of total female employment that was part-time; (2) the percentage of women with tertiary education among all women participating in the labour force; (3) the ratio of the female to the male labour force participation rate; and (4) the percentage of total female employment that was temporary.[6] The selection of these variables was inspired by a previous study (Bellani and Esping-Andersen 2013), which suggested that family-friendly labour market policies positively influence the intentions of second and higher order births, especially of highly educated women. These labour market features have an impact not just on work-life balance, but on the likelihood that individuals will realise their fertility intentions (Castro-Martín and Martín-García 2013). Moreover, "… these variables are key to identifying the extent to which labour market regulation may help reduce (or increase) the potential opportunity cost of a new birth" (Bellani and Esping-Andersen 2013, p. 92). Since the starting point of the survey periods covered in the meta-sample is the year 1990, all four macro indicators refer to this year.[7] In addition, a trend component – the percentage change registered between 1990 and 2012, the time period covered in the meta-analysis – has been inserted into the model. We checked the robustness of the meta-regression results by running different sensitivity tests. First, the country with the largest number of studies, Germany, was dropped from the sample. Second, an additional dummy variable indicating whether the educational measure had been adjusted or recalculated was added to the models. Finally, the reference group was switched to Northern Europe. None of the sensitivity tests altered the results reported in Table 3.

[6] Other macro-economic characteristics were tried, including the following: the percentage of women in the public sector labour force, the share of women in temporary employment, the GDP per capita, the national investments in pre-primary childcare as a percentage of total investments, the UNDP gender inequality index, as well as the 1990–2011 trend components of these measures. None of these indicators were associated with any statistically significant results.

[7] If data from 1990 were missing, the earliest data point available was used; see Table 1 for details.

Table 3:
Meta-regression of effect sizes of education on childbearing intentions. Beta coefficients

	Models									
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Midpoint of the data interval	–0.0015 (0.021)	–0.00872 (0.021)	–0.0148 (0.020)	–0.0042 (0.021)	0.0069 (0.021)	0.0017 (0.021)	–0.0040 (0.022)	–0.0122 (0.0223)	–0.0057 (0.022)	–0.0098 (0.021)
Type of intentions										
General intentions (reference)										
Timing of intentions	–0.247 (0.183)	–0.123 (0.170)	–0.186 (0.172)	–0.300 (0.184)	–0.194 (0.173)	–0.190 (0.187)	–0.129 (0.176)	–0.0835 (0.189)	–0.143 (0.177)	–0.104 (0.182)
Quantum of intentions	0.352 (0.412)	0.369 (0.378)	0.149 (0.385)	0.107 (0.425)	0.339 (0.395)	0.407 (0.410)	0.386 (0.406)	0.406 (0.407)	0.354 (0.385)	0.368 (0.384)

Continued

Table 3:
Continued

Variables	Models (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Expression of intentions										
Desire and others (reference)										
Intention	0.332	0.320	0.269	0.0429	0.217	0.299	0.279	0.387	0.283	0.326
	(0.290)	(0.275)	(0.278)	(0.321)	(0.281)	(0.289)	(0.289)	(0.336)	(0.288)	(0.280)
Gender										
Female (reference)										
Male	0.00296	0.0547	0.0455	−0.0538	−0.0442	−0.0384	0.0505	0.0515	0.0507	0.0430
	(0.180)	(0.167)	(0.168)	(0.179)	(0.171)	(0.180)	(0.170)	(0.172)	(0.172)	(0.177)
Parity										
No child (reference)										
One child	−0.218	−0.244	−0.238	−0.192	−0.227	−0.255	−0.251	−0.212	−0.238	−0.221
	(0.185)	(0.177)	(0.181)	(0.185)	(0.185)	(0.187)	(0.183)	(0.190)	(0.180)	(0.190)
More than one child	−0.448	−0.308	−0.302	−0.356	−0.311	−0.577*	−0.298	−0.281	−0.289	−0.293
	(0.332)	(0.309)	(0.312)	(0.330)	(0.323)	(0.339)	(0.313)	(0.318)	(0.316)	(0.329)

Continued

Table 3:
Continued

	Models									
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Country clusters										
Southern Europe (reference)										
Northern Europe		–1.099***					–0.855	–1.189***	–1.061*	–1.063**
		(0.329)					(0.596)	(0.432)	(0.537)	(0.416)
Central Europe		–1.015***					–0.814	–1.023***	–1.059**	–0.975***
		(0.290)					(0.527)	(0.329)	(0.507)	(0.366)
Eastern Europe		–1.103***					–0.641	–1.189***	–0.940*	1.104***
		(0.279)					(0.710)	(0.363)	(0.475)	(0.314)
Macro-level indicators										
1990: Part-time employment, female (% of total female employment)*			0.0004				0.007			
			(0.006)				(0.010)			

Continued

Table 3: Continued

	Models									
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
1990–2011 Trend: Part-time employment, female (% of total female employment)*			0.427*** (0.118)				0.204 (0.297)			
1990: Labour force with tertiary education, female (% of female labour force)*				−0.033* (0.019)				0.012 (0.026)		
1990–2011 Trend				0.052 (0.167)				0.092 (0.181)		
1990: Ratio of female to male labour force participation rate (%)*					−0.044** (0.017)				0.003 (0.030)	

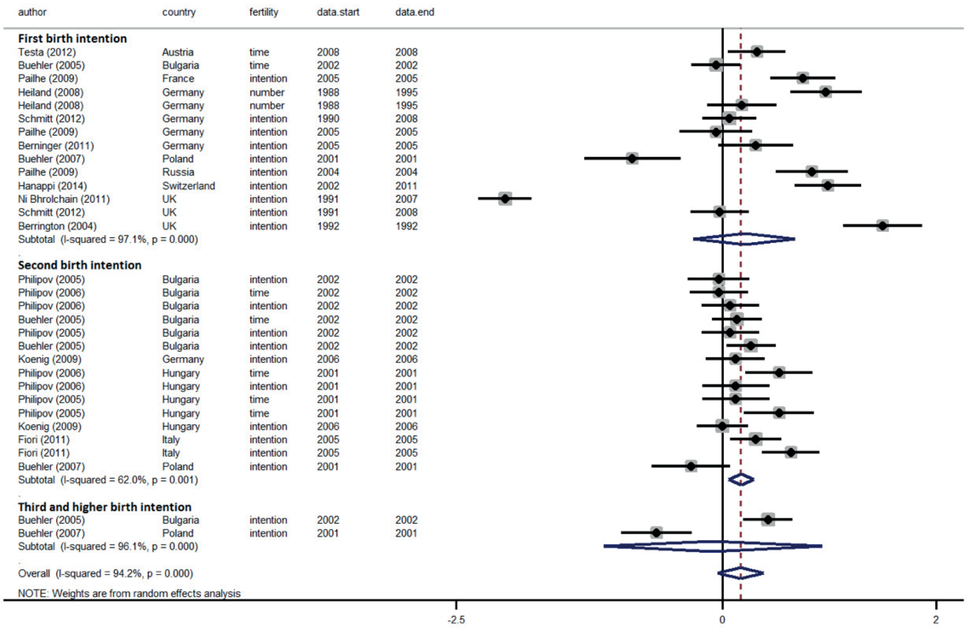
Continued

Table 3:
Continued

	Models									
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
1990–2011 Trend					−2.073				0.922	
					(1.352)				(2.917)	
1990: Vulnerable employment, female (% of female employment)*						0.020*				0.002
						(0.012)				(0.014)
1990–2011 Trend						0.019				0.014
						(0.034)				(0.038)
Constant	3.291	18.59	29.65	9.486	−10.26	−3.626	8.762	25.17	12.38	20.70
	(42.87)	(42.24)	(40.25)	(42.46)	(42.57)	(42.75)	(44.87)	(44.56)	(45.05)	(43.26)
Study lines (obs)	86	86	86	86	86	86	86	86	86	86
Inter-study var	0.377	0.302	0.315	0.364	0.331	0.370	0.309	0.311	0.311	0.312

Note: Standard errors in parentheses.
*p<0.1, **p <0.05, ***p< 0.01.
*The World Bank, World Development Indicators (2015). Atlas method [Data file].
Retrieved from http://data.worldbank.org/indicator/.

Figure 1 Panel (a):
Effect size of education on childbearing intentions by parity. Women of main reproductive ages

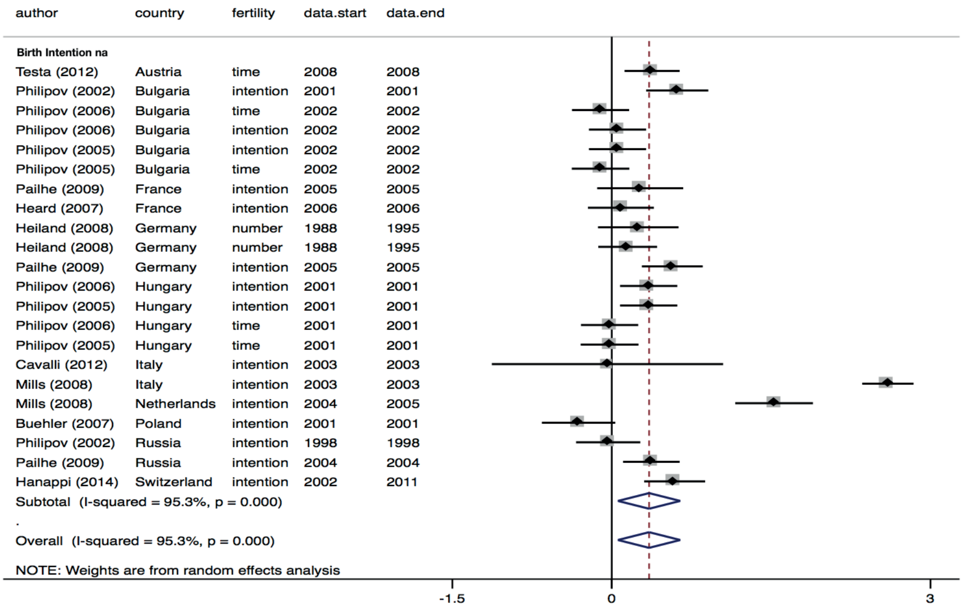


4 Results

4.1 Meta-analytic evidence based on forest plots

The educational gradient of birth intentions is measured by the effect sizes; i.e. the black dots in the forest plots of Figures 1 and 2 refer to women and men, respectively. The variability of each study's effect size, measured by the 95% confidence interval, is represented by the black line that crosses the dots horizontally. The average effect sizes by group/parity are displayed by the large diamond that appears at the bottom of each parity group; and the overall average effect size across all parities is given by the diamond at the very bottom of the graph that is centred on the broken vertical line. The unbroken vertical line indicates the null value. Positive effect sizes stand for cases in which highly educated individuals have higher intentions than their less educated counterparts. This interpretation requires some caution, because an increase in the effect sizes could refer to the lower fertility intentions of less educated individuals or the higher fertility intentions of highly educated individuals, or a combination of both. Conversely, a decrease in the effect sizes could result from the higher intentions of less educated individuals or the lower intentions of highly educated individuals, or a combination of both.

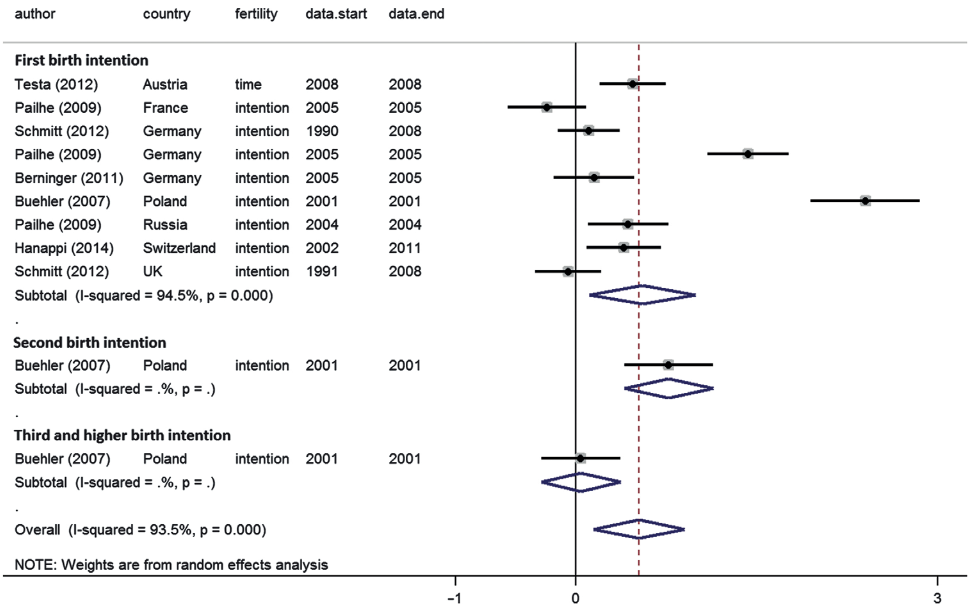
Figure 1 Panel (b):
Effect size of education on childbearing intentions. Women of main reproductive ages at any parity status



To test hypotheses one and two, we compare the effect size of women and men by parity. The educational gradient of first and second birth intentions is positive in most of the studies for both women and men (Figures 1 and 2). Gender differences tend to become smaller at higher parities. The effect sizes of education on first birth intentions are almost always positive among men, and tend to be positive among women (Figure 2 and Figure 1, respectively; panel (a)). Poland and the United Kingdom provide study lines with negative effect sizes for women (studies by Bühler and Fratczak 2007 and Ní Bhrolcháin and Beaujouan 2011, respectively); this means that in such studies, the first birth intentions of less educated women are higher than those of highly educated women. By contrast, the effect sizes of women's first birth intentions are positive and statistically significant in the following countries: Austria, France, Germany, Russia, and Switzerland (Figure 1, panel (a)).

The black dots of second birth intentions are located mostly in the positive spectrum. As the positioning of the two diamonds at the bottom of the parity groups indicate (Figure 1, panel (a)), the effect size of education on second birth intentions is clearly positive, and is even larger than the effect on first birth intentions. Finally, as the positioning of the diamond at the bottom of the related parity group (Figure 1, panel (a)) shows, the educational gradient of higher birth order

Figure 2 Panel (a):
Effect size of education on childbearing intentions by parity. Men of main reproductive ages



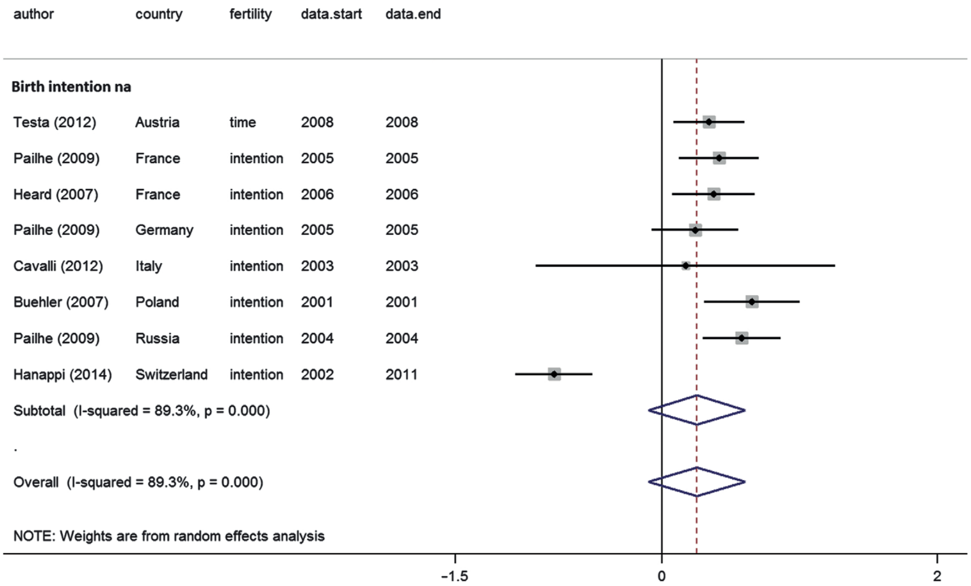
intentions is still positive, but is not statistically significant. To sum up, the positive education-intention relationship is driven mainly by women who have just one child. The relationship is positive at parity zero and parity one, but is statistically significant for second birth intentions only.

Among men, there is no study line for which there is a significant negative effect size of education on first birth intentions: among all of these nine study lines, five show clearly positive effect sizes (Figure 2, panel (a)). The picture does not change substantially for higher birth order intentions. Thus, the overall effect size of education on childbearing intentions is clearly positive and statistically significant (Figure 2, panel (a)).

The variation in the effect of education across parities is greater among women than among men. Overall, there are only a few exceptions to the positive education-intentions relationship: namely, two study lines at parity zero and one study line each at parity two and parity three among women, and two study lines at parity zero among men.

The meta-analytic results that refer to study lines without parity stratification provide further evidence of a generally positive educational gradient in fertility intentions for both men and women (Figures 1 and 2 panel (b)). To sum up, the evidence based on the forest plots suggests that the positive effect of educational

Figure 2 Panel (b):
Effect size of education on childbearing intentions. Men of main reproductive ages at any parity status



attainment on birth intentions is larger among men than among women; and that among women, it is bigger for second birth intentions than for first birth intentions.

4.2 Meta-analytic evidence based on regression findings

In order to account for the cross-regional differences in the educational gradient of birth intentions, we regressed the effect sizes on a set of country clusters dummies (model 2, Table 3); then separately on a set of macro-level indicators (models 3 to 6, Table 3); and, finally, on both sets of covariates at a time (models 7 to 10, Table 3). In model 1, we included several control variables in the following order: the midpoint of the time covered by the study, two dummies indicating the type of intention (i.e. general childbearing intentions, the timing of births, or the number of children), one dummy indicating whether "intentions" or "desires" were used in the study, one dummy for gender, and two dummies denoting the actual parity status (i.e. one child or two or more children). These explanatory variables were kept in all models (1 to 10). We set Southern Europe (only Italy is available in this group) as a reference category. The educational gradient of fertility intentions is lower in all clusters of countries than it is in Italy (model 2). By combining this finding with the results from the forest plots, it becomes clear that the most relevant geographical divide in the educational gradient of fertility intentions is between Southern and Northern Europe, which, respectively, have the largest and the smallest educational gradient of birth intentions. To account for cross-regional differences and to test the third hypothesis, we included in the regression models four macro-level labour market indicators. The results show that all of these indicators have a statistically significant effect on the educational gradient of fertility intentions, albeit in different ways. On the one hand, the share of women with tertiary education among all women participating in the labour market and the gender ratio in labour force participation (as well as its trend component) have negative effects on the effect size; i.e. they reduce the educational differences in fertility intentions (models 4 and 5, respectively). On the other hand, the trend component of female part-time employment and the percentage of women in vulnerable employment have positive effects on the effect sizes; i.e. they increase the educational differences in fertility intentions (models 3 and 6, respectively). If, however, country clusters dummies are included in the models, the effects of these labour market macro indicators decrease in magnitude and even lose their statistical significance (models 7 to 10), which implies that these labour market features explain a significant portion of the cross-cluster variance in the effect size of education on birth intentions, as our third research hypothesis suggested. The indicator of inter-study variance, which shows how much the effect sizes vary between the single studies, can be interpreted as a measure of model fit: the smaller it is, the better the selected control variables explain the variance between single studies. According to this interpretation, model 2, which includes the set of country cluster dummies, provides the best fit for the data. This finding suggests that the diversity across countries is not explained by labour market indicators alone.

5 Concluding remarks

This investigation sought to validate empirical evidence of a positive education-fertility intentions link in Europe (Testa 2014). We conducted a meta-analysis of research published between 1990 and 2011 on fertility intentions using 86 study lines for 13 European countries. The application of a meta-analytical approach to the study of fertility intentions is entirely new in the literature. Given that reproductive decisions are sequential and individuals' life courses are gendered, we focused on the first and second birth intentions of women and men separately. In addition, we controlled for possible confounders (such as age, partnership status, and employment status) by selecting only studies that provided regression estimates. Finally, we covered several geographical regions and grouped studies into clusters of countries that reflect different economic, institutional, and policy contexts.

The meta-analysis revealed a positive educational gradient of both first and second birth intentions among both men and women. Thus, our findings lend support to previous cross-country empirical research that found a positive correlation between education and fertility intentions in Europe (Testa 2014). As predicted, the slope of the gradient was shown to be steeper for men than for women; and to be more pronounced for second than for first birth intentions, especially among women (second research hypotheses). The relationship between educational attainment and birth intentions was also found to be positive among women and men at the start of childbearing; i.e. among those who were forming their first birth intentions (first research hypothesis). For this group, the correlation was found to be stronger among men than among women, as the finding that the effect size is larger in the men's than in the women's forest plot suggests.

One potential explanation for these gender differences is that the income effect is more important than the substitution effect among men than among women. It is possible that men have higher intended fertility than women across parities because men tend to have more financial resources and to face lower economic costs when having children (Berrignton 2004). The parity differences can be read in light of the persistence of the two-child family norm, which is, surprisingly, just as common among the most emancipated social group of highly educated women (Testa 2014) and men as it is among other educational groups. We speculate that this outcome is attributable to the unique reasons that drive highly educated people to have a first and a second child, which are, respectively, the desire to become a parent and the desire to provide the first child with a companion. Additionally, parity differences can be explained by evidence showing that highly educated women tend to have their children over a shorter time period because they start later, and thus have less time to reproduce before reaching the end of their fertile period (time squeeze) (Kreyenfeld 2002). Hence, if highly educated women are at parity one, they will be more likely than their less educated counterparts to be observed while planning their second birth. Another possible explanation is related to the selection stemming from a parity-specific analysis; i.e. there are unobservable variables that could be correlated with the probability of having a child in parity n (in this case, zero), as well as with the probability of intending to have a child of the next order, n + 1 (in this case, one). Thus, the women and men who are at parity one are also more likely to intend to have a second child (self-selection) (Kreyenfeld 2002).

The meta-data could not tell us whether this positive correlation emerged only recently as a result of the implementation of policies designed to facilitate work-family balance, or had been present in earlier decades. We were unable to answer this question because in the meta-sample collection, there were too few studies for the same countries across time, and we could not go back earlier than 1990. The finding in the meta-regression that the midpoint of the data interval used in the study line lacked statistical significance suggests that there was no temporal change in the educational gradient of birth intentions in the years 1990–2011.

In support of the third research hypothesis, we found that the educational gradient of birth intentions was positively correlated with the trend in the share of women in part-time employment: in contexts in which women increasingly opted for part-time employment, the educational differences in birth intentions were larger. Women often choose to work part-time to facilitate the combining of work and family life. This result therefore suggests that more educated women could be encouraged to have larger families by an increase in the availability of part-time work, which would make it easier for them to have both a career and a family with (more) children. Moreover, the educational gradient of birth intentions was found to be positively correlated with the share of women in vulnerable employment arrangements. The most plausible explanation for this finding is that the largest educational differences were driven by the lower fertility intentions of the less educated women who experienced more labour market vulnerability.

In line with the third research hypothesis, we found that gender equality in labour force participation and the share of highly qualified women in employment were reducing the educational gradient of birth intentions. This suggests that labour markets supportive of working mothers can perhaps ease the opportunity costs of childbearing for lower educated women, and can therefore encourage them to develop fertility plans that are more similar to those of their more educated counterparts. Alternatively, labour markets supportive of working higher educated mothers might allow them to be more focused on their careers, and in turn reduce their fertility intentions for additional children, hence making them more similar to the intentions of their lower educated counterparts.

This study has several caveats, which may provide direction for future research. First, the criteria of cross-country comparability and quality used in the selection of the meta-sample led us to sharply reduce our initial collection of papers: the sample of 161 papers was narrowed to just 23 papers, and almost none of these remaining papers examined third or higher order birth intentions. This suggests that although the number of studies on reproductive intentions has increased considerably in recent decades, this research topic remains under-investigated. Second, differences in the educational gradient (size effects) cannot be clearly traced back to elevated intentions among the highly educated, and the source of the change in the effect sizes in the educational gradient remains unknown. This suggests that there is an opportunity to complement this quantitative literature review with statistical analyses based on cross-country comparative datasets; and to include other dimensions such as enrolment in education and field of education, both of which are very relevant for reproductive choices (Blossfeld and Huinink 1991; Hoem et al. 2006; Tesching 2012). Third, because only a few countries have study lines available for several years, it was not possible to conduct deep investigations into the temporal trends of national patterns and the effects of changes in institutional support for families. Furthermore, the distribution of study lines across parities was very unbalanced, with some countries providing study lines for all parity statuses, and others providing study lines for just one parity status (either zero or one child). Gender distribution was also unbalanced, with some countries providing study lines for both men and women, and other countries offering study lines for women only.

The limited availability of study lines by country forced us to cluster together countries with different welfare regimes, institutional contexts, and labour markets, like the UK, Norway, and Finland. While we acknowledge this limitation, we can reasonably assume that the ranking of the countries clusters in the meta-analytic regression – with the effect sizes being the biggest in the Southern European countries and the smallest in the Northern European countries – would not have been substantially different if the UK had been removed from the Northern European cluster. On the other hand, in the regression models 2 to 6, which included labour market indicators but not cluster dummies, the assumption of a homogeneous cluster of Northern Europe (i.e. the UK, Finland, and Norway) was implicitly released.

Finally, the studies collected in the meta-analysis might have been subject to selection bias. Since highly educated women (and men) are more likely to postpone the start of childbearing than their less educated counterparts, they are also more likely than less educated women and men to be observed at a stage of their reproductive career when they have yet to realise their fertility plans. Thus, the first and second birth intentions of the highly educated would be artificially inflated by the inclusion of children in the future component of family size. This issue, as well as the possibility that there are unobserved characteristics[8] that could influence both education and reproductive decisions, cannot be tackled with the meta-data at hand, which are restricted by the design of the analysis adopted in the selected study lines (as almost none of them modelled explicitly selection bias and endogeneity due to unobserved heterogeneity). We hope that new longitudinal studies will shed light on this critical topic by investigating the reproductive decision-making processes of highly and less educated women and men over a long time span.

In light of the existing body of literature, this study is the first comparative meta-analysis of the interplay between educational attainment and fertility intentions. It is, however, limited by the number of published comparable studies that could be retained in the final meta-sample, which is indeed very small (i.e. only 23 papers out of the 161 initially selected papers). This severe restriction in the literature suitable for such analyses calls for further research, and suggests that there is a need to adopt standard measures of fertility intentions that would enhance comparability over time and across countries; as well as to enlarge the sample sizes in fertility surveys, as doing so would allow for a deeper investigation of men's and women's birth order intentions beyond parity two. Given the steadily growing body of empirical analysis in the realm of fertility intentions, future meta-analytical studies might have a better starting position as a result of the guidelines this work is able to provide.

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[8] In a recent study, the variation in the educational gradient in second births was found to be associated with a positive link between fertility and economic conditions, as well as social services for the highly educated women and men (Wood et al. 2017).

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References[10]

Adsera, A. 2011. The interplay of employment uncertainty and education in explaining second births in Europe. *Demographic Research* 25(16): 513–544.

Ajzen, I. 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50(2): 179–211.

Ajzen, I. and J. Klobas 2013. Fertility intentions: an approach based on the theory of planned behaviour. *Demographic Research* 29(8): 203–232.

Amato, P. and B. Keith 1991. Parental divorce and adult well-being: A meta-analysis, *Journal of Marriage and the Family*, 53(1): 43–58.

Andersson, G., M. Rønsen, M. L. Knudsen, T. Lappegård, G. Neyer, K. Skrede, K. Teschner and A. Vikat 2009. Cohort fertility patterns in the Nordic countries. *Demographic Research* 20(14): 313–352.

Bachrach, C. A. and S. P. Morgan 2011. Further reflections on the theory of planned behaviour and fertility research. *Vienna Yearbook of Population Research* 9: 71–74.

Balbo, N. and M. Mills 2011. The effects of social capital and social pressure on the intention to have a second or third child in France, Germany, and Bulgaria, 2004–05. *Population Studies* 65(3): 335–351.

Bankole, A. 1995. Desired fertility and fertility behaviour among the Yoruba of Nigeria: A study of couple preferences and subsequent fertility. *Population Studies* 49(2): 317–328.

Baranowska-Rataj, A. and A. Matysiak 2014. The causal effect of the number of children on female employment – do European institutional and gender conditions matter? Warsaw, Poland: Institute of Statistics and Demography. Warsaw School of Economics *Working Paper* No. 39.

Becker, G. S. 1960. *An economic analysis of fertility. Demographic and Economic change in developed countries*. Princeton: Universities-National Bureau of Economic Research (NBER).

Becker, G. 1991. *A treatise on the family*. London: Harvard University Press.

Becker, G. and H. G. Lewis 1973. On the interaction between the quantity and the quality of children. *The Journal of Political Economy* 81(2): S279-S288.

Bellani, D. and G. Esping-Andersen 2013. Education, employment and fertility. In Esping-Andersen, G. (ed.) *The fertility gap in Europe: singularities of the Spanish case.* Barcelona: "la Caixa" Welfare Projects: 82–101.

Berninger, I., B. Weiß and M. Wagner 2011. on the links between employment, partnership quality, and the intention to have a first child: the case of West Germany. *Demographic Research* 24(24): 579–610.*

[10] All studies marked with an asterisk have been considered for our meta-analysis.

Berrington, A. 2004. Perpetual postponers? Women's, men's and couple's fertility intentions and subsequent fertility behaviour. *Population trends* 117: 9–19.*

Billari, F. C., D. Philipov and M. R. Testa 2009. Attitudes, norms and perceived behavioural control: Explaining fertility intentions in Bulgaria. *European Journal of Population/Revue européenne de Démographie* 25(4): 439–465.

Billari, F. C. and D. Philipov 2004. Education and transition to motherhood: a comparative analysis of Western Europe. European Demographic Research Papers No. 3. Vienna Institute of Demography.

Björklund, A. 2006. Does family policy affect fertility? *Journal of Population Economics* 19: 3–24.

Blettner, Maria, Willi Sauerbrei, Brigitte Schlehofer, Thomas Scheuchenpflug, and Christine Friedenreich 1999. Traditional reviews, meta-analyses and pooled analyses in epidemiology, International *Journal of Epidemiology* 28(1): 1–9.

Blossfeld, H.-P. and J. Huinink 1991. Human capital investments or norms of role transition? How women's schooling and career affect the process of family formation. *American Journal of Sociology* 97: 143–168.

Borenstein, M., L. Hedges, J. Higgins and H. Rothstein 2010. A basic introduction to fixed-effect and random-effect models for meta-analysis, *Research Synthesis Methods* 1/2010: 97–111.

Bühler, C. and E. Fratczak 2005. Social capital and fertility intentions: the case of Poland. *Working Paper* No. 2004-012.*

Bühler, C. and E. Fratczak 2007. Learning from others and receiving support: The impact of personal networks on fertility intentions in Poland. *European Societies* 9(3): 359–382.

Castro-Martín, T. and T. Martín-García 2013. The fertility gap in Spain: late parenthood, few children and unfulfilled reproductive desires. In: Esping-Andersen, G. (ed.) *The Fertility Gap in Europe: Singularities of the Spanish Case.* Barcelona: "la Caixa" Welfare Projects. 45–81.

Caltabiano, M., M. Castiglioni and A. Rosina 2009. Lowest-low fertility: signs of a recovery in Italy? *Demographic Research* 21(23): 681–718.

Cavalli, L. 2012. Fertility Intentions of Employed Mothers in Italy: Does the Choice of Public versus Private Sector Matter? *Working Paper* No. 27, University of Verona.*

Cook, T. D., L. C. Leviton 1980. Reviewing the literature: a comparison of traditional methods with meta-analysis. *Journal of Personality* 48: 449–472.

De Wachter, D. and K. Neels 2011. Educational differentials in fertility intentions and outcomes: family formation in Flanders in the early 1990s. *Vienna Yearbook of Population Research* 9: 227–258.

Dharmalingam, A. and S. P. Morgan 2004. Pervasive Muslim–Hindu Fertility Differences in India. *Demography* 41(3): 529–545.

Dibaba, Y. 2009. Factors influencing women's intention to limit child bearing in Oromia, Ethiopia. *Ethiopian Journal of Health Development* 23(1): 28–33.

Dommaraju, P. and V. Agadjanian 2009. India's North–South divide and theories of fertility change. *Journal of Population Research* 26(3): 249–272.

Dommermuth, L., J. Klobas and T. Lappegård 2011. Now or later? The theory of planned behavior and timing of fertility intentions. *Advances in Life Course Research* 16(1): 42–53.*

Duvander, A. Z., T. Lappegård and G. Andersson 2010. Family policy and fertility: fathers' and mothers' use of parental leave and continued childbearing in Norway and Sweden. *Journal of European Social Policy* 20(1): 45–57.

Edmonston, B., S. M. Lee and Z. Wu 2010. Fertility intentions in Canada: change or no change? *Canadian Studies in Population* 37(3-4): 297–337.

Esping-Andersen, G. 1999. *Social foundations of postindustrial economies*. New York: Oxford University Press.

Esping-Andersen, G. (ed.) 2013. *The fertility gap in Europe: singularities of the Spanish case.* Barcelona: "la Caixa" Welfare Projects.

Fiori, F. 2011. Do childcare arrangements make the difference? A multilevel approach to the intention of having a second child in Italy. *Population, Space and Place* 17(5): 579–596.*

Hanappi, D., VA. Ryser and L. Bernardi 2014. Coping strategies under uncertain, precarious employment conditions in Switzerland, *Families and Societies*, *Working Paper Series* 12.*

Hassen, M. A. 2013. Assessment of Sexual Behavior, Unmet Reproductive Health Needs and Fertility Intention of People Living with HIV/AIDS, Jimma, South West of Ethiopia. *Global Journal of Medical Research* 13(2): 24–33.

Hayford, S. R. 2009. The evolution of fertility expectations over the life course. *Demography* 46(4): 765–783.

Hayford, S. R. and V. Agadjanian 2011. Uncertain future, non-numeric preferences, and the fertility transition: A case study of rural Mozambique, *African Population Studies* 25(2): 419–439.

Hayford, S. R. and S. P. Morgan 2008. Religiosity and fertility in the United States: The role of fertility intentions. *Social Forces* 86(3): 1163–1188.

Heard, I., R. Sitta and F. Lert 2007. Reproductive choice in men and women living with HIV: evidence from a large representative sample of outpatients attending French hospitals (ANRS-EN12-VESPA Study). *Aids* 21: S77–S82.*

Hedges, L. V. and I. Olkin 1985. *Statistical methods for meta-analysis*. Orlando, FL: Academic.*

Heiland, F., A. Prskawetz and W. C. Sanderson 2008. Are individuals' desired family sizes stable? Evidence from West German panel data. *European Journal of Population/Revue Européenne de Démographie* 24(2): 129–156.*

Hiekel, N. and T. Castro-Martín 2014. Grasping the diversity of cohabitation: fertility intentions among cohabiters across Europe. *Journal of Marriage and Family* 76(3), 489–505.

Hoem, J. M., Neyer and G. Andersson 2006. Education and childlessness: the relationship between educational field, educational level, and childlessness among Swedish women born in 1955-59. *Demographic Research* 14(15): 331–380.

Iacovou, M. and Tavares L. P. 2011. Yearning, learning and conceding: reasons men and women change their childbearing intentions. *Population and Development Review* 37(1): 89–123.

Johnson-Hanks, J. A., C. A. Bachrach, S. P. Morgan, H.-P. Kohler 2011. *Understanding family change and variation: toward a theory of conjunctural action*. Springer.

Kocourková, J. 2002. Leave arrangements and childcare services in Central Europe: policies and practices before and after the transition. *Community, Work & Family* 5(3): 301–318.

Kharkova, T. L. and E. M. Andreev 2000. Did the economic crisis cause the fertility decline in Russia: Evidence from the 1994 Microcensus. *European Journal of Population/Revue Européenne de Démographie* 16(3): 211–233.

Kipp, W., J. Heys, G. S. Jhangri, A. Alibhai and T. Rubaale 2011. Impact of antiretroviral therapy on fertility desires among HIV-infected persons in rural Uganda. *Reproductive Health* 8(1): 27.

Kohler, H-P., F. C. Billari and J. A. Ortega 2002. The emergence of lowest-low fertility in Europe during the 1990s. *Population and Development Review* 28(4): 641–680.

Kohler, HP., J. L. Rodgers 2003. Education, fertility, and heritability: explaining a paradox. In: Sobotka, T. 2009. Sub-replacement fertility intentions in Austria. *European Journal of Population* 25(4): 387–412.

Korpi, W. 2000. Faces of inequality: gender, class and patterns of inequalities in different types of welfare states. Luxembourg Income Study. *Working Paper* No. 224.

König, S. 2011. Higher order births in Germany and Hungary, *MZES Working Paper*, 146, Mannheim.*

Kravdal, Ø. and R. R. Rindfuss 2008. Changing relationship between education and fertility: a study of women and men born 1940 to 1964. *American Sociological Review* 73(5): 854–873.

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(2): 15–48.

Lambert, S. M., P. Masson and H. Fisch 2006. The male biological clock. *World Journal of Urology* 24(6): 611–617.

Lappegård, T. 2012. Gender ideology and fertility intentions across Europe. In *Population Association of America* (p.1–4).

Lappegård, T., M. Ronsen and K. Skrede 2011. Fatherhood and fertility. *Fathering: a Journal of Theory, Research and Practice about Men as Fathers* 9(1): 103–120.

Leibenstein, H. 1974. An interpretation of the economic theory of fertility: Promising path or blind alley? *Journal of Economic Literature* 12(2): 457–479.

Lesthaeghe, R. and J. Surkyn 1988. Cultural dynamics and economic theories of fertility change. *Population and Development Review* 14(1): 1–45.

Lesthaeghe, R. 2010. *The unfolding story of the second demographic transition*. Michigan: Population Studies Center (Research Report No. 10-696).

Liefbroer A. C. 2009. Changes in family size intentions across young adulthood: a life course perspective. *European Journal of Population* 25(4): 363–386.

Liefbroer A. C. and M. Corijn 1999. Who, what, where and when? Specifying the impact of educational attainment and labour force participation on family formation. *European Journal of Population* 15(1): 45–75.

Lipsey, Mark W. and David B. Wilson 2001. *Practical meta-analysis*. London and New Delhi: Sage.

Mahmood, N. 1992. The desire for additional children among Pakistani women: The determinants. *The Pakistan Development Review* 1–30.

Marcellin, F., C. Protopopescu, C. Abé, S. Boyer, J. Blanche, P. Ongolo-Zogo and the EVAL Study Group 2010. Desire for a child among HIV-infected women receiving antiretroviral therapy in Cameroon: results from the national survey EVAL (ANRS 12-116). *Aids Care* 22(4): 441–451.

Martin-Garcia, T. 2008. 'Bringing men back in': a re-examination of the impact of type of education and educational enrolment on first births in Spain. *European Sociological Review* 25(2): 199–213.

Morgan, S. P. and M. G. Taylor 2006. Low fertility at the turn of the twenty-first century. *Annual Review of Sociology* 1(32): 375–399.

Matysiak, A. and D. Vignoli 2008. Fertility and women's employment – a meta-analysis. European *Journal of Population Revue Européenne de Démographie* 24(4): 363–384.

Mencarini, L., S. Salvini, L. Secondi and D. Vignoli 2010. Having children in Italy: from intentions to realizations. *Working Paper*, Universita di Torino: Collegio Carlo Alberto, 1–8.*

Miettinen, A., S. Basten and A. Rotkirch 2011. Gender equality and fertility intentions revisited: evidence from Finland. *Demographic Research* 24(20): 469–496.*

Miller, W. B. 2011. Fertility desires and intentions: construct differences and the modeling of fertility outcomes. Presented at the conference *From Intentions to Behaviour: Reproductive Decision-making in a Macro-micro Perspective* organized by the Vienna Institute of Demography and the international project REPRO and taking place in Vienna, Austria on December 2-3, 2010.

Mills, M., L. Mencarini, M. L. Tanturri and K. Begall 2008. Gender equity and fertility intentions in Italy and the Netherlands. *Demographic Research* 18(1): 1–26.*

McQuillan, J., A. L. Greil, K. M. Shreffler and A. V. Bedrous 2014. The importance of motherhood and fertility intentions among U.S. women. *Sociological Perspectives* 6: 1–16.

Muresan, C. and J. M. Hoem 2010. The negative educational gradients in Romanian fertility. *Demographic Research* 22(4): 95–114.

Musick, K., P. England, S. Edgington and N. Kangas 2009. Education differences in intended and unintended fertility. *Social Forces* 88(2): 543–572.

Namboodiri 1983. Sequential fertility decision making and the life course. In *Determinants of fertility in developing countries. Volume 2. Fertility regulation and institutional influences*, eds R. A. Bulatao and R. D. Lee, 444–472. New York: Academic Press.

Neyer, G. 2013. Welfare states, family policies, and fertility in Europe. In *The demography of Europe* (pp. 29–53). Springer Netherlands.

Ní Bhrolcháin, M. and É. Beaujouan 2011. Uncertainty in fertility intentions in Britain, 1979-2007. *Vienna Yearbook of Population Research* 9: 99–129.*

Ní Bhrolcháin, M. and É. Beaujouan 2012. Fertility postponement is largely due to rising educational enrolment. *Population Studies* 66(3): 311–327.

Nóbrega, A. A., F. A. Oliveira, M. T. Galvão, R. S. Mota, R. M. Barbosa, I. Dourado, … and L. R. Kerr-Pontes 2007. Desire for a child among women living with HIV/AIDS in Northeast Brazil. *AIDS Patient Care and STDs* 21(4): 261–267.

Oluwaseyi, A. T. 2013. Fertility intention and contraceptive use among males in Nigeria. Doctoral dissertation.

Oppenheimer, V. K. 1988. A Theory of Marriage Timing. *The American Journal of Sociology*, 94: 563–591.

Pailhé, A. 2009. Work-family balance and childbearing intentions in France, Germany and the Russian Federation. In *How Generations and gender shape demographic change. Towards policies based on better knowledge*. Conference Proceedings. Geneva 14–16 May 2008. United Nations Economic Commission for Europe (UNECE): 57–82.*

Paiva, V., N. Santos, I. França-Junior, E. Filipe, J. R. Ayres and A. Segurado 2007. Desire to have children: gender and reproductive rights of men and women living with HIV: a challenge to health care in Brazil. *AIDS Patient Care and STDs* 21(4): 268–277.

Park, S. M. 2012. Social networks and second-childbirth intentions of Korean married women. *Journal of Reproductive and Infant Psychology* 30(4): 398–412.

Philipov, D. 2011. Theories of fertility intentions: a demographer's perspective. *Vienna Yearbook for Population Research* 9: 37–45.

Philipov, D. 2002. Fertility in times of discontinuous societal change: the case of Central and Eastern Europe. Working Paper WP, 24.*

Philipov, D., Z. Spéder and F. C. Billari 2005. Now or later fertility intentions in Bulgaria and Hungary and the impact of anomie and social capital, Working Paper 82005, Vienna Institute of Demography.*

Philipov, D., Z. Spéder and F. C. Billari 2006. Soon, later, or ever? The impact of anomie and social capital on fertility intentions in Bulgaria (2002) and Hungary (2001).*Population Studies* 60(3): 289–308.*

Rindfuss, R. R., S. P. Morgan and K. Outt 1996. Education and the changing pattern of American fertility: 1963-1989. *Demography* 33(3): 277–290.

Rinesi, F., A. Pinnelli, S. Prati, C. Castagnaro and C. Iaccarino 2011. The transition to second child in Italy expectations and realization. *Population* 66(2): 391–405.*

Ruokolainen, A. and I. L. Notkola 2002. Familial, situational and attitudinal determinants of third-birth intentions and their uncertainty. *Yearbook of Population Research in Finland* 38: 179–206.

Schmitt, C. 2012. Labour market integration, occupational uncertainty, and fertility choices in Germany and the UK. *Demographic Research* 26(12): 253–292.*

Sobotka, T. 2009. Sub-replacement fertility intentions in Austria. *European Journal of Population/Revue Européenne de Démographie* 25(4): 387–412.

Sterne, J. A. C. (ed.) 2009. Meta-analysis in Stata: an updated collection from the Stata Journal. Stata Press.*

Sweet, J. A. and R. R. Rindfuss 1983. Those ubiquitous fertility trends: United States, 1945-1979. *Social Biology* 30(2): 127–139.

Tamene, W. and M. Fantahun 2007. Fertility desire and family-planning demand among HIV-positive women and men undergoing antiretroviral treatment in Addis Ababa, Ethiopia. *African Journal of AIDS research* 6(3): 223–227.

Tanskanen, A. and A. Rotkirch 2014. The impact of grandparental investment on mothers' fertility intentions in four European countries. *Demographic Research* 31(1): 1–26.

Tesching, K. 2012. *Education and Fertility. Dynamic Interrelations Between Women's Educational Level, Educational Field and Fertility in Sweden*. Doctoral Thesis in Sociological Demography. Stockholm University. Demographic Unit. Dissertation Series No. 6.

Tesfaye, L., M. Admassu, A. Getachew and H. R. Sharma 2012. Fertility desires and family planning demand among HIV-positive clients in follow-up care at antiretroviral treatment unit in Gondar University hospital, Ethiopia. *Vulnerable Children and Youth Studies* 7(1): 20–35.*

Testa, M. R. and L. Grilli 2006. The influence of childbearing regional contexts on ideal family size in Europe. *Population* 61(1): 99–127.

Testa, M. R. 2010. Child-number and child-timing intentions in a micro-macro European framework. *European Demographic Research Paper*, 4. Vienna Institute of Demography of the Austrian Academy of Sciences.*

Testa, M. R. 2012a. Family sizes in Europe: evidence from the 2011 Eurobarometer survey. *European Demographic Research Papers*, 2, Vienna Institute of Demography of the Austrian Academy of Sciences.

Testa, M. R. 2012b. Women's fertility intentions and level of education: why are they positively correlated in Europe. *European Demographic Research Papers*, 3. Vienna Institute of Demography of the Austrian Academy of Sciences.

Testa, M. R. 2012c. Couple disagreement about short-term fertility desires in Austria: effects on intentions and contraceptive behaviour. *Demographic Research* 26(3): 63–98.*

Thévenon, O. 2008. Family policies in Europe: available databases and initial comparisons. *Vienna Yearbook of Population Research* 6: 165–177.

Thomson, R. and C. Lee 2011. Sooner or later? Young Australian men's perspectives on timing of parenthood. *Journal of Health Psychology* 16(5): 807–818.

Van de Kaa, D. 2002. The idea of a second demographic transition in industrialized countries. Paper presented at the Sixth Welfare Policy Seminar of the National Institute of Population and Social Security, Tokyo, Japan, January 29.

Wachter, K. W. and R. A. Bulatao (eds) 2003. Offspring: human fertility behavior in biodemographic perspective. Washington: National Academic Press: 46–90.

Waldforf, Brigitte and Byun Pillsung 2005. Meta-analysis of the impact of age structure on fertility. *Journal of Population Economics* 18: 15–40.

Wampler, K. 1982. Bringing the review of literature into the age of quantification: meta-analysis as a strategy for integrating research findings in family studies. *Journal of Marriage and the Family* 44: 1009–1023.

Wu, Z. and H. Wang 1998. Third birth intentions and uncertainty in Canada. *Biodemography and Social Biology* 45(1-2): 96–112.

Yeatman, S., C. Sennott and S. Culpepper 2013. Young women's dynamic family size preferences in the context of transitioning fertility. *Demography* 50(5): 1715–1737.

Yu, P. 2006. Higher education, the bane of fertility? An investigation with the HILDA Survey. *Working Paper*, Australian National University.